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Isospin sum rules for bottom-baryon weak decays

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Abstract Isospin symmetry, as the most precise flavor symmetry, can be used to extract information about hadronic dynamics. The effective Hamiltonian operators of bottom quark weak decays are zero under a series of isospin lowering operators I_-^n, which permits us to generate isospin sum rules without the Wigner–Eckart invariants. In this work, we derive hundreds of isospin sum rules for the two- and three-body non-leptonic decays of bottom baryons. They provide hints for new decay modes and the isospin partners of pentaquark states.

1 Introduction

Bottom baryon decays provide ideal laboratories for studying strong and weak interactions in heavy-to-light baryonic transitions. In recent years, a number of bottom-baryon decay modes have been observed at the Large Hadron Collider (LHC) [1], allowing us to extract information about the dynamics of bottom-baryon decays. Flavor symmetry is a powerful tool for analyzing weak decays of heavy hadrons. Flavor symmetry analysis has been applied to bottom baryon decays in the literature [2–10]. Flavor symmetry results in certain relations between several decay modes, known as flavor sum rules. Isospin symmetry is the most precise flavor symmetry. Isospin breaking is naively expected to be $\delta_I \simeq (m_u - m_d)/\Lambda_{\rm QCD} \sim 1\%$. Isospin sum rules may provide hints for the isospin partners of exotic hadrons through bottom baryon decays.

In Refs. [11–13], we propose a simple approach to generate isospin sum rules for heavy hadron decays, in which the Wigner–Eckart invariants [14,15] are not needed. The effective Hamiltonian operators of heavy quark weak decays are zero under isospin lowering operators I_-^n. This fact allows us to generate isospin sum rules by acting with I_-^n on the initial and final states of heavy hadron weak decays. In this work, we apply this approach to bottom baryon decays, and we derive master formulas for generating isospin sum rules for two- and three-body bottom baryon decays. Many new isospin sum rules are obtained from these master formulas.

The rest of this paper is structured as follows. The theoretical framework for generating isospin sum rules for b-baryon decays is presented in Sect. 2, and phenomenological analysis of the isospin sum rules is discussed in Sect. 3. Section 4 provides a brief summary. The coefficient matrices generated by I_- operating on hadron states and decay modes are listed in Appendix A. The isospin sum rules for two- and three-body b-baryon decays are listed in Appendices B and C, respectively.

2 Theoretical framework

Taking the $\mathcal{B}_b \to D\mathcal{B}_8$ decays (where D is a charm meson and $\mathcal{B}_8$ is a light octet baryon) as examples, we demonstrate the basic idea of generating isospin sum rules by I_-^n as follows. In the $SU(3)$ picture, the effective Hamiltonian of the $b \to c\bar{u}q$ transition can be written as

$$\mathcal{H}_{\rm eff} = \sum_{i,j=1}^{3} H^i_j O^i_j, \tag{1}$$

where O^i_j denotes the four-quark operator and H is the 3×3 coefficient matrix. The initial and final states of the weak decay, such as the light octet baryon, can be written as

$$|\mathcal{B}_8^\alpha\rangle = (\mathcal{B}_8^\alpha)^i_j |[\mathcal{B}_8]^i_j\rangle, \tag{2}$$

where $|[\mathcal{B}_8]^i_j\rangle$ is the quark composition of the meson state and $(\mathcal{B}_8^\alpha)$ is the coefficient matrix. The decay amplitude for

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the $\mathcal{B}_b^\gamma \to D^\alpha \mathcal{B}_8^\beta$ mode is constructed as

$$\begin{aligned}\mathcal{A}(\mathcal{B}_b^\gamma \to D^\alpha \mathcal{B}_8^\beta) &= \langle D^\alpha \mathcal{B}_8^\beta | \mathcal{H}_{\rm eff} | \mathcal{B}_b^\gamma \rangle \\ &= \sum_\omega (D^\alpha)^n \langle D^n | (\mathcal{B}_8^\beta)^l_m \langle [\mathcal{B}_8]^l_m || H^j_k O^j_k || (\mathcal{B}_b^\gamma)_i | [\mathcal{B}_b]_i \rangle \\ &= \sum_\omega \langle D^n [\mathcal{B}_8]^l_m | O^j_k | [\mathcal{B}_b]_i \rangle \times (D^\alpha)^n (\mathcal{B}_8^\beta)^l_m H^j_k (\mathcal{B}_b^\gamma)_i \\ &= \sum_\omega X_\omega (C_\omega)^{\alpha\beta\gamma}, \end{aligned} \tag{3}$$

where $\sum_\omega$ represents summing over all full contractions of tensor $\langle D^n [\mathcal{B}_8]^l_m | O^j_k | [\mathcal{B}_b]_i \rangle$, i.e., the invariant tensor such as $\langle D^i [\mathcal{B}_8]^k_j | O^j_k | [\mathcal{B}_b]_i \rangle$, etc. According to the Wigner–Eckart theorem [14,15], the invariant tensor X_ω is independent of decay channels, i.e., indices α, β and γ. All the information for initial/final states is absorbed into the Clebsch–Gordan coefficient $(C_\omega)^{\alpha\beta\gamma}$.

The isospin lowering operator I_- is

$$I_- = \begin{pmatrix} 0 & 0 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}. \tag{4}$$

If the effective Hamiltonian (1) is zero under a series of operators I_-^n, i.e., $I_-^n H = I_-\{I_- \dots \{I_- H\} \dots\} = 0$, we have

$$\begin{aligned}\langle D^\alpha \mathcal{B}_8^\beta | I_-^n \mathcal{H}_{\rm eff} | \mathcal{B}_b^\gamma \rangle &= \sum_\omega \langle D^n [\mathcal{B}_8]^l_m | O^j_k | [\mathcal{B}_b]_i \rangle \\ &\times (D^\alpha)^n (\mathcal{B}_8^\beta)^l_m (I_-^n H)^j_k (\mathcal{B}_b^\gamma)_i = 0, \end{aligned} \tag{5}$$

since zero multiplied by any quantity is zero. The times of operation n is obtained through the following calculations. The effective Hamiltonian of the $b \to c\bar{u}q$ transition is given by [16]

$$\mathcal{H}_{\rm eff} = \frac{G_F}{\sqrt{2}} \sum_{q=d,s} V_{cb} V^*_{uq} \left[C_1(\mu) O_1(\mu) + C_2(\mu) O_2(\mu) \right] + h.c., \tag{6}$$

where O_1 and O_2 are

$$\begin{aligned} O_1 &= (\bar{q}_\alpha u_\beta)_{V-A} (\bar{c}_\beta b_\alpha)_{V-A}, \\ O_2 &= (\bar{q}_\alpha u_\alpha)_{V-A} (\bar{c}_\beta b_\beta)_{V-A}. \end{aligned} \tag{7}$$

In the $SU(3)$ picture, the nonzero coefficient of O^i_j includes

$$H^2_1 = V_{cb} V^*_{ud}, \qquad H^3_1 = V_{cb} V^*_{us}. \tag{8}$$

H^2_1 and H^3_1 are responding to the $b \to c\bar{u}d$ and $b \to c\bar{u}s$ transitions, respectively. Operator O^i_j can be decomposed into irreducible representations as $3 \otimes \overline{3} = 8 \oplus 1$. The coefficient matrices $H(8)$ and $H(1)$ are

$$H(8) = \begin{pmatrix} 0 & V_{cb}V^*_{ud} & V_{cb}V^*_{us} \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \quad \text{and} \quad H(1) = 0. \tag{9}$$

Under I_-^n, $H(8)$ is transformed as

$$\begin{aligned} I_-\, H(8) &= I_- \cdot H(8) - H(8) \\ &\cdot I_- = \begin{pmatrix} -V_{cb}V^*_{ud} & 0 & 0 \\ 0 & V_{cb}V^*_{ud} & V_{cb}V^*_{us} \\ 0 & 0 & 0 \end{pmatrix}, \end{aligned} \tag{10}$$

$$I_-^2\, H(8) = I_-\{I_-\, H(8)\} = \begin{pmatrix} 0 & 0 & 0 \\ -2V_{cb}V^*_{ud} & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \tag{11}$$

$$I_-^3\, H(8) = I_-\{I_-\{I_-\, H(8)\}\} = 0. \tag{12}$$

Thus, the effective Hamiltonian of the $b \to c\bar{u}d$ ($b \to c\bar{u}s$) transition is zero under I_-^n with $n \geq 3$ ($n \geq 2$).

On the other hand, if we apply I_-^n to the initial and final states, the LHS of Eq. (5) becomes

$$\begin{aligned} \langle D^\alpha \mathcal{B}_8^\beta | I_-^n \mathcal{H}_{\rm eff} | \mathcal{B}_b^\gamma \rangle = \sum_\omega \langle D^n [\mathcal{B}_8]^l_m | O^j_k | [\mathcal{B}_b]_i \rangle \\ \times \Big[(I_-^n (D^\alpha))^n (\mathcal{B}_8^\beta)^l_m H^j_k (\mathcal{B}_b^\gamma)_i \\ + (D^\alpha)^n (I_-^n (\mathcal{B}_8^\beta))^l_m H^j_k (\mathcal{B}_b^\gamma)_i \\ + (D^\alpha)^n (\mathcal{B}_8^\beta)^l_m H^j_k (I_-^n (\mathcal{B}_b^\gamma))_i \Big], \end{aligned} \tag{13}$$

and the RHS of Eq. (5) is still zero since $\langle D^\alpha \mathcal{B}_8^\beta | I_-^n \mathcal{H}_{\rm eff} | \mathcal{B}_b^\gamma \rangle$ is invariant. One can expand the matrices $I_-^n (D^\alpha)$, $I_-^n (\mathcal{B}_8^\beta)$, and $I_-^n (\mathcal{B}_b^\gamma)$ by the coefficient matrices of the initial and final states. Then Eq. (13) becomes a sum of decay amplitudes with appropriate factors. For example, the equation

$$\begin{aligned} I_- (\mathcal{B}_8^{\Sigma^+}) &= I_- \cdot (\mathcal{B}_8^{\Sigma^+}) - (\mathcal{B}_8^{\Sigma^+}) \cdot I_- \\ &= \begin{pmatrix} 0&0&0 \\ 1&0&0 \\ 0&0&0 \end{pmatrix} \cdot \begin{pmatrix} 0&1&0 \\ 0&0&0 \\ 0&0&0 \end{pmatrix} - \begin{pmatrix} 0&1&0 \\ 0&0&0 \\ 0&0&0 \end{pmatrix} \cdot \begin{pmatrix} 0&0&0 \\ 1&0&0 \\ 0&0&0 \end{pmatrix} \\ &= \begin{pmatrix} -1&0&0 \\ 0&1&0 \\ 0&0&0 \end{pmatrix} = -\sqrt{2} \begin{pmatrix} 1/\sqrt{2} & 0 & 0 \\ 0 & -1/\sqrt{2} & 0 \\ 0 & 0 & 0 \end{pmatrix} \\ &= -\sqrt{2}\, (\mathcal{B}_8^{\Sigma^0}) \end{aligned} \tag{14}$$

indicates that

$$\langle D^\alpha \Sigma^+ | I_- \mathcal{H}_{\rm eff} | \mathcal{B}_b^\gamma \rangle = \sum_\omega \langle D^n [\mathcal{B}_8]^l_m | O^j_k | [\mathcal{B}_b]_i \rangle \times [\cdots - \sqrt{2} (D^\alpha)^n (\mathcal{B}_8^{\Sigma^0})^l_m H^j_k (\mathcal{B}_b^\gamma)_i + \cdots]$$

$$= \cdots - \sqrt{2}\,\mathcal{A}(\mathcal{B}_b^{\gamma} \to D^{\alpha}\Sigma^0) \ \ldots . \tag{15}$$

Summing over all the contributions arising from $I_-\,(D^{\alpha})$, $I_-\,(\mathcal{B}_8^{\beta})$, and $I_-\,(\mathcal{B}_b^{\gamma})$, the sum of decay amplitudes generated by I_- for the $\mathcal{B}_b^{\gamma} \to D^{\alpha}\mathcal{B}_8^{\beta}$ mode is derived to be

$$\begin{aligned} &Sum I_-[\gamma,\alpha,\beta] \\ &= \sum_{\mu}\Big[-\{[I_-]_D\}_{\alpha}^{\mu}\mathcal{A}_{\gamma\to\mu\beta} \\ &\quad +\{[I_-]_{\mathcal{B}_8}\}_{\beta}^{\mu}\mathcal{A}_{\gamma\to\alpha\mu} + \{[I_-]_{\mathcal{B}_b}\}_{\gamma}^{\mu}\mathcal{A}_{\mu\to\alpha\beta}\Big], \end{aligned} \tag{16}$$

in which $[I_-]_D$, $[I_-]_{\mathcal{B}_8}$, and $[I_-]_{\mathcal{B}_b}$ are the coefficient matrices given in Appendix A, and $\mathcal{A}_{\gamma\to\mu\beta}$, $\mathcal{A}_{\gamma\to\alpha\mu}$, and $\mathcal{A}_{\mu\to\alpha\beta}$ are the decay amplitudes of the $\mathcal{B}_b^{\gamma} \to D^{\mu}\mathcal{B}_8^{\beta}$, $\mathcal{B}_b^{\gamma} \to D^{\alpha}\mathcal{B}_8^{\mu}$, and $\mathcal{B}_b^{\mu} \to D^{\alpha}\mathcal{B}_8^{\beta}$ modes, respectively. The minus sign in the first term matches the minus sign in I_- operating on the octet baryon, where $I_-\langle\mathcal{B}_8| = I_-\cdot\langle\mathcal{B}_8| - \langle\mathcal{B}_8|\cdot I_-$. One can apply Eq. (16) three times (two times) or more with appropriate α, β, and γ to obtain an isospin sum rule for the $b \to c\bar{u}d$ ($b \to c\bar{u}s$) modes.

It is found in Refs. [11,13] that the effective Hamiltonian operators for the $b \to c\bar{u}d$, $b \to c\bar{u}s$, $b \to u\bar{u}d$, $b \to u\bar{u}s$, $b \to c\bar{c}d$, $b \to c\bar{c}s$, $b \to u\bar{c}d$, and $b \to u\bar{c}s$ transitions are zero under I_-^n with $n \geq 3$, $n \geq 2$, $n \geq 3$, $n \geq 2$, $n \geq 2$, $n \geq 1$, $n \geq 2$, and $n \geq 1$, respectively. The values of n for which $I_-^n H = 0$ holds for all types of transitions are listed in Table 1. Similarly to Eq. (16), the summations of amplitudes for other b-baryon decay modes generated by I_- can be obtained using the coefficient matrices given in Appendix A. It is noted that minus signs should be introduced for the D meson and the anti-triplet charmed baryon to match the minus sign of the commutator in meson and baryon octets.

The isospin sum rules for two- and three-body b-baryon decays are listed in Appendices B and C, respectively. Many isospin sum rules are derived for the first time. One can verify these isospin sum rules by writing the isospin amplitudes for each decay mode and substituting them into the isospin sum rules to check whether they are zero. The isospin sum rules (B28)$\sim$(B37) were found in Refs. [5,6], and (B36) was also found in Ref. [4]. The relative minus signs between Refs. [5,6] and this work arise from the different conventions of initial and final states.

It is noted that the order of final states in the isospin sum rules for three-body decays cannot be exchanged arbitrarily; otherwise the isospin relations of intermediate resonance strong decays are violated [12]. The isospin sum rules listed in Appendices B and C are valid for excited states. For example, the pseudoscalar mesons π and K in the isospin sum rules can be replaced by the corresponding vector mesons ρ and K^*.

The decay modes dominated by the $b \to c\bar{c}d/s$ ($b \to u\bar{u}d/s$) transitions also receive contributions from the $b \to u\bar{u}d/s$ ($b \to c\bar{c}d/s$) transitions. According to Table 1, the isospin sum rules derived from $I_-^n H_{u\bar{u}d/s} = 0$ are not violated by the $b \to c\bar{c}d/s$ transitions, but the isospin sum rules derived from $I_-^n H_{c\bar{c}d/s} = 0$ are violated by the $b \to u\bar{u}d/s$ contributions. The breaking induced by $I_-^n H_{u\bar{u}s} \neq 0$ and $I_-^n H_{u\bar{u}d} \neq 0$ is naively predicted to be $(V_{ub}V_{us})/(V_{cb}V_{cs}) \sim \mathcal{O}(1\%)$ and $(V_{ub}V_{ud})/(V_{cb}V_{cd}) \sim \mathcal{O}(10\%)$, respectively. Thus, we discarded the isospin sum rules derived from $I_-^n H_{c\bar{c}d} = 0$ where $I_-^n H_{u\bar{u}d} \neq 0$, while retaining the isospin sum rules derived from $I_-^n H_{c\bar{c}s} = 0$ where $I_-^n H_{u\bar{u}s} \neq 0$ in Appendices B1 and C1.

3 Phenomenological analysis

The isospin sum rules are useful tools in the phenomenological analysis of bottom baryon decays. The decay amplitude for the $\mathcal{B}_b \to \mathcal{B}M$ mode is given by

$$\mathcal{A}(\mathcal{B}_b \to \mathcal{B}M) = i\bar{u}_{\mathcal{B}}(A - B\gamma_5)u_{\mathcal{B}_b}, \tag{17}$$

where A and B are the parity-violating S-wave and parity-conserving P-wave amplitudes with strong phases δ_S and δ_P, respectively. The decay width Γ and Lee-Yang parameters α', β', and γ' are computed as

$$\begin{aligned} \Gamma &= \frac{p_c}{8\pi}\frac{(m_{\mathcal{B}_b}+m_{\mathcal{B}})^2 - m_M^2}{m_{\mathcal{B}_b}^2}\left(|A|^2 + \kappa^2|B|^2\right), \\ \alpha' &= \frac{2\kappa|A^*B|\cos(\delta_P - \delta_S)}{|A|^2+\kappa^2|B|^2}, \\ \beta' &= \frac{2\kappa|A^*B|\sin(\delta_P - \delta_S)}{|A|^2+\kappa^2|B|^2}, \\ \gamma' &= \frac{|A|^2-\kappa^2|B|^2}{|A|^2+\kappa^2|B|^2}, \end{aligned} \tag{18}$$

where p_c is the center of momentum (CM) three-momentum in the rest frame of the initial baryon, and κ is defined as $\kappa = p_c/(E_{\mathcal{B}} + m_{\mathcal{B}}) = \sqrt{(E_{\mathcal{B}} - m_{\mathcal{B}})/(E_{\mathcal{B}} + m_{\mathcal{B}})}$. The isospin sum rules work for all partial waves. Therefore, if two decay channels form an isospin sum rule, their branching fractions are proportional, and their decay asymmetries α', β', and γ' are identical. One can use the isospin sum rules and experimental data to test isospin symmetry and predict the branching fractions and Lee-Yang parameters of unobserved decay modes. If three decay channels form an isospin sum rule, their decay amplitudes form a triangle in the complex plane. One can use the isospin triangle to extract the relative strong phases between different modes. For three-body decays, the resonance states do not violate the isospin sum rules. The isospin sum rules can be used to study the isospin multiplets of exotic hadrons in bottom baryon decays.

Table 1 The values of n for which the Hamiltonian operators of $b \to q_1\overline{q}_2q_3$ transitions are zero under I_-^n

Mode	$b \to c\overline{u}d$	$b \to c\overline{u}s$	$b \to c\overline{c}d$	$b \to c\overline{c}s$	$b \to u\overline{u}d$	$b \to u\overline{u}s$	$b \to u\overline{c}d$	$b \to u\overline{c}s$
n	≥ 3	≥ 2	≥ 2	≥ 1	≥ 3	≥ 2	≥ 2	≥ 1

According to the isospin sum rule

$$SumI_-[\Lambda_b^0, p, J/\psi, \overline{K}^0] = \mathcal{A}(\Lambda_b^0 \to nJ/\psi\overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to pJ/\psi K^-) = 0, \tag{19}$$

and the branching fraction of $\Lambda_b^0 \to pJ/\psi K^-$ decay [1], so we predict that the branching fraction of the $\Lambda_b^0 \to nJ/\psi\overline{K}^0$ decay is

$$\mathcal{B}r(\Lambda_b^0 \to nJ/\psi\overline{K}^0) \simeq \mathcal{B}r(\Lambda_b^0 \to pJ/\psi K^-) = (3.2^{+0.6}_{-0.5}) \times 10^{-4}. \tag{20}$$

The Large Hadron Collider beauty (LHCb) collaboration reported pentaquark states $P_c(4312)^+$, $P_c(4440)^+$, and $P_c(4457)^+$ in the $\Lambda_b^0 \to P_c^+(\to pJ/\psi)K^-$ decay [17–19]. If the isospin symmetry is exact, the neutral isospin partners of these pentaquark states will contribute to the $\Lambda_b^0 \to nJ/\psi\overline{K}^0$ decay with $\Lambda_b^0 \to P_c^0(\to nJ/\psi)\overline{K}^0$. However, the isospin breaking is naively predicted to be $\mathcal{O}(1\%)$, which is comparable to the relative mass differences and decay widths of the three pentaquark states. Therefore, it is an uncertain possibility that three neutral pentaquark states contributing to the $\Lambda_b^0 \to nJ/\psi\overline{K}^0$ decay.

The recent LHCb measurement found that [20]

$$\frac{\mathcal{B}r(\Lambda_b^0 \to \Xi^- J/\psi K^+)}{\mathcal{B}r(\Lambda_b^0 \to \Lambda^0 J/\psi)} = (1.17 \pm 0.14 \pm 0.08) \times 10^{-2}. \tag{21}$$

According to the isospin sum rule

$$SumI_-[\Lambda_b^0, \Xi^0, J/\psi, K^+] = \mathcal{A}(\Lambda_b^0 \to \Xi^0 J/\psi K^0) - \mathcal{A}(\Lambda_b^0 \to \Xi^- J/\psi K^+) = 0, \tag{22}$$

the ratio $\mathcal{B}r(\Lambda_b^0 \to \Xi^0 J/\psi K^0)/\mathcal{B}r(\Lambda_b^0 \to \Lambda^0 J/\psi)$ is predicted to be $(1.17 \pm 0.16) \times 10^{-2}$. According to the following isospin sum rules given in Appendix C1,

$$\begin{aligned} SumI_-^2[\Xi_b^-, \Xi^0, J/\psi, \pi^+] = {} & 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\psi\pi^0) \\ & + \mathcal{A}(\Xi_b^0 \to \Xi^- J/\psi\pi^+) \\ & - \mathcal{A}(\Xi_b^- \to \Xi^0 J/\psi\pi^-) \\ & + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- J/\psi\pi^0)\big] \\ = {} & 0, \end{aligned} \tag{23}$$

$$\begin{aligned} SumI_-[\Xi_b^0, \Xi^0, J/\psi, \pi^+] = {} & -\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\psi\pi^0) \\ & - \mathcal{A}(\Xi_b^0 \to \Xi^- J/\psi\pi^+) = 0, \end{aligned} \tag{24}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Xi^-, J/\psi, \pi^+] = {} & -\mathcal{A}(\Xi_b^0 \to \Xi^- J/\psi\pi^+) \\ & - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- J/\psi\pi^0) \\ = {} & 0, \end{aligned} \tag{25}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Xi^0, J/\psi, \pi^0] = {} & -\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\psi\pi^0) \\ & + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^0 J/\psi\pi^-) \\ & - \mathcal{A}(\Xi_b^- \to \Xi^- J/\psi\pi^0) = 0, \end{aligned} \tag{26}$$

we obtain

$$\begin{aligned} \mathcal{A}(\Xi_b^- \to \Xi^0 J/\psi\pi^-) & = \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- J/\psi\pi^0) \\ & = \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\psi\pi^0) = -\mathcal{A}(\Xi_b^0 \to \Xi^- J/\psi\pi^+). \end{aligned} \tag{27}$$

The recent LHCb measurement showed that [20]

$$\frac{\mathcal{B}r(\Xi_b^0 \to \Xi^- J/\psi\pi^+)}{\mathcal{B}r(\Xi_b^- \to \Xi^- J/\psi)} = (11.9 \pm 1.4 \pm 0.6) \times 10^{-2}. \tag{28}$$

The ratios between other $\Xi_b \to \Xi J/\psi\pi$ modes and $\Xi_b^- \to \Xi^- J/\psi$ are predicted to be

$$\begin{aligned} \frac{\mathcal{B}r(\Xi_b^0 \to \Xi^0 J/\psi\pi^0)}{\mathcal{B}r(\Xi_b^- \to \Xi^- J/\psi)} & = (6.0 \pm 0.8) \times 10^{-2}, \\ \frac{\mathcal{B}r(\Xi_b^- \to \Xi^0 J/\psi\pi^-)}{\mathcal{B}r(\Xi_b^- \to \Xi^- J/\psi)} & = (12.6 \pm 1.6) \times 10^{-2}, \\ \frac{\mathcal{B}r(\Xi_b^- \to \Xi^- J/\psi\pi^0)}{\mathcal{B}r(\Xi_b^- \to \Xi^- J/\psi)} & = (6.3 \pm 0.8) \times 10^{-2}. \end{aligned} \tag{29}$$

4 Summary

Flavor symmetry is a powerful tool for analyzing the weak decays of heavy hadrons. Isospin symmetry is the most precise flavor symmetry. In this work, we derive isospin sum rules for the two- and three-body non-leptonic decays of bottom baryons using a systematic approach. The isospin sum rules can be used to test isospin symmetry and provide hints about new decay modes and the isospin partners of exotic hadrons.

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Code Availability Statement This manuscript has no associated code/software. [Authors' comment: Data sharing not applicable to this article as no datasets were generated or analysed during the current study.]

Appendix A: Coefficient matrices derived by I_- acting on states

The bottom-baryon anti-triplet is defined as

$$|\mathcal{B}_{b\bar{3}}\rangle = \begin{pmatrix} 0 & \Lambda_b^0 & \Xi_b^0 \\ -\Lambda_b^0 & 0 & \Xi_b^- \\ -\Xi_b^0 & -\Xi_b^- & 0 \end{pmatrix}, \tag{A1}$$

which can be expressed using the Levi-Civita tensor as

$$|\mathcal{B}_{b\bar{3}}\rangle_{ij} = \epsilon_{ijk}|\mathcal{B}_{b\bar{3}}\rangle^k \quad \text{with} \quad |\mathcal{B}_{b\bar{3}}\rangle^k = \begin{pmatrix} \Xi_b^- \\ -\Xi_b^0 \\ \Lambda_b^0 \end{pmatrix}. \tag{A2}$$

If we use the beauty baryon anti-triplet basis as $|[\mathcal{B}_{b\bar{3}}]_\beta\rangle = (|\Xi_b^-\rangle,\ |\Xi_b^0\rangle,\ |\Lambda_b^0\rangle)$, the coefficient matrix $[I_-]_{\mathcal{B}_{b\bar{3}}}$ is

$$[I_-]_{\mathcal{B}_{b\bar{3}}} = \begin{pmatrix} 0 & 0 & 0 \\ -1 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}. \tag{A3}$$

If we use the charmed baryon anti-triplet basis as $|[\mathcal{B}_{c\bar{3}}]_\beta\rangle = (|\Xi_c^0\rangle,\ |\Xi_c^+\rangle,\ |\Lambda_c^+\rangle)$, the coefficient matrix $[I_-]_{\mathcal{B}_{c\bar{3}}}$ is a transposition of Eq. (A3), $[I_-]_{\mathcal{B}_{c\bar{3}}} = [I_-]^T_{\mathcal{B}_{b\bar{3}}}$, since the anti-triplet in the final state can be regarded as a triplet in the initial state. The charm meson anti-triplet and triplet are $|D\rangle = (|D^0\rangle,\ |D^+\rangle,\ |D_s^+\rangle)$ and $|\overline{D}\rangle = (|\overline{D}^0\rangle,\ |D^-\rangle,\ |D_s^-\rangle)$, respectively. The coefficient matrix $[I_-]_D$ is derived as

$$[I_-]_D = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}, \tag{A4}$$

and $[I_-]_{\overline{D}} = [I_-]_D^T$.

The pseudoscalar meson octet is expressed as

$$|M_8\rangle = \begin{pmatrix} \frac{1}{\sqrt{2}}\pi^0 + \frac{1}{\sqrt{6}}\eta_8, & \pi^+, & K^+ \\ \pi^-, & -\frac{1}{\sqrt{2}}\pi^0 + \frac{1}{\sqrt{6}}\eta_8, & K^0 \\ K^-, & \overline{K}^0, & -\sqrt{2/3}\eta_8 \end{pmatrix}. \tag{A5}$$

If the basis of the pseudoscalar meson octet is defined as

$$\langle [M_8]_\alpha| = (\langle \pi^+|,\ \langle \pi^0|,\ \langle \pi^-|,\ \langle K^+|,\ \langle K^0|,\ \langle \overline{K}^0|,\ \langle K^-|,\ \langle \eta_8|), \tag{A6}$$

the coefficient matrix $[I_-]_{M_8}$ is

$$[I_-]_{M_8} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ -\sqrt{2} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & \sqrt{2} & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}. \tag{A7}$$

The light baryon octet is

$$|\mathcal{B}_8\rangle = \begin{pmatrix} \frac{1}{\sqrt{2}}\Sigma^0 + \frac{1}{\sqrt{6}}\Lambda^0 & \Sigma^+ & p \\ \Sigma^- & -\frac{1}{\sqrt{2}}\Sigma^0 + \frac{1}{\sqrt{6}}\Lambda^0 & n \\ \Xi^- & \Xi^0 & -\sqrt{2/3}\Lambda^0 \end{pmatrix}. \tag{A8}$$

Matrix $[I_-]_{\mathcal{B}_8}$ is the same as $[I_-]_{M_8}$ if the light baryon octet basis is defined as

$$\langle [\mathcal{B}_8]_\beta| = (\langle \Sigma^+|,\ \langle \Sigma^0|,\ \langle \Sigma^-|,\ \langle p|,\ \langle n|,\ \langle \Xi^0|,\ \langle \Xi^-|,\ \langle \Lambda^0|). \tag{A9}$$

The charmed baryon sextet is

$$|\mathcal{B}_{c6}\rangle = \begin{pmatrix} \Sigma_c^{++} & \frac{1}{\sqrt{2}}\Sigma_c^+ & \frac{1}{\sqrt{2}}\Xi_c^{*+} \\ \frac{1}{\sqrt{2}}\Sigma_c^+ & \Sigma_c^0 & \frac{1}{\sqrt{2}}\Xi_c^{*0} \\ \frac{1}{\sqrt{2}}\Xi_c^{*+} & \frac{1}{\sqrt{2}}\Xi_c^{*0} & \Omega_c^0 \end{pmatrix}. \tag{A10}$$

If we define the charmed baryon sextet basis as $\langle [\mathcal{B}_{c6}]_\beta| = (\langle \Sigma_c^{++}|,\ \langle \Sigma_c^0|,\ \langle \Omega_c^0|,\ \langle \Sigma_c^+|,\ \langle \Xi_c^{*+}|,\ \langle \Xi_c^{*0}|)$, the coefficient matrix $[I_-]_{\mathcal{B}_{c6}}$ is derived as

$$[I_-]_{\mathcal{B}_{c6}} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & \sqrt{2} & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ \sqrt{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 1 & 0 \end{pmatrix}. \tag{A11}$$

The light baryon decuplet is given by

$$|\mathcal{B}_{10}\rangle = \left(\begin{pmatrix} \Delta^{++} & \frac{1}{\sqrt{3}}\Delta^{+} & \frac{1}{\sqrt{3}}\Sigma^{*+} \\ \frac{1}{\sqrt{3}}\Delta^{+} & \frac{1}{\sqrt{3}}\Delta^{0} & \frac{1}{\sqrt{6}}\Sigma^{*0} \\ \frac{1}{\sqrt{3}}\Sigma^{*+} & \frac{1}{\sqrt{6}}\Sigma^{*0} & \frac{1}{\sqrt{3}}\Xi^{*0} \end{pmatrix} \begin{pmatrix} \frac{1}{\sqrt{3}}\Delta^{+} & \frac{1}{\sqrt{3}}\Delta^{0} & \frac{1}{\sqrt{6}}\Sigma^{*0} \\ \frac{1}{\sqrt{3}}\Delta^{0} & \Delta^{-} & \frac{1}{\sqrt{3}}\Sigma^{*-} \\ \frac{1}{\sqrt{6}}\Sigma^{*0} & \frac{1}{\sqrt{3}}\Sigma^{*-} & \frac{1}{\sqrt{3}}\Xi^{*-} \end{pmatrix} \right.$$
$$\left. \times \begin{pmatrix} \frac{1}{\sqrt{3}}\Sigma^{*+} & \frac{1}{\sqrt{6}}\Sigma^{*0} & \frac{1}{\sqrt{3}}\Xi^{*0} \\ \frac{1}{\sqrt{6}}\Sigma^{*0} & \frac{1}{\sqrt{3}}\Sigma^{*-} & \frac{1}{\sqrt{3}}\Xi^{*-} \\ \frac{1}{\sqrt{3}}\Xi^{*0} & \frac{1}{\sqrt{3}}\Xi^{*-} & \Omega^{-} \end{pmatrix} \right). \tag{A12}$$

If the light baryon decuplet basis is defined as

$$\langle[\mathcal{B}_{10}]_\beta| = (\langle\Delta^{++}|,\ \langle\Delta^{+}|,\ \langle\Delta^{0}|,\ \langle\Delta^{-}|,$$
$$\langle\Sigma^{*+}|,\ \langle\Sigma^{*0}|,\ \langle\Sigma^{*-}|,\ \langle\Xi^{*0}|,\ \langle\Xi^{*-}|,\ \langle\Omega^{-}|), \tag{A13}$$

the coefficient matrix $[I_-]_{\mathcal{B}_{10}}$ is derived as

$$[I_-]_{\mathcal{B}_{10}} = \begin{pmatrix} 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ \sqrt{3} & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & \sqrt{3} & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & \sqrt{2} & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & \sqrt{2} & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{pmatrix}. \tag{A14}$$

J/Ψ is the isospin singlet, and then $[I_-]_{J/\Psi} = 0$.

Appendix B: Isospin sum rules for two-body decays

1. $b \to c\bar{c}d/s$ modes

$$SumI_-[\Xi_b^-, \Xi^0, J/\Psi] = -\big[\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\Psi) + \mathcal{A}(\Xi_b^- \to \Xi^- J/\Psi)\big] = 0, \tag{B1}$$

$$SumI_-[\Xi_b^-, \Xi^{*0}, J/\Psi] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0} J/\Psi) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} J/\Psi) = 0, \tag{B2}$$

$$SumI_-[\Lambda_b^0, \Sigma^{*+}, J/\Psi] = \sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} J/\Psi) = 0, \tag{B3}$$

$$SumI_-[\Xi_b^-, \Xi_c^+, D_s^-] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^+ D_s^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^0 D_s^-) = 0, \tag{B4}$$

$$SumI_-[\Lambda_b^0, \Xi_c^+, \overline{D}^0] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^0 \overline{D}^0) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^+ D^-) = 0, \tag{B5}$$

$$SumI_-[\Xi_b^-, \Omega_c^0, \overline{D}^0] = -\mathcal{A}(\Xi_b^0 \to \Omega_c^0 \overline{D}^0) + \mathcal{A}(\Xi_b^- \to \Omega_c^0 D^-) = 0, \tag{B6}$$

$$SumI_-[\Xi_b^-, \Xi_c^{*+}, D_s^-] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D_s^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D_s^-) = 0, \tag{B7}$$

$$SumI_-[\Lambda_b^0, \Sigma_c^{++}, D_s^-] = \sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D_s^-) = 0, \tag{B8}$$

$$SumI_-[\Lambda_b^0, \Xi_c^{*+}, \overline{D}^0] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \overline{D}^0) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*+} D^-) = 0. \tag{B9}$$

2. $b \to c\bar{u}d/s$ modes

$$SumI_-^3[\Xi_b^-, \Sigma^+, D^+] = -6\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^- D^+) - \mathcal{A}(\Xi_b^- \to \Sigma^- D^0)\big] = 0, \tag{B10}$$

$$SumI_-^2[\Xi_b^-, \Xi^0, D^+] = 2\big[\mathcal{A}(\Xi_b^0 \to \Xi^0 D^0) + \mathcal{A}(\Xi_b^0 \to \Xi^- D^+) + \mathcal{A}(\Xi_b^- \to \Xi^- D^0)\big] = 0, \tag{B11}$$

$$SumI_-^2[\Lambda_b^0, \Sigma^+, D^+] = 2\big[\sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^0) - \mathcal{A}(\Lambda_b^0 \to \Sigma^- D^+)\big] = 0, \tag{B12}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*+}, D^+] = 6\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^+) - \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^0)\big] = 0, \tag{B13}$$

$$SumI_-^3[\Lambda_b^0, \Delta^{++}, D^+] = 2\sqrt{3}\big[\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^0) + \sqrt{3}\,\mathcal{A}(\Lambda_b^0 \to \Delta^- D^+)\big] = 0, \tag{B14}$$

$$SumI_-^2[\Xi_b^-, \Xi^{*0}, D^+] = 2\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^0) - \mathcal{A}(\Xi_b^0 \to \Xi^{*-} D^+) - \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^0)\big] = 0, \tag{B15}$$

$$SumI_-^2[\Lambda_b^0, \Sigma^{*+}, D^+] = -2\big[\sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^0) - \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D^+)\big] = 0, \tag{B16}$$

$$SumI_-^3[\Xi_b^-, \Xi_c^+, \pi^+] = 6\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Xi_c^0 \pi^0) + \mathcal{A}(\Xi_b^0 \to \Xi_c^+ \pi^-) - \mathcal{A}(\Xi_b^- \to \Xi_c^0 \pi^-)\big] = 0, \tag{B17}$$

$$SumI_-^2[\Xi_b^-, \Xi_c^+, \overline{K}^0] = 2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^+ K^-) - \mathcal{A}(\Xi_b^0 \to \Xi_c^0 \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Xi_c^0 K^-)\big] = 0, \tag{B18}$$

$$SumI_-^2[\Lambda_b^0, \Xi_c^+, \pi^+] = -2\big[\sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Xi_c^0 \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^+ \pi^-)\big] = 0, \tag{B19}$$

$$SumI_-^3[\Xi_b^-, \Sigma_c^{++}, \overline{K}^0] = 6\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ K^-) - \mathcal{A}(\Xi_b^0 \to \Sigma_c^0 \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Sigma_c^0 K^-)\big] = 0, \tag{B20}$$

$$Sum I_-^3\,[\Xi_b^-, \Xi_c^{*+}, \pi^+] = 6\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0}\pi^0) + \mathcal{A}(\Xi_b^0 \to \Xi_c^{*+}\pi^-) - \mathcal{A}(\Xi_b^- \to \Xi_c^{*0}\pi^-)\big] = 0, \quad \text{(B21)}$$

$$Sum I_-^3\,[\Lambda_b^0, \Sigma_c^{++}, \pi^+] = -6\sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0\pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma_c^+\pi^-)\big] = 0, \quad \text{(B22)}$$

$$Sum I_-^2\,[\Xi_b^-, \Omega_c^0, \pi^+] = 2\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Omega_c^0\pi^0) - \mathcal{A}(\Xi_b^- \to \Omega_c^0\pi^-)\big] = 0, \quad \text{(B23)}$$

$$Sum I_-^2\,[\Xi_b^-, \Xi_c^{*+}, \overline{K}^0] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0}\overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Xi_c^{*+}K^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*0}K^-)\big] = 0, \quad \text{(B24)}$$

$$Sum I_-^2\,[\Lambda_b^0, \Sigma_c^+, \overline{K}^0] = -2\big[\sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+K^-) - \mathcal{A}(\Lambda_b^0 \to \Sigma_c^0\overline{K}^0)\big] = 0, \quad \text{(B25)}$$

$$Sum I_-^2\,[\Lambda_b^0, \Xi_c^{*+}, \pi^+] = -2\big[\sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0}\pi^0) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*+}\pi^-)\big] = 0. \quad \text{(B26)}$$

3. $b \to u\bar{u}d/s$ modes

$$Sum I_-^3\,[\Xi_b^-, \Sigma^+, \pi^+] = 6\big[-2\,\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^+) + \mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^-) + \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^-) + \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^0)\big] = 0, \quad \text{(B27)}$$

$$Sum I_-^2\,[\Xi_b^-, \Sigma^+, \overline{K}^0] = 2\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Sigma^0\overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^+K^-) + \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^0K^-) - \mathcal{A}(\Xi_b^- \to \Sigma^-\overline{K}^0)\big] = 0, \quad \text{(B28)}$$

$$Sum I_-^2\,[\Xi_b^-, \Xi^0, \pi^+] = 2\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Xi^0\pi^0) + \mathcal{A}(\Xi_b^0 \to \Xi^-\pi^+) + \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Xi^-\pi^0) - \mathcal{A}(\Xi_b^- \to \Xi^0\pi^-)\big] = 0, \quad \text{(B29)}$$

$$Sum I_-^2\,[\Lambda_b^0, \Sigma^+, \pi^+] = 2\big[2\,\mathcal{A}(\Lambda_b^0 \to \Sigma^0\pi^0) - \mathcal{A}(\Lambda_b^0 \to \Sigma^-\pi^+) - \mathcal{A}(\Lambda_b^0 \to \Sigma^+\pi^-)\big] = 0, \quad \text{(B30)}$$

$$Sum I_-^3\,[\Xi_b^-, \Delta^{++}, \overline{K}^0] = 6\big[-\sqrt{3}\,\mathcal{A}(\Xi_b^0 \to \Delta^0\overline{K}^0) + \sqrt{3}\,\mathcal{A}(\Xi_b^0 \to \Delta^+K^-) - \sqrt{3}\,\mathcal{A}(\Xi_b^- \to \Delta^0K^-) + \mathcal{A}(\Xi_b^- \to \Delta^-\overline{K}^0)\big] = 0, \quad \text{(B31)}$$

$$Sum I_-^3\,[\Xi_b^-, \Sigma^{*+}, \pi^+] = 6\big[2\,\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*-}\pi^+) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^-) - \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^-) - \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^0)\big] = 0, \quad \text{(B32)}$$

$$Sum I_-^3\,[\Lambda_b^0, \Delta^{++}, \pi^+] = -6\big[\sqrt{6}\,\mathcal{A}(\Lambda_b^0 \to \Delta^0\pi^0) + \sqrt{3}\,\mathcal{A}(\Lambda_b^0 \to \Delta^+\pi^-) - \mathcal{A}(\Lambda_b^0 \to \Delta^-\pi^+)\big] = 0, \quad \text{(B33)}$$

$$Sum I_-^2\,[\Xi_b^-, \Sigma^{*+}, \overline{K}^0] = 2\big[-\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}K^-) - \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^{*0}K^-) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\overline{K}^0)\big] = 0, \quad \text{(B34)}$$

$$Sum I_-^2\,[\Xi_b^-, \Xi^{*0}, \pi^+] = 2\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Xi^{*0}\pi^0) - \mathcal{A}(\Xi_b^0 \to \Xi^{*-}\pi^+) - \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Xi^-\pi^0) - \mathcal{A}(\Xi_b^- \to \Xi^{*0}\pi^-)\big] = 0, \quad \text{(B35)}$$

$$Sum I_-^2\,[\Lambda_b^0, \Delta^{++}, \overline{K}^0] = 2\sqrt{3}\big[\mathcal{A}(\Lambda_b^0 \to \Delta^0\overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to \Delta^+K^-)\big] = 0, \quad \text{(B36)}$$

$$Sum I_-^2\,[\Lambda_b^0, \Sigma^{*+}, \pi^+] = 2\big[-2\,\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0}\pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-}\pi^+) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+}\pi^-)\big] = 0. \quad \text{(B37)}$$

4. $b \to u\bar{c}d/s$ modes

$$Sum I_-^2\,[\Xi_b^-, \Sigma^+, \overline{D}^0] = 2\big[\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Sigma^0\overline{D}^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^+D^-) - \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^0D^-) - \mathcal{A}(\Xi_b^- \to \Sigma^-\overline{D}^0)\big] = 0, \quad \text{(B38)}$$

$$Sum I_-\,[\Xi_b^-, \Sigma^+, D_s^-] = -\big[\mathcal{A}(\Xi_b^0 \to \Sigma^+D_s^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0D_s^-)\big] = 0, \quad \text{(B39)}$$

$$SumI_-[\Xi_b^-, \Xi^0, \overline{D}^0] = -\mathcal{A}(\Xi_b^0 \to \Xi^0 \overline{D}^0) + \mathcal{A}(\Xi_b^- \to \Xi^0 D^-) - \mathcal{A}(\Xi_b^- \to \Xi^- \overline{D}^0) = 0, \tag{B40}$$

$$SumI_-[\Lambda_b^0, \Sigma^+, \overline{D}^0] = -\sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Sigma^0 \overline{D}^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^+ D^-) = 0, \tag{B41}$$

$$SumI_-^2[\Xi_b^-, \Delta^{++}, D_s^-] = 2\sqrt{3}\big[-\mathcal{A}(\Xi_b^0 \to \Delta^+ D_s^-) + \mathcal{A}(\Xi_b^- \to \Delta^0 D_s^-)\big] = 0, \tag{B42}$$

$$SumI_-^2[\Xi_b^-, \Sigma^{*+}, \overline{D}^0] = 2\big[-\sqrt{2}\,\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} \overline{D}^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^-) + \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^-) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-} \overline{D}^0)\big] = 0, \tag{B43}$$

$$SumI_-^2[\Lambda_b^0, \Delta^{++}, \overline{D}^0] = 2\sqrt{3}\big[\mathcal{A}(\Lambda_b^0 \to \Delta^0 \overline{D}^0) + \mathcal{A}(\Lambda_b^0 \to \Delta^+ D^-)\big] = 0, \tag{B44}$$

$$SumI_-[\Xi_b^-, \Sigma^{*+}, D_s^-] = -\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D_s^-) + \sqrt{2}\,\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D_s^-) = 0, \tag{B45}$$

$$SumI_-[\Xi_b^-, \Xi^{*0}, \overline{D}^0] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0} \overline{D}^0) + \mathcal{A}(\Xi_b^- \to \Xi^{*0} D^-) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} \overline{D}^0) = 0, \tag{B46}$$

$$SumI_-[\Lambda_b^0, \Sigma^{*+}, \overline{D}^0] = \sqrt{2}\,\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} \overline{D}^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^-) = 0, \tag{B47}$$

$$SumI_-[\Lambda_b^0, \Delta^{++}, D_s^-] = \sqrt{3}\,\mathcal{A}(\Lambda_b^0 \to \Delta^+ D_s^-) = 0. \tag{B48}$$

Appendix C: Isospin sum rules for three-body decays

1. $b \to c\bar{c}d/s$ modes

$$SumI_-^3[\Xi_b^-, \Xi_c^+, \overline{D}^0, \pi^+] = -6\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^0 D^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^0 \overline{D}^0 \pi^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^+ D^- \pi^0) - \mathcal{A}(\Xi_b^0 \to \Xi_c^+ \overline{D}^0 \pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^0 D^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^0 \overline{D}^0 \pi^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^+ D^- \pi^-)\big] = 0, \tag{C1}$$

$$SumI_-^2[\Xi_b^-, \Xi_c^+, D_s^-, K^+] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^0 D_s^- K^+) + \mathcal{A}(\Xi_b^0 \to \Xi_c^+ D_s^- K^0) - \mathcal{A}(\Xi_b^- \to \Xi_c^0 D_s^- K^0)\big] = 0, \tag{C2}$$

$$SumI_-[\Lambda_b^0, \Lambda_c^+, \overline{D}^0, \overline{K}^0] = \mathcal{A}(\Lambda_b^0 \to \Lambda_c^+ D^- \overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to \Lambda_c^+ \overline{D}^0 K^-) = 0, \tag{C3}$$

$$SumI_-[\Lambda_b^0, \Lambda_c^+, D_s^-, \pi^+] = -\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Lambda_c^+ D_s^- \pi^0) = 0, \tag{C4}$$

$$SumI_-[\Lambda_b^0, \Xi_c^+, \overline{D}^0, \eta_8] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^0 \overline{D}^0 \eta_8) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^+ D^- \eta_8) = 0, \tag{C5}$$

$$SumI_-[\Lambda_b^0, \Xi_c^+, D_s^-, K^+] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^0 D_s^- K^+) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^+ D_s^- K^0) = 0, \tag{C6}$$

$$SumI_-[\Xi_b^-, \Lambda_c^+, D_s^-, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Lambda_c^+ D_s^- \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Lambda_c^+ D_s^- K^-) = 0, \tag{C7}$$

$$SumI_-^2[\Xi_b^-, \Xi_c^+, \overline{D}^0, \overline{K}^0] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^0 \overline{D}^0 \overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Xi_c^+ D^- \overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Xi_c^+ \overline{D}^0 K^-) - \mathcal{A}(\Xi_b^- \to \Xi_c^0 D^- \overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^0 \overline{D}^0 K^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^+ D^- K^-)\big] = 0, \tag{C8}$$

$$SumI_-^2[\Xi_b^-, \Xi_c^+, D_s^-, \pi^+] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^0 D_s^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^+ D_s^- \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^0 D_s^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^+ D_s^- \pi^-)\big] = 0, \tag{C9}$$

$$SumI_-[\Xi_b^-, \Xi_c^+, D_s^-, \eta_8] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^+ D_s^- \eta_8) + \mathcal{A}(\Xi_b^- \to \Xi_c^0 D_s^- \eta_8) = 0, \tag{C10}$$

$$SumI_-[\Xi_b^0, \Xi_c^+, \overline{D}^0, \overline{K}^0] = \mathcal{A}(\Xi_b^0 \to \Xi_c^0 \overline{D}^0 \overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Xi_c^+ D^- \overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Xi_c^+ \overline{D}^0 K^-) = 0, \tag{C11}$$

$$SumI_-[\Xi_b^-, \Xi_c^0, \overline{D}^0, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^0 \overline{D}^0 \overline{K}^0)$$

$$+\mathcal{A}(\Xi_b^- \to \Xi_c^0 D^- \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Xi_c^0 \overline{D}^0 K^-) = 0, \tag{C12}$$

$$SumI_-[\Xi_b^-, \Xi_c^+, D^-, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^+ D^- \overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^0 D^- \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Xi_c^+ D^- K^-) = 0, \tag{C13}$$

$$SumI_-[\Xi_b^-, \Xi_c^+, \overline{D}^0, K^-] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^+ \overline{D}^0 K^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^0 \overline{D}^0 K^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^+ D^- K^-) = 0, \tag{C14}$$

$$SumI_-[\Xi_b^0, \Xi_c^+, D_s^-, \pi^+] = \mathcal{A}(\Xi_b^0 \to \Xi_c^0 D_s^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^+ D_s^- \pi^0) = 0, \tag{C15}$$

$$SumI_-[\Xi_b^-, \Xi_c^0, D_s^-, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^0 D_s^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^0 D_s^- \pi^0) = 0, \tag{C16}$$

$$SumI_-[\Xi_b^-, \Xi_c^+, D_s^-, \pi^0] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^+ D_s^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^0 D_s^- \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^+ D_s^- \pi^-) = 0, \tag{C17}$$

$$SumI_-^3[\Lambda_b^0, \Sigma_c^{++}, \overline{D}^0, \pi^+] = 6\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 D^- \pi^+) - 6\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \overline{D}^0 \pi^0) + 2\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D^- \pi^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \overline{D}^0 \pi^-) + \mathcal{A}(\Lambda_b^0 \to \Sigma_c^{++} D^- \pi^-)\big] = 0, \tag{C18}$$

$$SumI_-^3[\Xi_b^-, \Sigma_c^{++}, \overline{D}^0, \overline{K}^0] = -6\big[\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \overline{D}^0 \overline{K}^0) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ D^- \overline{K}^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ \overline{D}^0 K^-) - \mathcal{A}(\Xi_b^0 \to \Sigma_c^{++} D^- K^-) - \mathcal{A}(\Xi_b^- \to \Sigma_c^0 D^- \overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Sigma_c^0 \overline{D}^0 K^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma_c^+ D^- K^-)\big] = 0, \tag{C19}$$

$$SumI_-^3[\Xi_b^-, \Sigma_c^{++}, D_s^-, \pi^+] = -6\big[\mathcal{A}(\Xi_b^0 \to \Sigma_c^0 D_s^- \pi^+) - 2\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ D_s^- \pi^0) - \mathcal{A}(\Xi_b^0 \to \Sigma_c^{++} D_s^- \pi^-) + \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Sigma_c^0 D_s^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Sigma_c^+ D_s^- \pi^-)\big)\big] = 0, \tag{C20}$$

$$SumI_-^3[\Xi_b^-, \Xi_c^{*+}, \overline{D}^0, \pi^+] = -6\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} D^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} \overline{D}^0 \pi^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D^- \pi^0) - \mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} \overline{D}^0 \pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} \overline{D}^0 \pi^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*+} D^- \pi^-)\big] = 0, \tag{C21}$$

$$SumI_-^2[\Lambda_b^0, \Sigma_c^{++}, \overline{D}^0, \overline{K}^0] = 2\big[\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \overline{D}^0 \overline{K}^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D^- \overline{K}^0) - \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \overline{D}^0 K^-) - \mathcal{A}(\Lambda_b^0 \to \Sigma_c^{++} D^- K^-)\big] = 0, \tag{C22}$$

$$SumI_-^2[\Lambda_b^0, \Sigma_c^{++}, D_s^-, \pi^+] = 2\big[\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 D_s^- \pi^+) - 2\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D_s^- \pi^0) - \mathcal{A}(\Lambda_b^0 \to \Sigma_c^{++} D_s^- \pi^-)\big] = 0, \tag{C23}$$

$$SumI_-[\Lambda_b^0, \Sigma_c^{++}, D_s^-, \eta_8] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D_s^- \eta_8) = 0, \tag{C24}$$

$$SumI_-^2[\Lambda_b^0, \Xi_c^{*+}, \overline{D}^0, \pi^+] = 2\mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} D^- \pi^+) - 2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \overline{D}^0 \pi^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi_c^{*+} D^- \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*+} \overline{D}^0 \pi^-)\big] = 0, \tag{C25}$$

$$SumI_-[\Lambda_b^0, \Xi_c^{*+}, \overline{D}^0, \eta_8] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \overline{D}^0 \eta_8) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*+} D^- \eta_8) = 0, \tag{C26}$$

$$SumI_-[\Lambda_b^0, \Xi_c^{*+}, D_s^-, K^+] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} D_s^- K^+) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*+} D_s^- K^0) = 0, \tag{C27}$$

$$SumI_-[\Lambda_b^0, \Omega_c^0, \overline{D}^0, K^+] = \mathcal{A}(\Lambda_b^0 \to \Omega_c^0 D^- K^+) + \mathcal{A}(\Lambda_b^0 \to \Omega_c^0 \overline{D}^0 K^0) = 0, \tag{C28}$$

$$SumI_-^2[\Xi_b^-, \Sigma_c^{++}, D_s^-, \overline{K}^0] = 2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ D_s^- \overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Sigma_c^{++} D_s^- K^-) + \mathcal{A}(\Xi_b^- \to \Sigma_c^0 D_s^- \overline{K}^0) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma_c^+ D_s^- K^-)\big] = 0, \tag{C29}$$

$$SumI_-^2[\Xi_b^-, \Xi_c^{*+}, \overline{D}^0, \overline{K}^0] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} \overline{D}^0 \overline{K}^0)$$

$$+\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D^- \overline{K}^0)$$
$$-\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} \overline{D}^0 K^-)$$
$$-\mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D^- \overline{K}^0)$$
$$+\mathcal{A}(\Xi_b^- \to \Xi_c^{*0} \overline{D}^0 K^-)$$
$$+\mathcal{A}(\Xi_b^- \to \Xi_c^{*+} D^- K^-)]$$
$$= 0, \tag{C30}$$

$$SumI_-^2[\Xi_b^-, \Xi_c^{*+}, D_s^-, \pi^+] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} D_s^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D_s^- \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D_s^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*+} D_s^- \pi^-)\big] = 0, \tag{C31}$$

$$SumI_-[\Xi_b^-, \Xi_c^{*+}, D_s^-, \eta_8] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D_s^- \eta_8) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D_s^- \eta_8) = 0, \tag{C32}$$

$$SumI_-^2[\Xi_b^-, \Omega_c^0, \overline{D}^0, \pi^+] = -2\big[\mathcal{A}(\Xi_b^0 \to \Omega_c^0 D^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Omega_c^0 \overline{D}^0 \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Omega_c^0 D^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Omega_c^0 \overline{D}^0 \pi^-)\big] = 0, \tag{C33}$$

$$SumI_-[\Xi_b^-, \Omega_c^0, \overline{D}^0, \eta_8] = -\mathcal{A}(\Xi_b^0 \to \Omega_c^0 \overline{D}^0 \eta_8) + \mathcal{A}(\Xi_b^- \to \Omega_c^0 D^- \eta_8) = 0, \tag{C34}$$

$$SumI_-[\Xi_b^-, \Omega_c^0, D_s^-, K^+] = -\mathcal{A}(\Xi_b^0 \to \Omega_c^0 D_s^- K^+) + \mathcal{A}(\Xi_b^- \to \Omega_c^0 D_s^- K^0) = 0, \tag{C35}$$

$$SumI_-[\Lambda_b^0, \Sigma_c^+, \overline{D}^0, \overline{K}^0] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \overline{D}^0 \overline{K}^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D^- \overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \overline{D}^0 K^-) = 0, \tag{C36}$$

$$SumI_-[\Lambda_b^0, \Sigma_c^{++}, D^-, \overline{K}^0] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D^- \overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to \Sigma_c^{++} D^- K^-) = 0, \tag{C37}$$

$$SumI_-[\Lambda_b^0, \Sigma_c^{++}, \overline{D}^0, K^-] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \overline{D}^0 K^-) + \mathcal{A}(\Lambda_b^0 \to \Sigma_c^{++} D^- K^-) = 0, \tag{C38}$$

$$SumI_-[\Lambda_b^0, \Sigma_c^+, D_s^-, \pi^+] = \sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 D_s^- \pi^+) - \mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D_s^- \pi^0)\big] = 0, \tag{C39}$$

$$SumI_-[\Lambda_b^0, \Sigma_c^{++}, D_s^-, \pi^0] = \sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ D_s^- \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma_c^{++} D_s^- \pi^-)\big] = 0, \tag{C40}$$

$$SumI_-[\Lambda_b^0, \Xi_c^{*0}, \overline{D}^0, \pi^+] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} D^- \pi^+) - \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \overline{D}^0 \pi^0) = 0, \tag{C41}$$

$$SumI_-[\Lambda_b^0, \Xi_c^{*+}, D^-, \pi^+] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} D^- \pi^+) - \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi_c^{*+} D^- \pi^0) = 0, \tag{C42}$$

$$SumI_-[\Lambda_b^0, \Xi_c^{*+}, \overline{D}^0, \pi^0] = \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \overline{D}^0 \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*+} D^- \pi^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi_b^{*+} \overline{D}^0 \pi^-) = 0, \tag{C43}$$

$$SumI_-[\Xi_b^0, \Sigma_c^{++}, D_s^-, \overline{K}^0] = \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ D_s^- \overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Sigma_c^{++} D_s^- K^-) = 0, \tag{C44}$$

$$SumI_-[\Xi_b^-, \Sigma_c^+, D_s^-, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ D_s^- \overline{K}^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma_c^0 D_s^- \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Sigma_c^+ D_s^- K^-) = 0, \tag{C45}$$

$$SumI_-[\Xi_b^-, \Sigma_c^{++}, D_s^-, K^-] = -\mathcal{A}(\Xi_b^0 \to \Sigma_c^{++} D_s^- K^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma_c^+ D_s^- K^-) = 0, \tag{C46}$$

$$SumI_-[\Xi_b^0, \Xi_c^{*+}, \overline{D}^0, \overline{K}^0] = \mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} \overline{D}^0 \overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D^- \overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} \overline{D}^0 K^-) = 0, \tag{C47}$$

$$SumI_-[\Xi_b^-, \Xi_c^{*0}, \overline{D}^0, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} \overline{D}^0 \overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D^- \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} \overline{D}^0 K^-) = 0, \tag{C48}$$

$$SumI_-[\Xi_b^-, \Xi_c^{*+}, D^-, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D^- \overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D^- \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Xi_c^{*+} D^- K^-) = 0, \tag{C49}$$

$$SumI_-[\Xi_b^-, \Xi_c^{*+}, \overline{D}^0, K^-] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} \overline{D}^0 K^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} \overline{D}^0 K^-) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*+} D^- K^-) = 0, \tag{C50}$$

$$SumI_-[\Xi_b^0, \Xi_c^{*+}, D_s^-, \pi^+] = \mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} D_s^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D_s^- \pi^0) = 0, \tag{C51}$$

$$SumI_-[\Xi_b^-, \Xi_c^{*0}, D_s^-, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} D_c^- \pi^+)$$

$$- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D_s^- \pi^0)$$
$$= 0, \quad \text{(C52)}$$

$$SumI_-[\Xi_b^-, \Xi_c^{*+}, D_s^-, \pi^0] = -\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} D_s^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} D_s^- \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^{*+} D_s^- \pi^-) = 0, \quad \text{(C53)}$$

$$SumI_-[\Xi_b^0, \Omega_c^0, \overline{D}^0, \pi^+] = \mathcal{A}(\Xi_b^0 \to \Omega_c^0 D^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Omega_c^0 \overline{D}^0 \pi^0) = 0, \quad \text{(C54)}$$

$$SumI_-[\Xi_b^-, \Omega_c^0, D^-, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Omega_c^0 D^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Omega_c^0 D^- \pi^0) = 0, \quad \text{(C55)}$$

$$SumI_-[\Xi_b^-, \Omega_c^0, \overline{D}^0, \pi^0] = -\mathcal{A}(\Xi_b^0 \to \Omega_c^0 \overline{D}^0 \pi^0) + \mathcal{A}(\Xi_b^- \to \Omega_c^0 D^- \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Omega_c^0 \overline{D}^0 \pi^-) = 0, \quad \text{(C56)}$$

$$SumI_-^3[\Xi_b^-, \Sigma^+, J/\psi, \pi^+] = 6\big[-2\mathcal{A}(\Xi_b^0 \to \Sigma^0 J/\psi \pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^- J/\psi \pi^+) + \mathcal{A}(\Xi_b^0 \to \Sigma^+ J/\psi \pi^-) + \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Sigma^0 J/\psi \pi^-) + \mathcal{A}(\Xi_b^- \to \Sigma^- J/\psi \pi^0)\big)\big] = 0, \quad \text{(C57)}$$

$$SumI_-[\Lambda_b^0, p, J/\psi, \overline{K}^0] = \mathcal{A}(\Lambda_b^0 \to n J/\psi \overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to p J/\psi K^-) = 0, \quad \text{(C58)}$$

$$SumI_-[\Lambda_b^0, \Xi^0, J/\psi, K^+] = \mathcal{A}(\Lambda_b^0 \to \Xi^0 J/\psi K^0) - \mathcal{A}(\Lambda_b^0 \to \Xi^- J/\psi K^+) = 0, \quad \text{(C59)}$$

$$SumI_-[\Lambda_b^0, \Lambda^0, J/\psi, \pi^+] = -\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Lambda^0 J/\psi \pi^0) = 0, \quad \text{(C60)}$$

$$SumI_-[\Lambda_b^0, \Sigma^+, J/\psi, \eta_8] = -\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 J/\psi \eta_8) = 0, \quad \text{(C61)}$$

$$SumI_-^2[\Xi_b^-, \Sigma^+, J/\psi, \overline{K}^0] = 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 J/\psi \overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^+ J/\psi K^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 J/\psi K^-) - \mathcal{A}(\Xi_b^- \to \Sigma^- J/\psi \overline{K}^0)\big] = 0, \quad \text{(C62)}$$

$$SumI_-^2[\Xi_b^-, \Xi^0, J/\psi, \pi^+] = 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\psi \pi^0) + \mathcal{A}(\Xi_b^0 \to \Xi^- J/\psi \pi^+) - \mathcal{A}(\Xi_b^- \to \Xi^0 J/\psi \pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- J/\psi \pi^0)\big] = 0, \quad \text{(C63)}$$

$$SumI_-[\Xi_b^-, \Xi^0, J/\psi, \eta_8] = -\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\psi \eta_8) - \mathcal{A}(\Xi_b^- \to \Xi^- J/\psi \eta_8) = 0, \quad \text{(C64)}$$

$$SumI_-[\Xi_b^-, \Lambda^0, J/\psi, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Lambda^0 J/\psi \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Lambda^0 J/\psi K^-) = 0, \quad \text{(C65)}$$

$$SumI_-[\Lambda_b^0, \Sigma^0, J/\psi, \pi^+] = \sqrt{2}\big[-\mathcal{A}(\Lambda_b^0 \to \Sigma^0 J/\psi \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^- J/\psi \pi^+)\big] = 0, \quad \text{(C66)}$$

$$SumI_-[\Lambda_b^0, \Sigma^+, J/\psi, \pi^0] = \sqrt{2}\big[-\mathcal{A}(\Lambda_b^0 \to \Sigma^0 J/\psi \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^+ J/\psi \pi^-)\big] = 0, \quad \text{(C67)}$$

$$SumI_-[\Xi_b^0, \Sigma^+, J/\psi, \overline{K}^0] = -\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 J/\psi \overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^+ J/\psi K^-)\big] = 0, \quad \text{(C68)}$$

$$SumI_-[\Xi_b^-, \Sigma^0, J/\psi, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Sigma^0 J/\psi \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Sigma^0 J/\psi K^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^- J/\psi \overline{K}^0) = 0, \quad \text{(C69)}$$

$$SumI_-[\Xi_b^-, \Sigma^+, J/\psi, K^-] = -\mathcal{A}(\Xi_b^0 \to \Sigma^+ J/\psi K^-) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 J/\psi K^-) = 0, \quad \text{(C70)}$$

$$SumI_-[\Xi_b^0, \Xi^0, J/\psi, \pi^+] = -\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\psi \pi^0) - \mathcal{A}(\Xi_b^0 \to \Xi^- J/\psi \pi^+) = 0, \quad \text{(C71)}$$

$$SumI_-[\Xi_b^-, \Xi^-, J/\psi, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Xi^- J/\psi \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- J/\psi \pi^0) = 0, \quad \text{(C72)}$$

$$SumI_-[\Xi_b^-, \Xi^0, J/\psi, \pi^0] = -\mathcal{A}(\Xi_b^0 \to \Xi^0 J/\psi \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^0 J/\psi \pi^-) - \mathcal{A}(\Xi_b^- \to \Xi^- J/\psi \pi^0) = 0, \quad \text{(C73)}$$

$$SumI_-^3[\Lambda_b^0, \Delta^{++}, J/\psi, \pi^+] = -6\big[\sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^0 J/\psi \pi^0) + \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ J/\psi \pi^-) - \mathcal{A}(\Lambda_b^0 \to \Delta^- J/\psi \pi^+)\big] = 0, \quad \text{(C74)}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*+}, J/\psi, \pi^+] = -6\big[-2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} J/\psi \pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} J/\psi \pi^+) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} J/\psi \pi^-) + \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Sigma^{*0} J/\psi \pi^-)$$

$$+\mathcal{A}(\Xi_b^- \to \Sigma^{*-} J/\psi \pi^0))] = 0, \tag{C75}$$

$$SumI_-^3[\Xi_b^-, \Delta^{++}, J/\psi, \overline{K}^0] = 6[-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 J/\psi \overline{K}^0) + \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+ J/\psi K^-) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0 J/\psi K^-) + \mathcal{A}(\Xi_b^- \to \Delta^- J/\psi \overline{K}^0)] = 0, \tag{C76}$$

$$SumI_-[\Lambda_b^0, \Xi^{*0}, J/\psi, K^+] = \mathcal{A}(\Lambda_b^0 \to \Xi^{*0} J/\psi K^0) + \mathcal{A}(\Lambda_b^0 \to \Xi^{*-} J/\psi K^+) = 0, \tag{C77}$$

$$SumI_-^2[\Lambda_b^0, \Sigma^{*+}, J/\psi, \pi^+] = -2[2\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} J/\psi \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} J/\psi \pi^-) - \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} J/\psi \pi^+)] = 0, \tag{C78}$$

$$SumI_-[\Lambda_b^0, \Sigma^{*+}, J/\psi, \eta_8] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} J/\psi \eta_8) = 0, \tag{C79}$$

$$SumI_-^2[\Lambda_b^0, \Delta^{++}, J/\psi, \overline{K}^0] = 2\sqrt{3}[\mathcal{A}(\Lambda_b^0 \to \Delta^0 J/\psi \overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to \Delta^+ J/\psi K^-)] = 0, \tag{C80}$$

$$SumI_-[\Xi_b^-, \Omega^-, J/\psi, K^+] = -\mathcal{A}(\Xi_b^0 \to \Omega^- J/\psi K^+) + \mathcal{A}(\Xi_b^- \to \Omega^- J/\psi K^0) = 0, \tag{C81}$$

$$SumI_-^2[\Xi_b^-, \Xi^{*0}, J/\psi, \pi^+] = 2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*0} J/\psi \pi^0) - 2[\mathcal{A}(\Xi_b^0 \to \Xi^{*-} J/\psi \pi^+) + \mathcal{A}(\Xi_b^- \to \Xi^{*0} J/\psi \pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*-} J/\psi \pi^0)] = 0, \tag{C82}$$

$$SumI_-[\Xi_b^-, \Xi^{*0}, J/\psi, \eta_8] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0} J/\psi \eta_8) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} J/\psi \eta_8) = 0, \tag{C83}$$

$$SumI_-^2[\Xi_b^-, \Sigma^{*+}, J/\psi, \overline{K}^0] = 2[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} J/\psi \overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} J/\psi K^-) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} J/\psi K^-) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-} J/\psi \overline{K}^0)] = 0, \tag{C84}$$

$$SumI_-[\Lambda_b^0, \Sigma^{*0}, J/\psi, \pi^+] = \sqrt{2}[-\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} J/\psi \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} J/\psi \pi^+)] = 0, \tag{C85}$$

$$SumI_-[\Lambda_b^0, \Sigma^{*+}, J/\psi, \pi^0] = \sqrt{2}[\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} J/\psi \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} J/\psi \pi^-)] = 0, \tag{C86}$$

$$SumI_-[\Lambda_b^0, \Delta^+, J/\psi, \overline{K}^0] = 2\mathcal{A}(\Lambda_b^0 \to \Delta^0 J/\psi \overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to \Delta^+ J/\psi K^-) = 0, \tag{C87}$$

$$SumI_-[\Lambda_b^0, \Delta^{++}, J/\psi, K^-] = \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ J/\psi K^-) = 0, \tag{C88}$$

$$SumI_-[\Xi_b^0, \Xi^{*0}, J/\psi, \pi^+] = -\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*0} J/\psi \pi^0) + \mathcal{A}(\Xi_b^0 \to \Xi^{*-} J/\psi \pi^+) = 0, \tag{C89}$$

$$SumI_-[\Xi_b^-, \Xi^{*-}, J/\psi, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*-} J/\psi \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*-} J/\psi \pi^0) = 0, \tag{C90}$$

$$SumI_-[\Xi_b^-, \Xi^{*0}, J/\psi, \pi^0] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0} J/\psi \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*0} J/\psi \pi^-) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} J/\psi \pi^0) = 0, \tag{C91}$$

$$SumI_-[\Xi_b^0, \Sigma^{*+}, J/\psi, \overline{K}^0] = \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} J/\psi \overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} J/\psi K^-) = 0, \tag{C92}$$

$$SumI_-[\Xi_b^-, \Sigma^{*0}, J/\psi, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} J/\psi \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Sigma^{*0} J/\psi K^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-} J/\psi \overline{K}^0) = 0, \tag{C93}$$

$$SumI_-[\Xi_b^-, \Sigma^{*+}, J/\psi, K^-] = -\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} J/\psi K^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} J/\psi K^-) = 0, \tag{C94}$$

$$SumI_-^2[\Lambda_b^0, \Sigma^+, D^+, \overline{D}^0] = -2[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^0 \overline{D}^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^+ D^-) - \mathcal{A}(\Lambda_b^0 \to \Sigma^+ D^0 D^-) + \mathcal{A}(\Lambda_b^0 \to \Sigma^- D^+ \overline{D}^0)] = 0, \tag{C95}$$

$$SumI_-[\Lambda_b^0, p, D^+, D_s^-] = \mathcal{A}(\Lambda_b^0 \to n D^+ D_s^-) + \mathcal{A}(\Lambda_b^0 \to p D^0 D_s^-) = 0, \tag{C96}$$

$$SumI_-[\Lambda_b^0, \Xi^0, D_s^+, \overline{D}^0] = \mathcal{A}(\Lambda_b^0 \to \Xi^0 D_s^+ D^-) - \mathcal{A}(\Lambda_b^0 \to \Xi^- D_s^+ \overline{D}^0) = 0, \tag{C97}$$

$$SumI_-[\Lambda_b^0, \Lambda^0, D^+, \overline{D}^0] = \mathcal{A}(\Lambda_b^0 \to \Lambda^0 D^0 \overline{D}^0) + \mathcal{A}(\Lambda_b^0 \to \Lambda^0 D^+ D^-) = 0, \tag{C98}$$

$$SumI_-[\Lambda_b^0, \Sigma^+, D_s^+, D_s^-] = -\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D_s^+ D_s^-) = 0, \tag{C99}$$

$$\begin{aligned} SumI_-^2[\Xi_b^-, \Sigma^+, D^+, D_s^-] &= 2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^+ D_s^-) \\ &- 2\big[\mathcal{A}(\Xi_b^0 \to \Sigma^+ D^0 D_s^-) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 D^0 D_s^-) \\ &+ \mathcal{A}(\Xi_b^- \to \Sigma^- D^+ D_s^-)\big] \\ &= 0, \end{aligned} \tag{C100}$$

$$\begin{aligned} SumI_-^2[\Xi_b^-, \Xi^0, D^+, \overline{D}^0] &= -2\big[\mathcal{A}(\Xi_b^0 \to \Xi^0 D^0 \overline{D}^0) \\ &+ \mathcal{A}(\Xi_b^0 \to \Xi^0 D^+ D^-) \\ &- \mathcal{A}(\Xi_b^0 \to \Xi^- D^+ \overline{D}^0) \\ &- \mathcal{A}(\Xi_b^- \to \Xi^0 D^0 D^-) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi^- D^0 \overline{D}^0) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi^- D^+ D^-)\big] \\ &= 0, \end{aligned} \tag{C101}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Xi^0, D_s^+, D_s^-] &= -\mathcal{A}(\Xi_b^0 \to \Xi^0 D_s^+ D_s^-) \\ &- \mathcal{A}(\Xi_b^- \to \Xi^- D_s^+ D_s^-) \\ &= 0, \end{aligned} \tag{C102}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Lambda^0, D^+, D_s^-] &= -\mathcal{A}(\Xi_b^0 \to \Lambda^0 D^+ D_s^-) \\ &+ \mathcal{A}(\Xi_b^- \to \Lambda^0 D^0 D_s^-) \\ &= 0, \end{aligned} \tag{C103}$$

$$\begin{aligned} SumI_-^3[\Xi_b^-, \Sigma^+, D^+, \overline{D}^0] &= 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^0 \overline{D}^0) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^+ D^-) \\ &- \mathcal{A}(\Xi_b^0 \to \Sigma^+ D^0 D^-) \\ &+ \mathcal{A}(\Xi_b^0 \to \Sigma^- D^+ \overline{D}^0) \\ &- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 D^0 D^-) \\ &- \mathcal{A}(\Xi_b^- \to \Sigma^- D^0 \overline{D}^0) \\ &- \mathcal{A}(\Xi_b^- \to \Sigma^- D^+ D^-)\big] \\ &= 0, \end{aligned} \tag{C104}$$

$$\begin{aligned} SumI_-[\Lambda_b^0, \Sigma^0, D^+, \overline{D}^0] &= \mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^0 \overline{D}^0) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^+ D^-) \\ &+ \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^- D^+ \overline{D}^0) \\ &= 0, \end{aligned} \tag{C105}$$

$$\begin{aligned} SumI_-[\Lambda_b^0, \Sigma^+, D^0, \overline{D}^0] &= -\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^0 \overline{D}^0) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Sigma^+ D^0 D^-) \\ &= 0, \end{aligned} \tag{C106}$$

$$\begin{aligned} SumI_-[\Lambda_b^0, \Sigma^+, D^+, D^-] &= -\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^+ D^-) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Sigma^+ D^0 D^-) \\ &= 0, \end{aligned} \tag{C107}$$

$$\begin{aligned} SumI_-[\Xi_b^0, \Sigma^+, D^+, D_s^-] &= -\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^+ D_s^-) \\ &+ \mathcal{A}(\Xi_b^0 \to \Sigma^+ D^0 D_s^-) \\ &= 0, \end{aligned} \tag{C108}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Sigma^0, D^+, D_s^-] &= -\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^+ D_s^-) \\ &+ \mathcal{A}(\Xi_b^- \to \Sigma^0 D^0 D_s^-) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^- D^+ D_s^-) \\ &= 0, \end{aligned} \tag{C109}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Sigma^+, D^0, D_s^-] &= -\mathcal{A}(\Xi_b^0 \to \Sigma^+ D^0 D_s^-) \\ &- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 D^0 D_s^-) \\ &= 0, \end{aligned} \tag{C110}$$

$$\begin{aligned} SumI_-[\Xi_b^0, \Xi^0, D^+, \overline{D}^0] &= \mathcal{A}(\Xi_b^0 \to \Xi^0 D^0 \overline{D}^0) \\ &+ \mathcal{A}(\Xi_b^0 \to \Xi^0 D^+ D^-) \\ &- \mathcal{A}(\Xi_b^0 \to \Xi^- D^+ \overline{D}^0) \\ &= 0, \end{aligned} \tag{C111}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Xi^-, D^+, \overline{D}^0] &= -\mathcal{A}(\Xi_b^0 \to \Xi^- D^+ \overline{D}^0) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi^- D^0 \overline{D}^0) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi^- D^+ D^-) \\ &= 0, \end{aligned} \tag{C112}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Xi^0, D^0, \overline{D}^0] &= -\mathcal{A}(\Xi_b^0 \to \Xi^0 D^0 \overline{D}^0) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi^0 D^0 D^-) \\ &- \mathcal{A}(\Xi_b^- \to \Xi^- D^0 \overline{D}^0) \\ &= 0, \end{aligned} \tag{C113}$$

$$\begin{aligned} SumI_-[\Xi_b^-, \Xi^0, D^+, D^-] &= -\mathcal{A}(\Xi_b^0 \to \Xi^0 D^+ D^-) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi^0 D^0 D^-) \\ &- \mathcal{A}(\Xi_b^- \to \Xi^- D^+ D^-) \\ &= 0, \end{aligned} \tag{C114}$$

$$\begin{aligned} SumI_-^3[\Lambda_b^0, \Delta^{++}, D^+, \overline{D}^0] &= 6\big[\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^0 \overline{D}^0) \\ &+ \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^+ D^-) \\ &+ \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 D^-) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Delta^- D^+ \overline{D}^0)\big] \\ &= 0, \end{aligned} \tag{C115}$$

$$\begin{aligned} SumI_-^3[\Xi_b^-, \Sigma^{*+}, D^+, \overline{D}^0] &= -6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0 \overline{D}^0) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ D^-) \\ &+ \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 D^-) \\ &+ \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^+ \overline{D}^0) \\ &- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^0 D^-) \\ &- \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^0 \overline{D}^0) \\ &- \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^+ D^-)\big] \\ &= 0, \end{aligned} \tag{C116}$$

$$\begin{aligned} SumI_-^3[\Xi_b^-, \Delta^{++}, D^+, D_s^-] &= 6\big[-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 D^+ D_s^-) \\ &- \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+ D^0 D_s^-) \\ &+ \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0 D^0 D_s^-)) \\ &+ \mathcal{A}(\Xi_b^- \to \Delta^- D^+ D_s^-)\big] \\ &= 0, \end{aligned} \tag{C117}$$

$$SumI_-[\Lambda_b^0, \Xi^{*0}, D_s^+, \overline{D}^0] = \mathcal{A}(\Lambda_b^0 \to \Xi^{*0} D_s^+ D^-)$$

$$+\mathcal{A}(\Lambda_b^0 \to \Xi^{*-} D_s^+ \overline{D}^0) = 0, \quad (C118)$$

$$SumI_-^2[\Lambda_b^0, \Sigma^{*+}, D^+, \overline{D}^0] = 2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^0 \overline{D}^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^+ D^-) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^0 D^-) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D^+ \overline{D}^0)\big] = 0, \quad (C119)$$

$$SumI_-[\Lambda_b^0, \Sigma^{*+}, D_s^+, D_s^-] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D_s^+ D_s^-) = 0, \quad (C120)$$

$$SumI_-^2[\Lambda_b^0, \Delta^{++}, D^+, D_s^-] = 2\sqrt{3}\big[\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^+ D_s^-) + \mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 D_s^-)\big] = 0, \quad (C121)$$

$$SumI_-[\Xi_b^-, \Omega^-, D_s^+, \overline{D}^0] = -\mathcal{A}(\Xi_b^0 \to \Omega^- D_s^+ \overline{D}^0) + \mathcal{A}(\Xi_b^- \to \Omega^- D_s^+ D^-) = 0, \quad (C122)$$

$$SumI_-^2[\Xi_b^-, \Xi^{*0}, D^+, \overline{D}^0] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^0 \overline{D}^0) + \mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^+ D^-) + \mathcal{A}(\Xi_b^0 \to \Xi^{*-} D^+ \overline{D}^0) - \mathcal{A}(\Xi_b^- \to \Xi^{*0} D^0 D^-) - \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^0 \overline{D}^0) - \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^+ D^-)\big] = 0, \quad (C123)$$

$$SumI_-[\Xi_b^-, \Xi^{*0}, D_s^+, D_s^-] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D_s^+ D_s^-) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} D_s^+ D_s^-) = 0, \quad (C124)$$

$$SumI_-^2[\Xi_b^-, \Sigma^{*+}, D^+, D_s^-] = 2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ D_s^-) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 D_s^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^0 D_s^-) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^+ D_s^-)\big] = 0, \quad (C125)$$

$$SumI_-[\Lambda_b^0, \Sigma^{*0}, D^+, \overline{D}^0] = \mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^0 \overline{D}^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^+ D^-) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D^+ \overline{D}^0) = 0, \quad (C126)$$

$$SumI_-[\Lambda_b^0, \Sigma^{*+}, D^0, \overline{D}^0] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^0 \overline{D}^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^0 D^-) = 0, \quad (C127)$$

$$SumI_-[\Lambda_b^0, \Sigma^{*+}, D^+, D^-] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^+ D^-) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^0 D^-) = 0, \quad (C128)$$

$$SumI_-[\Lambda_b^0, \Delta^+, D^+, D_s^-] = 2\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^+ D_s^-) + \mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 D_s^-) = 0, \quad (C129)$$

$$SumI_-[\Lambda_b^0, \Delta^{++}, D^0, D_s^-] = \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 D_s^-) = 0, \quad (C130)$$

$$SumI_-[\Xi_b^0, \Xi^{*0}, D^+, \overline{D}^0] = \mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^0 \overline{D}^0) + \mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^+ D^-) + \mathcal{A}(\Xi_b^0 \to \Xi^{*-} D^+ \overline{D}^0) = 0, \quad (C131)$$

$$SumI_-[\Xi_b^-, \Xi^{*-}, D^+, \overline{D}^0] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*-} D^+ \overline{D}^0) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^0 \overline{D}^0) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^+ D^-) = 0, \quad (C132)$$

$$SumI_-[\Xi_b^-, \Xi^{*0}, D^0, \overline{D}^0] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^0 \overline{D}^0) + \mathcal{A}(\Xi_b^- \to \Xi^{*0} D^0 D^-) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^0 \overline{D}^0) = 0, \quad (C133)$$

$$SumI_-[\Xi_b^-, \Xi^{*0}, D^+, D^-] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^+ D^-) + \mathcal{A}(\Xi_b^- \to \Xi^{*0} D^0 D^-) + \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^+ D^-) = 0, \quad (C134)$$

$$SumI_-[\Xi_b^0, \Sigma^{*+}, D^+, D_s^-] = \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ D_s^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 D_s^-) = 0, \quad (C135)$$

$$SumI_-[\Xi_b^-, \Sigma^{*0}, D^+, D_s^-] = -\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ D_s^-) + \mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^0 D_s^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^+ D_s^-) = 0, \quad (C136)$$

$$SumI_-[\Xi_b^-, \Sigma^{*+}, D^0, D_s^-] = -\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 D_s^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^0 D_s^-) = 0. \quad (C137)$$

2. $b \to c\bar{u}d/s$ modes

$$SumI_-^3[\Lambda_b^0, \Lambda_c^+, \pi^+, \pi^+] = 6\sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Lambda_c^+ \pi^0 \pi^-) + \mathcal{A}(\Lambda_b^0 \to \Lambda_c^+ \pi^- \pi^0)\big] = 0, \quad (C138)$$

$$SumI_-^3[\Lambda_b^0, \Xi_c^+, \pi^+, K^+] = -6\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi_c^0 \pi^0 K^0) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^0 \pi^- K^+) + \mathcal{A}(\Lambda_b^0 \to \Xi_c^+ \pi^- K^0)\big] = 0, \quad (C139)$$

$$SumI_-^3[\Xi_b^-, \Lambda_c^+, \pi^+, \overline{K}^0] = 6\big[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Lambda_c^+ \pi^0 K^-)$$

$$
\begin{aligned}
&+\mathcal{A}(\Xi_b^0\to\Lambda_c^+\pi^-\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^-\to\Lambda_c^+\pi^-K^-)\big]\\
&=0, \qquad (C140)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^4[\Xi_b^-,\Xi_c^+,\pi^+,\pi^+]=&\,24[-2\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^0\pi^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^+\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^-\pi^+)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^0\pi^-)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^-\pi^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^0\pi^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^-\pi^0)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^+\pi^-\pi^-)\big]\\
&=0, \qquad (C141)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-,\Xi_c^+,\pi^+,\eta_8]=&\,6\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^0\eta_8)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^-\eta_8)\\
&-\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^-\eta_8)\big]\\
&=0, \qquad (C142)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-,\Xi_c^+,K^+,\overline{K}^0]=&\,-6\big[\mathcal{A}(\Xi_b^0\to\Xi_c^0K^0\overline{K}^0)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^0K^+K^-)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^+K^0K^-)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^0K^0K^-)\big]\\
&=0, \qquad (C143)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Lambda_c^+,\pi^+,\overline{K}^0]=&\,2\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Lambda_c^+\pi^0K^-)\\
&-2\mathcal{A}(\Lambda_b^0\to\Lambda_c^+\pi^-\overline{K}^0)\\
&=0, \qquad (C144)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Lambda_b^0,\Xi_c^+,\pi^+,\pi^+]=&\,6\big[2\mathcal{A}(\Lambda_b^0\to\Xi_c^0\pi^0\pi^0)\\
&-\mathcal{A}(\Lambda_b^0\to\Xi_c^0\pi^+\pi^-)\\
&-\mathcal{A}(\Lambda_b^0\to\Xi_c^0\pi^-\pi^+)\\
&+\sqrt{2}\big(\mathcal{A}(\Lambda_b^0\to\Xi_c^+\pi^0\pi^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Xi_c^+\pi^-\pi^0)\big)\big]\\
&=0, \qquad (C145)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Xi_c^+,\pi^+,\eta_8]=&\,-2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Xi_c^0\pi^0\eta_8)\\
&+\mathcal{A}(\Lambda_b^0\to\Xi_c^+\pi^-\eta_8)\big]\\
&=0, \qquad (C146)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Xi_c^+,K^+,\overline{K}^0]=&\,2\big[\mathcal{A}(\Lambda_b^0\to\Xi_c^0K^0\overline{K}^0)\\
&-\mathcal{A}(\Lambda_b^0\to\Xi_c^0K^+K^-)\\
&-\mathcal{A}(\Lambda_b^0\to\Xi_c^+K^0K^-)\big]\\
&=0, \qquad (C147)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-,\Lambda_c^+,\overline{K}^0,\overline{K}^0]=&\,2\big[\mathcal{A}(\Xi_b^0\to\Lambda_c^+K^-\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0\to\Lambda_c^+\overline{K}^0K^-)\\
&+\mathcal{A}(\Xi_b^-\to\Lambda_c^+K^-K^-)\big]\\
&=0, \qquad (C148)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-,\Xi_c^+,\pi^+,\overline{K}^0]=&\,6\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^+K^-)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^0K^-)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^-\overline{K}^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^0K^-)\\
&-\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^-\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^+\pi^-K^-)\big]\\
&=0, \qquad (C149)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-,\Xi_c^+,\overline{K}^0,\eta_8]=&\,-2\big[\mathcal{A}(\Xi_b^0\to\Xi_c^0\overline{K}^0\eta_8)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^+K^-\eta_8)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^0K^-\eta_8)\big]\\
&=0, \qquad (C150)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^0,\Xi_c^+,\pi^+,\pi^+]=&\,6\big[2\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^0\pi^0)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^+\pi^-)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^-\pi^+)\\
&+\sqrt{2}\big(\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^0\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^-\pi^0)\big)\big]\\
&=0, \qquad (C151)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-,\Xi_c^0,\pi^+,\pi^+]=&\,6\big[-2\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^0\pi^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^+\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^-\pi^+)\\
&+\sqrt{2}\big(\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^0\pi^-)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^-\pi^0)\big)\big]\\
&=0, \qquad (C152)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-,\Xi_c^+,\pi^0,\pi^+]=&\,6\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^0\pi^0)\\
&-6\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^-\pi^+)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^0\pi^-)\\
&-2\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^-\pi^0)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^0\pi^-)\\
&+2\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^-\pi^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^+\pi^-\pi^-)\big]\\
&=0, \qquad (C153)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^0,\Xi_c^+,\pi^+,\overline{K}^0]=&\,-2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^+K^-)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^0K^-)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^+\pi^-\overline{K}^0)\big]\\
&=0, \qquad (C154)
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-,\Xi_c^0,\pi^+,\overline{K}^0]=&\,2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^0\pi^+K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^0K^-)\\
&-\mathcal{A}(\Xi_b^-\to\Xi_c^0\pi^-\overline{K}^0)\big]
\end{aligned}
$$

$$= 0, \quad \text{(C155)}$$

$$\begin{aligned} SumI_-^2[\Xi_b^-, \Xi_c^+, \pi^0, \overline{K}^0] &= -2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^0 \pi^0 \overline{K}^0) \\ &- \mathcal{A}(\Xi_b^0 \to \Xi_c^+ \pi^0 K^-) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^+ \pi^- \overline{K}^0) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi_c^0 \pi^0 K^-) \\ &+ \sqrt{2}\big(-\mathcal{A}(\Xi_b^- \to \Xi_c^0 \pi^- \overline{K}^0) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi_c^+ \pi^- K^-)\big)\big] \\ &= 0, \end{aligned} \quad \text{(C156)}$$

$$\begin{aligned} SumI_-^2[\Xi_b^-, \Xi_c^+, \pi^+, K^-] &= -2\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^0 \pi^+ K^-) \\ &- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^+ \pi^0 K^-) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^0 \pi^0 K^-) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi_c^+ \pi^- K^-)\big] \\ &= 0, \end{aligned} \quad \text{(C157)}$$

$$\begin{aligned} SumI_-^4[\Lambda_b^0, \Sigma^{++}, \pi^+, \pi^+] &= 24\big[2\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \pi^0 \pi^0) \\ &- \mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \pi^+ \pi^-) \\ &- \mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \pi^- \pi^+) \\ &+ 2\big(\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \pi^0 \pi^-) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \pi^- \pi^0)\big) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Sigma_c^{++} \pi^- \pi^-)\big] \\ &= 0, \end{aligned} \quad \text{(C158)}$$

$$\begin{aligned} SumI_-^3[\Lambda_b^0, \Sigma_c^{++}, \pi^+, \eta_8] &= -6\sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \pi^0 \eta_8) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \pi^- \eta_8)\big] \\ &= 0, \end{aligned} \quad \text{(C159)}$$

$$\begin{aligned} SumI_-^3[\Lambda_b^0, \Sigma_c^{++}, K^+, \overline{K}^0] &= -6\big[-\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 K^0 \overline{K}^0) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 K^+ K^-) \\ &+ \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ K^0 K^-)\big] \\ &= 0, \end{aligned} \quad \text{(C160)}$$

$$\begin{aligned} SumI_-^3[\Lambda_b^0, \Xi_c^{*+}, \pi^+, K^+] &= -6\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \pi^0 K^0) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \pi^- K^+) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Xi_c^+ \pi^- K^0)\big] \\ &= 0, \end{aligned} \quad \text{(C161)}$$

$$\begin{aligned} SumI_-^4[\Xi_b^-, \Sigma_c^{++}, \pi^+, \overline{K}^0] &= 24\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma_c^0 \pi^0 \overline{K}^0) \\ &+ \mathcal{A}(\Xi_b^0 \to \Sigma_c^0 \pi^+ K^-) \\ &- 2\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ \pi^0 K^-) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ \pi^- \overline{K}^0) \\ &- \mathcal{A}(\Xi_b^0 \to \Sigma_c^{++} \pi^- K^-) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma_c^0 \pi^0 K^-) \\ &- \mathcal{A}(\Xi_b^- \to \Sigma_c^0 \pi^- \overline{K}^0) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma_c^+ \pi^- K^-)\big] \\ &= 0, \end{aligned} \quad \text{(C162)}$$

$$\begin{aligned} SumI_-^3[\Xi_b^-, \Sigma_c^{++}, \overline{K}^0, \eta_8] &= -6\big[\mathcal{A}(\Xi_b^0 \to \Sigma_c^0 \overline{K}^0 \eta_8) \\ &- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ K^- \eta_8) \\ &+ \mathcal{A}(\Xi_b^- \to \Sigma_c^0 K^- \eta_8)\big] \\ &= 0, \end{aligned} \quad \text{(C163)}$$

$$\begin{aligned} SumI_-^4[\Xi_b^-, \Xi_c^{*+}, \pi^+, \pi^+] &= 24\big[-2\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} \pi^0 \pi^0) \\ &+ \mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} \pi^- \pi^+) \\ &+ \mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} \pi^+ \pi^-) \\ &- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} \pi^0 \pi^-) \\ &- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} \pi^- \pi^0) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^{*0} \pi^0 \pi^-) \\ &+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi_c^{*0} \pi^- \pi^0) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi_c^{*+} \pi^- \pi^-)\big] \\ &= 0, \end{aligned} \quad \text{(C164)}$$

$$\begin{aligned} SumI_-^3[\Xi_b^-, \Xi_c^{*+}, \pi^+, \eta_8] &= 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} \pi^0 \eta_8) \\ &+ \mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} \pi^- \eta_8) \\ &- \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} \pi^- \eta_8)\big] \\ &= 0, \end{aligned} \quad \text{(C165)}$$

$$\begin{aligned} SumI_-^3[\Xi_b^-, \Xi_c^{*+}, K^+, \overline{K}^0] &= -6\big[\mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} K^0 \overline{K}^0) \\ &- \mathcal{A}(\Xi_b^0 \to \Xi_c^{*0} K^+ K^-) \\ &- \mathcal{A}(\Xi_b^0 \to \Xi_c^{*+} K^0 K^-) \\ &+ \mathcal{A}(\Xi_b^- \to \Xi_c^{*0} K^0 K^-)\big] \\ &= 0, \end{aligned} \quad \text{(C166)}$$

$$\begin{aligned} SumI_-^3[\Xi_b^-, \Sigma_c^{++}, \overline{K}^0, \eta_8] &= -6\big[\mathcal{A}(\Xi_b^0 \to \Sigma_c^0 \overline{K}^0 \eta_8) \\ &- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma_c^+ K^- \eta_8) \\ &+ \mathcal{A}(\Xi_b^- \to \Sigma_c^0 K^- \eta_8)\big] \\ &= 0, \end{aligned} \quad \text{(C167)}$$

$$\begin{aligned} SumI_-^3[\Xi_b^-, \Omega_c^0, \pi^+, K^+] &= 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Omega_c^0 \pi^0 K^0) \\ &+ \mathcal{A}(\Xi_b^0 \to \Omega_c^0 \pi^- K^+) \\ &- \mathcal{A}(\Xi_b^- \to \Omega_c^0 \pi^- K^0)\big] \\ &= 0, \end{aligned} \quad \text{(C168)}$$

$$\begin{aligned} SumI_-^3[\Lambda_b^0, \Sigma_c^{++}, \pi^+, \overline{K}^0] &= -6\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \pi^0 \overline{K}^0) \\ &+ \mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \pi^+ K^-) \\ &- 2\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \pi^0 K^-) \\ &+ \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ \pi^- \overline{K}^0) \\ &- \mathcal{A}(\Lambda_b^0 \to \Sigma_c^{++} \pi^- K^-)\big] \\ &= 0, \end{aligned} \quad \text{(C169)}$$

$$\begin{aligned} SumI_-^2[\Lambda_b^0, \Sigma_c^{++}, \overline{K}^0, \eta_8] &= 2\big[\mathcal{A}(\Lambda_b^0 \to \Sigma_c^0 \overline{K}^0 \eta_8) \\ &- \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma_c^+ K^- \eta_8)\big] \\ &= 0, \end{aligned} \quad \text{(C170)}$$

$$\begin{aligned} SumI_-^3[\Lambda_b^0, \Xi_c^{*+}, \pi^+, \pi^+] &= 6\big[2\mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \pi^0 \pi^0) \\ &- \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \pi^+ \pi^-) \\ &- \mathcal{A}(\Lambda_b^0 \to \Xi_c^{*0} \pi^- \pi^+) \end{aligned}$$

$$+\sqrt{2}\big(\mathcal{A}(\Lambda_b^0\to\Xi_c^{*+}\pi^0\pi^-)+\mathcal{A}(\Lambda_b^0\to\Xi_c^{*+}\pi^-\pi^0)\big)\big]=0, \quad (C171)$$

$$SumI_-^2[\Lambda_b^0,\Xi_c^{*+},\pi^+,\eta_8]=-2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Xi_c^{*0}\pi^0\eta_8)+\mathcal{A}(\Lambda_b^0\to\Xi_c^{*+}\pi^-\eta_8)\big]=0, \quad (C172)$$

$$SumI_-^2[\Lambda_b^0,\Xi_c^{*+},K^+,\overline{K}^0]=2\big[\mathcal{A}(\Lambda_b^0\to\Xi_c^{*0}K^0\overline{K}^0)-\mathcal{A}(\Lambda_b^0\to\Xi_c^{*0}K^+K^-)-\mathcal{A}(\Lambda_b^0\to\Xi_c^{*+}K^0K^-)\big]=0, \quad (C173)$$

$$SumI_-^2[\Lambda_b^0,\Omega_c^0,\pi^+,K^+]=-2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Omega_c^0\pi^0K^0)+\mathcal{A}(\Lambda_b^0\to\Omega_c^0\pi^-K^+)\big]=0, \quad (C174)$$

$$SumI_-^3[\Xi_b^-,\Sigma_c^{++},\overline{K}^0,\overline{K}^0]=-6\big[\mathcal{A}(\Xi_b^0\to\Xi_c^0\overline{K}^0\overline{K}^0)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^+K^-\overline{K}^0)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^+\overline{K}^0K^-)+\mathcal{A}(\Xi_b^0\to\Sigma_c^{++}K^-K^-)+\mathcal{A}(\Xi_b^-\to\Sigma_c^0K^-\overline{K}^0)+\mathcal{A}(\Xi_b^-\to\Sigma_c^0\overline{K}^0K^-)-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma_c^+K^-K^-)\big]=0, \quad (C175)$$

$$SumI_-^3[\Xi_b^-,\Xi_c^{*+},\pi^+,\overline{K}^0]=6\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^0\overline{K}^0)+\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^+K^-)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^0K^-)+\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^-\overline{K}^0)+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^{*}\pi^0K^-)-\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^-\overline{K}^0)+\mathcal{A}(\Xi_b^-\to\Xi_c^{*+}\pi^-K^-)\big]=0, \quad (C176)$$

$$SumI_-^2[\Xi_b^-,\Xi_c^{*+},\overline{K}^0,\eta_8]=-2\big[\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\overline{K}^0\eta_8)-\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}K^-\eta_8)+\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}K^-\eta_8)\big]=0, \quad (C177)$$

$$SumI_-^3[\Xi_b^-,\Omega_c^0,\pi^+,\pi^+]=6\big[-2\mathcal{A}(\Xi_b^0\to\Omega_c^0\pi^0\pi^0)+\mathcal{A}(\Xi_b^0\to\Omega_c^0\pi^+\pi^-)+\mathcal{A}(\Xi_b^0\to\Omega_c^0\pi^-\pi^+)+\sqrt{2}\big(\mathcal{A}(\Xi_b^-\to\Omega_c^0\pi^0\pi^-)+\mathcal{A}(\Xi_b^-\to\Omega_c^0\pi^-\pi^0)\big)\big]=0, \quad (C178)$$

$$SumI_-^2[\Xi_b^-,\Omega_c^0,\pi^+,\eta_8]=2\sqrt{2}\mathcal{A}(\Xi_b^0\to\Omega_c^0\pi^0\eta_8)-2\mathcal{A}(\Xi_b^-\to\Omega_c^0\pi^-\eta_8)=0, \quad (C179)$$

$$SumI_-^2[\Xi_b^-,\Omega_c^0,K^+,\overline{K}^0]=-2\big[\mathcal{A}(\Xi_b^0\to\Omega_c^0K^0\overline{K}^0)-\mathcal{A}(\Xi_b^0\to\Omega_c^0K^+K^-)+\mathcal{A}(\Xi_b^-\to\Omega_c^0K^0K^-)\big]=0, \quad (C180)$$

$$SumI_-^3[\Lambda_b^0,\Sigma_c^+,\pi^+,\pi^+]=6\sqrt{2}\big[2\mathcal{A}(\Lambda_b^0\to\Sigma_c^0\pi^0\pi^0)-\mathcal{A}(\Lambda_b^0\to\Sigma_c^0\pi^+\pi^-)-\mathcal{A}(\Lambda_b^0\to\Sigma_c^0\pi^-\pi^+)+\mathcal{A}(\Lambda_b^0\to\Sigma_c^+\pi^0\pi^-)+\mathcal{A}(\Lambda_b^0\to\Sigma_c^+\pi^-\pi^0)\big]=0, \quad (C181)$$

$$SumI_-^3[\Lambda_b^0,\Sigma_c^{++},\pi^0,\pi^+]=-6\sqrt{2}\big[\mathcal{A}(\Lambda_b^0\to\Sigma_c^0\pi^0\pi^0)-\mathcal{A}(\Lambda_b^0\to\Sigma_c^0\pi^-\pi^+)+\mathcal{A}(\Lambda_b^0\to\Sigma_c^+\pi^0\pi^-)+2\mathcal{A}(\Lambda_b^0\to\Sigma_c^+\pi^-\pi^0)+\mathcal{A}(\Lambda_b^0\to\Sigma_c^{++}\pi^-\pi^-)\big]=0, \quad (C182)$$

$$SumI_-^3[\Xi_b^0,\Sigma_c^{++},\pi^+,\overline{K}^0]=-6\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^0\pi^0\overline{K}^0)+\mathcal{A}(\Xi_b^0\to\Sigma_c^0\pi^+K^-)-2\mathcal{A}(\Xi_b^0\to\Sigma_c^+\pi^0K^-)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^+\pi^-\overline{K}^0)-\mathcal{A}(\Xi_b^0\to\Sigma_c^{++}\pi^-K^-)\big]=0, \quad (C183)$$

$$SumI_-^3[\Xi_b^-,\Sigma_c^+,\pi^+,\overline{K}^0]=6\big[2\mathcal{A}(\Xi_b^0\to\Sigma_c^0\pi^0\overline{K}^0)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^0\pi^+K^-)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^+\pi^0K^-)+\mathcal{A}(\Xi_b^0\to\Sigma_c^+\pi^-\overline{K}^0)+2\mathcal{A}(\Xi_b^-\to\Sigma_c^0\pi^0K^-)-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma_c^0\pi^-\overline{K}^0)+\mathcal{A}(\Xi_b^-\to\Sigma_c^+\pi^-K^-)\big]=0, \quad (C184)$$

$$SumI_-^3[\Xi_b^-,\Sigma_c^{++},\pi^0,\overline{K}^0]=-6\big[\mathcal{A}(\Xi_b^0\to\Sigma_c^0\pi^0\overline{K}^0)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^+\pi^0K^-)+2\mathcal{A}(\Xi_b^0\to\Sigma_c^+\pi^-\overline{K}^0)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^{++}\pi^-K^-)+\mathcal{A}(\Xi_b^-\to\Sigma_c^0\pi^0K^-)-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma_c^0\pi^-\overline{K}^0)+2\mathcal{A}(\Xi_b^-\to\Sigma_c^+\pi^-K^-)\big]=0, \quad (C185)$$

$$SumI_-^3[\Xi_b^-,\Sigma_c^{++},\pi^+,K^-]=-6\big[\mathcal{A}(\Xi_b^0\to\Sigma_c^0\pi^+K^-)-2\mathcal{A}(\Xi_b^0\to\Sigma_c^+\pi^0K^-)$$

$$\begin{aligned}
&-\mathcal{A}(\Xi_b^0\to\Sigma_c^{++}\pi^-K^-)\\
&+\sqrt{2}\big(\mathcal{A}(\Xi_b^-\to\Sigma_c^0\pi^0K^-)\\
&+\mathcal{A}(\Xi_b^-\to\Sigma_c^+\pi^-K^-)\big)\big]\\
&=0, \qquad\qquad (C186)
\end{aligned}$$

$$\begin{aligned}
SumI^3_-[\Xi_b^0,\Xi_c^{*+},\pi^+,\pi^+] &= 6\big[2\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^0\pi^0)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^-\pi^+)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^+\pi^-)\\
&+\sqrt{2}\big(\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^0\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^-\pi^0)\big)\big]\\
&=0, \qquad\qquad (C187)
\end{aligned}$$

$$\begin{aligned}
SumI^3_-[\Xi_b^-,\Xi_c^{*0},\pi^+,\pi^+] &= 6\big[-2\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^0\pi^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^-\pi^+)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^+\pi^-)\\
&+\sqrt{2}\big(\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^0\pi^-)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^-\pi^0)\big)\big]\\
&=0, \qquad\qquad (C188)
\end{aligned}$$

$$\begin{aligned}
SumI^3_-[\Xi_b^-,\Xi_c^{*+},\pi^0,\pi^+] &= 6\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^0\pi^0)\\
&-6\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^-\pi^+)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^0\pi^-)\\
&-2\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^-\pi^0)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^0\pi^-)\\
&+2\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^-\pi^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^{*+}\pi^-\pi^-)\big]\\
&=0, \qquad\qquad (C189)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Lambda_b^0,\Sigma_c^{+},\pi^+,\overline{K}^0] &= -2\big[2\mathcal{A}(\Lambda_b^0\to\Sigma_c^{0}\pi^0\overline{K}^0)\\
&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma_c^{0}\pi^+K^-)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma_c^{+}\pi^0K^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma_c^{+}\pi^-\overline{K}^0)\big]\\
&=0, \qquad\qquad (C190)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Lambda_b^0,\Sigma_c^{++},\pi^0,\overline{K}^0] &= 2\big[\mathcal{A}(\Lambda_b^0\to\Sigma_c^{0}\pi^0\overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma_c^{+}\pi^0K^-)\\
&+2\mathcal{A}(\Lambda_b^0\to\Sigma_c^{+}\pi^-\overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma_c^{++}\pi^-K^-)\big]\\
&=0, \qquad\qquad (C191)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Lambda_b^0,\Sigma_c^{++},\pi^+,K^-] &= 2\big[\mathcal{A}(\Lambda_b^0\to\Sigma_c^{0}\pi^+K^-)\\
&-2\mathcal{A}(\Lambda_b^0\to\Sigma_c^{+}\pi^0K^-)\\
&-\mathcal{A}(\Lambda_b^0\to\Sigma_c^{++}\pi^-K^-)\big]\\
&=0, \qquad\qquad (C192)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Lambda_b^0,\Xi_c^{*0},\pi^+,\pi^+] &= 4\mathcal{A}(\Lambda_b^0\to\Xi_c^{*0}\pi^0\pi^0)\\
&-2\big[\mathcal{A}(\Lambda_b^0\to\Xi_c^{*0}\pi^+\pi^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Xi_c^{*0}\pi^-\pi^+)\big]\\
&=0, \qquad\qquad (C193)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Lambda_b^0,\Xi_c^{*+},\pi^0,\pi^+] &= -2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Xi_c^{*0}\pi^0\pi^0)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Xi_c^{*0}\pi^-\pi^+)\\
&+\mathcal{A}(\Lambda_b^0\to\Xi_c^{*+}\pi^0\pi^-)\\
&+2\mathcal{A}(\Lambda_b^0\to\Xi_c^{*+}\pi^-\pi^0)\big]=0, \qquad (C194)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Xi_b^0,\Sigma_c^{++},\overline{K}^0,\overline{K}^0] &= 2\big[\mathcal{A}(\Xi_b^0\to\Sigma_c^{0}\overline{K}^0\overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^{+}K^-\overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^{+}\overline{K}^0K^-)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma_c^{++}K^-K^-)\big]\\
&=0, \qquad\qquad (C195)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Xi_b^-,\Sigma_c^{++},K^-,\overline{K}^0] &= 2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma_c^{+}K^-\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma_c^{++}K^-K^-)\\
&+\mathcal{A}(\Xi_b^-\to\Sigma_c^{0}K^-\overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma_c^{+}K^-K^-)\big]\\
&=0, \qquad\qquad (C196)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Xi_b^0,\Xi_c^{*+},\pi^+,\overline{K}^0] &= -2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^+K^-)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^0K^-)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^-\overline{K}^0)\big]\\
&=0, \qquad\qquad (C197)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Xi_b^-,\Xi_c^{*0},\pi^+,\overline{K}^0] &= 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^+K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^0K^-)\\
&-\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^-\overline{K}^0)\big]\\
&=0, \qquad\qquad (C198)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Xi_b^-,\Xi_c^{*+},\pi^0,\overline{K}^0] &= -2\big[\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^0\overline{K}^0)\\
&-\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^0K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^-\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^0K^-)\\
&+\sqrt{2}\big(-\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^-\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^{*+}\pi^-K^-)\big)\big]\\
&=0, \qquad\qquad (C199)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Xi_b^-,\Xi_c^{*+},\pi^+,K^-] &= -2\big[\mathcal{A}(\Xi_b^0\to\Xi_c^{*0}\pi^+K^-)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi_c^{*+}\pi^0K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi_c^{*0}\pi^0K^-)\\
&+\mathcal{A}(\Xi_b^-\to\Xi_c^{*+}\pi^-K^-)\big]\\
&=0, \qquad\qquad (C200)
\end{aligned}$$

$$\begin{aligned}
SumI^2_-[\Xi_b^0,\Omega_c^{0},\pi^+,\pi^+] &= 4\mathcal{A}(\Xi_b^0\to\Omega_c^{0}\pi^0\pi^0)\\
&-2\big[\mathcal{A}(\Xi_b^0\to\Omega_c^{0}\pi^+\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Omega_c^{0}\pi^-\pi^+)\big]
\end{aligned}$$

$$= 0, \qquad (C201)$$

$$SumI_-^2[\Xi_b^-, \Omega_c^0, \pi^0, \pi^+] = 2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Omega_c^0\pi^0\pi^0) - 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Omega_c^0\pi^-\pi^+) + \mathcal{A}(\Xi_b^- \to \Omega_c^0\pi^0\pi^-) + 2\mathcal{A}(\Xi_b^- \to \Omega_c^0\pi^-\pi^0)\big] = 0, \qquad (C202)$$

$$SumI_-^3[\Lambda_b^0, p, D^+, \pi^+] = -6\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to nD^0\pi^0) + \mathcal{A}(\Lambda_b^0 \to nD^+\pi^-) + \mathcal{A}(\Lambda_b^0 \to pD^0\pi^-)\big] = 0, \qquad (C203)$$

$$SumI_-^3[\Lambda_b^0, \Sigma^+, D^+, K^+] = -6\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^0 K^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^- D^0 K^+) + \mathcal{A}(\Lambda_b^0 \to \Sigma^- D^+ K^0)\big] = 0, \qquad (C204)$$

$$SumI_-^3[\Lambda_b^0, \Sigma^+, D_s^+, \pi^+] = 6\sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D_s^+\pi^-) + \mathcal{A}(\Lambda_b^0 \to \Sigma^- D_s^+\pi^0)\big] = 0 \qquad (C205)$$

$$SumI_-^4[\Xi_b^-, \Sigma^+, D^+, \pi^+] = -24\big[2\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^0\pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^+\pi^-) - \mathcal{A}(\Xi_b^0 \to \Sigma^- D^0\pi^+) - \mathcal{A}(\Xi_b^0 \to \Sigma^+ D^0\pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^- D^+\pi^0) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 D^0\pi^-) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^- D^0\pi^0) - \mathcal{A}(\Xi_b^- \to \Sigma^- D^+\pi^-)\big] = 0, \qquad (C206)$$

$$SumI_-^3[\Xi_b^-, p, D^+, \overline{K}^0] = -6\big[\mathcal{A}(\Xi_b^0 \to nD^0\overline{K}^0) - \mathcal{A}(\Xi_b^0 \to nD^+K^-) - \mathcal{A}(\Xi_b^0 \to pD^0K^-) + \mathcal{A}(\Xi_b^- \to nD^0K^-)\big] = 0, \qquad (C207)$$

$$SumI_-^3[\Xi_b^-, \Sigma^+, D^+, \eta_8] = 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^0\eta_8) + \mathcal{A}(\Xi_b^0 \to \Sigma^- D^+\eta_8) - \mathcal{A}(\Xi_b^- \to \Sigma^- D^0\eta_8)\big] = 0, \qquad (C208)$$

$$SumI_-^3[\Xi_b^-, \Sigma^+, D_s^+, \overline{K}^0] = 6\big[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D_s^+K^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^- D_s^+\overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Sigma^- D_s^+K^-)\big] = 0, \qquad (C209)$$

$$SumI_-^3[\Xi_b^-, \Xi^0, D^+, K^+] = -6\big[\mathcal{A}(\Xi_b^0 \to \Xi^0 D^0 K^0) - \mathcal{A}(\Xi_b^0 \to \Xi^- D^0 K^+) - \mathcal{A}(\Xi_b^0 \to \Xi^- D^+ K^0) + \mathcal{A}(\Xi_b^- \to \Xi^- D^0 K^0)\big] = 0, \qquad (C210)$$

$$SumI_-^3[\Xi_b^-, \Xi^0, D_s^+, \pi^+] = 6\big[\mathcal{A}(\Xi_b^0 \to \Xi^0 D_s^+\pi^-) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^- D_s^+\pi^0) + \mathcal{A}(\Xi_b^- \to \Xi^- D_s^+\pi^-)\big] = 0, \qquad (C211)$$

$$SumI_-^3[\Xi_b^-, \Lambda^0, D^+, \pi^+] = 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Lambda^0 D^0\pi^0) + \mathcal{A}(\Xi_b^0 \to \Lambda^0 D^+\pi^-) - \mathcal{A}(\Xi_b^- \to \Lambda^0 D^0\pi^-)\big] = 0, \qquad (C212)$$

$$SumI_-^3[\Lambda_b^0, \Sigma^+, D^+, \pi^+] = 6\big[2\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^0\pi^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^+\pi^-) - \mathcal{A}(\Lambda_b^0 \to \Sigma^- D^0\pi^+) - \mathcal{A}(\Lambda_b^0 \to \Sigma^+ D^0\pi^-) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^- D^+\pi^0)\big] = 0, \qquad (C213)$$

$$SumI_-^2[\Lambda_b^0, p, D^+, \overline{K}^0] = 2\big[\mathcal{A}(\Lambda_b^0 \to nD^0\overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to nD^+K^-) - \mathcal{A}(\Lambda_b^0 \to pD^0K^-)\big] = 0, \qquad (C214)$$

$$SumI_-^2[\Lambda_b^0, \Sigma^+, D^+, \eta_8] = -2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^0\eta_8) + \mathcal{A}(\Lambda_b^0 \to \Sigma^- D^+\eta_8)\big] = 0, \qquad (C215)$$

$$SumI_-^2[\Lambda_b^0, \Sigma^+, D_s^+, \overline{K}^0] = 2\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D_s^+K^-) - 2\mathcal{A}(\Lambda_b^0 \to \Sigma^- D_s^+\overline{K}^0) = 0, \qquad (C216)$$

$$SumI_-^2[\Lambda_b^0, \Xi^0, D^+, K^+] = 2\big[\mathcal{A}(\Lambda_b^0 \to \Xi^0 D^0 K^0) - \mathcal{A}(\Lambda_b^0 \to \Xi^- D^0 K^+) - \mathcal{A}(\Lambda_b^0 \to \Xi^- D^+ K^0)\big] = 0, \qquad (C217)$$

$$SumI_-^2[\Lambda_b^0, \Xi^0, D_s^+, \pi^+] = -2\mathcal{A}(\Lambda_b^0 \to \Xi^0 D_s^+\pi^-) + 2\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi^- D_s^+\pi^0) = 0, \qquad (C218)$$

$$SumI_-^2[\Lambda_b^0, \Lambda^0, D^+, \pi^+] = -2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Lambda^0 D^0\pi^0) + \mathcal{A}(\Lambda_b^0 \to \Lambda^0 D^+\pi^-)\big] = 0, \qquad (C219)$$

$$SumI_-^3[\Xi_b^-, \Sigma^+, D^+, \overline{K}^0] = 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^0\overline{K}^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^+K^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^+ D^0K^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^- D^+\overline{K}^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 D^0K^-)$$

$$-\mathcal{A}(\Xi_b^-\to\Sigma^-D^0\overline{K}^0)+\mathcal{A}(\Xi_b^-\to\Sigma^-D^+K^-)\big]=0, \tag{C220}$$

$$\begin{aligned}SumI_-^3[\Xi_b^-,\Xi^0,D^+,\pi^+]=6\big[&\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^0D^0\pi^0)+\mathcal{A}(\Xi_b^0\to\Xi^0D^+\pi^-)+\mathcal{A}(\Xi_b^0\to\Xi^-D^0\pi^+)\\&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^-D^+\pi^0)-\mathcal{A}(\Xi_b^-\to\Xi^0D^0\pi^-)+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi^-D^0\pi^0)\\&+\mathcal{A}(\Xi_b^-\to\Xi^-D^+\pi^-)\big]=0,\end{aligned} \tag{C221}$$

$$SumI_-^2[\Xi_b^-,\Xi^0,D^+,\eta_8]=-2\big[\mathcal{A}(\Xi_b^0\to\Xi^0D^0\eta_8)-\mathcal{A}(\Xi_b^0\to\Xi^-D^+\eta_8)+\mathcal{A}(\Xi_b^-\to\Xi^-D^0\eta_8)\big]=0, \tag{C222}$$

$$SumI_-^2[\Xi_b^-,\Xi^0,D_s^+,\overline{K}^0]=2\big[\mathcal{A}(\Xi_b^0\to\Xi^0D_s^+K^-)+\mathcal{A}(\Xi_b^0\to\Xi^-D_s^+\overline{K}^0)+\mathcal{A}(\Xi_b^-\to\Xi^-D_s^+K^-)\big]=0, \tag{C223}$$

$$SumI_-^2[\Xi_b^-,\Lambda^0,D^+,\overline{K}^0]=-2\big[\mathcal{A}(\Xi_b^0\to\Lambda^0D^0\overline{K}^0)-\mathcal{A}(\Xi_b^0\to\Lambda^0D^+K^-)+\mathcal{A}(\Xi_b^-\to\Lambda^0D^0K^-)\big]=0, \tag{C224}$$

$$\begin{aligned}SumI_-^3[\Xi_b^0,\Sigma^+,D^+,\pi^+]=6\big[&2\mathcal{A}(\Xi_b^0\to\Sigma^0D^0\pi^0)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^+\pi^-)-\mathcal{A}(\Xi_b^0\to\Sigma^-D^0\pi^+)\\&-\mathcal{A}(\Xi_b^0\to\Sigma^+D^0\pi^-)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^-D^+\pi^0)\big]=0,\end{aligned} \tag{C225}$$

$$\begin{aligned}SumI_-^3[\Xi_b^-,\Sigma^0,D^+,\pi^+]=6\big[&\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^0\pi^0)+\mathcal{A}(\Xi_b^0\to\Sigma^0D^+\pi^-)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^-D^0\pi^+)\\&+2\mathcal{A}(\Xi_b^0\to\Sigma^-D^+\pi^0)-\mathcal{A}(\Xi_b^-\to\Sigma^0D^0\pi^-)-2\mathcal{A}(\Xi_b^-\to\Sigma^-D^0\pi^0)\\&-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^-D^+\pi^-)\big]=0,\end{aligned} \tag{C226}$$

$$\begin{aligned}SumI_-^3[\Xi_b^-,\Sigma^+,D^0,\pi^+]=6\big[&-2\mathcal{A}(\Xi_b^0\to\Sigma^0D^0\pi^0)+\mathcal{A}(\Xi_b^0\to\Sigma^-D^0\pi^+)+\mathcal{A}(\Xi_b^0\to\Sigma^+D^0\pi^-)\\&+\sqrt{2}\big(\mathcal{A}(\Xi_b^-\to\Sigma^0D^0\pi^-)+\mathcal{A}(\Xi_b^-\to\Sigma^-D^0\pi^0)\big)\big]=0,\end{aligned} \tag{C227}$$

$$\begin{aligned}SumI_-^3[\Xi_b^-,\Sigma^+,D^+,\pi^0]=6\big[&\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^0\pi^0)+2\mathcal{A}(\Xi_b^0\to\Sigma^0D^+\pi^-)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^+D^0\pi^-)\\&+\mathcal{A}(\Xi_b^0\to\Sigma^-D^+\pi^0)-2\mathcal{A}(\Xi_b^-\to\Sigma^0D^0\pi^-)-\mathcal{A}(\Xi_b^-\to\Sigma^-D^0\pi^0)\\&-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^-D^+\pi^-)\big]=0,\end{aligned} \tag{C228}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Sigma^0,D^+,\pi^+]=-2\big[&\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^0D^0\pi^0)+\mathcal{A}(\Lambda_b^0\to\Sigma^0D^+\pi^-)-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^-D^0\pi^+)\\&+2\mathcal{A}(\Lambda_b^0\to\Sigma^-D^+\pi^0)\big]=0,\end{aligned} \tag{C229}$$

$$SumI_-^2[\Lambda_b^0,\Sigma^+,D^0,\pi^+]=4\mathcal{A}(\Lambda_b^0\to\Sigma^0D^0\pi^0)-2\big[\mathcal{A}(\Lambda_b^0\to\Sigma^-D^0\pi^+)+\mathcal{A}(\Lambda_b^0\to\Sigma^+D^0\pi^-)\big]=0, \tag{C230}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Sigma^+,D^+,\pi^0]=-2\big[&\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^0D^0\pi^0)+2\mathcal{A}(\Lambda_b^0\to\Sigma^0D^+\pi^-)-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^+D^0\pi^-)\\&+\mathcal{A}(\Lambda_b^0\to\Sigma^-D^+\pi^0)\big]=0,\end{aligned} \tag{C231}$$

$$\begin{aligned}SumI_-^2[\Xi_b^0,\Sigma^+,D^+,\overline{K}^0]=-2\big[&\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^0\overline{K}^0)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^+K^-)+\mathcal{A}(\Xi_b^0\to\Sigma^+D^0K^-)\\&+\mathcal{A}(\Xi_b^0\to\Sigma^-D^+\overline{K}^0)\big]=0,\end{aligned} \tag{C232}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^0,D^+,\overline{K}^0]=-2\big[&\mathcal{A}(\Xi_b^0\to\Sigma^0D^0\overline{K}^0)-\mathcal{A}(\Xi_b^0\to\Sigma^0D^+K^-)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^-D^+\overline{K}^0)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^0D^0K^-)+\sqrt{2}\big(-\mathcal{A}(\Xi_b^-\to\Sigma^-D^0\overline{K}^0)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^-D^+K^-)\big)\big]=0,\end{aligned} \tag{C233}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^+,D^0,\overline{K}^0]=2\big[&\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^0\overline{K}^0)+\mathcal{A}(\Xi_b^0\to\Sigma^+D^0K^-)+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^0D^0K^-)\\&-\mathcal{A}(\Xi_b^-\to\Sigma^-D^0\overline{K}^0)\big]=0,\end{aligned} \tag{C234}$$

$$\begin{aligned} Sum I_-^2[\Xi_b^-, \Sigma^+, D^+, K^-] &= 2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 D^+ K^-) \\ &\quad - 2\big[\mathcal{A}(\Xi_b^0 \to \Sigma^+ D^0 K^-) \\ &\quad + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 D^0 K^-) \\ &\quad + \mathcal{A}(\Xi_b^- \to \Sigma^- D^+ K^-)\big] \\ &= 0, \end{aligned} \tag{C235}$$

$$\begin{aligned} Sum I_-^2[\Xi_b^0, \Xi^0, D^+, \pi^+] &= -2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 D^0 \pi^0) \\ &\quad + \mathcal{A}(\Xi_b^0 \to \Xi^0 D^+ \pi^-) \\ &\quad + \mathcal{A}(\Xi_b^0 \to \Xi^- D^0 \pi^+) \\ &\quad - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^- D^+ \pi^0)\big] \\ &= 0, \end{aligned} \tag{C236}$$

$$\begin{aligned} Sum I_-^2[\Xi_b^-, \Xi^-, D^+, \pi^+] &= -2\big[\mathcal{A}(\Xi_b^0 \to \Xi^- D^0 \pi^+) \\ &\quad - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^- D^+ \pi^0) \\ &\quad + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- D^0 \pi^0) \\ &\quad + \mathcal{A}(\Xi_b^- \to \Xi^- D^+ \pi^-)\big] \\ &= 0, \end{aligned} \tag{C237}$$

$$\begin{aligned} Sum I_-^2[\Xi_b^-, \Xi^0, D^0, \pi^+] &= 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 D^0 \pi^0) \\ &\quad + \mathcal{A}(\Xi_b^0 \to \Xi^- D^0 \pi^+) \\ &\quad - \mathcal{A}(\Xi_b^- \to \Xi^0 D^0 \pi^-) \\ &\quad + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- D^0 \pi^0)\big] \\ &= 0, \end{aligned} \tag{C238}$$

$$\begin{aligned} Sum I_-^2[\Xi_b^-, \Xi^0, D^+, \pi^0] &= -2\big[\mathcal{A}(\Xi_b^0 \to \Xi^0 D^0 \pi^0) \\ &\quad + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 D^+ \pi^-) \\ &\quad - \mathcal{A}(\Xi_b^0 \to \Xi^- D^+ \pi^0) \\ &\quad - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^0 D^0 \pi^-) \\ &\quad + \mathcal{A}(\Xi_b^- \to \Xi^- D^0 \pi^0) \\ &\quad + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- D^+ \pi^-)\big] \\ &= 0, \end{aligned} \tag{C239}$$

$$\begin{aligned} Sum I_-^3[\Lambda_b^0, \Sigma^{*+}, D^+, K^+] &= 6\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^0 K^0) \\ &\quad + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D^0 K^+) \\ &\quad + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D^+ K^0)\big] \\ &= 0, \end{aligned} \tag{C240}$$

$$\begin{aligned} Sum I_-^3[\Lambda_b^0, \Sigma^{*+}, D_s^+, \pi^+] &= -6\sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D_s^+ \pi^-) \\ &\quad + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D_s^+ \pi^0)\big] \\ &= 0, \end{aligned} \tag{C241}$$

$$\begin{aligned} Sum I_-^3[\Lambda_b^0, \Delta^{++}, D^+, \pi^+] &= -24\big[\sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^0 \pi^0) \\ &\quad + \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^+ \pi^-) \\ &\quad - \mathcal{A}(\Lambda_b^0 \to \Delta^- D^0 \pi^+) \\ &\quad + \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 \pi^-) \\ &\quad + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^- D^+ \pi^0)\big] \\ &= 0, \end{aligned} \tag{C242}$$

$$\begin{aligned} Sum I_-^3[\Lambda_b^0, \Delta^{++}, D^+, \eta_8] &= 6\big[\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^0 \eta_8) \\ &\quad + \mathcal{A}(\Lambda_b^0 \to \Delta^- D^+ \eta_8)\big] \\ &= 0, \end{aligned} \tag{C243}$$

$$\begin{aligned} Sum I_-^3[\Lambda_b^0, \Delta^{++}, D_s^+, \overline{K}^0] &= -6\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D_s^+ K^-) \\ &\quad + 6\mathcal{A}(\Lambda_b^0 \to \Delta^- D_s^+ \overline{K}^0) \\ &= 0, \end{aligned} \tag{C244}$$

$$\begin{aligned} Sum I_-^3[\Xi_b^-, \Xi^{*0}, D^+, K^+] &= -6\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^0 K^0) \\ &\quad + \mathcal{A}(\Xi_b^0 \to \Xi^{*-} D^0 K^+) \\ &\quad + \mathcal{A}(\Xi_b^0 \to \Xi^{*-} D^+ K^0) \\ &\quad - \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^0 K^0)\big] \\ &= 0, \end{aligned} \tag{C245}$$

$$\begin{aligned} Sum I_-^3[\Xi_b^-, \Xi^{*0}, D_s^+, \pi^+] &= 6\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D_s^+ \pi^-) \\ &\quad + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*-} D_s^+ \pi^0) \\ &\quad - \mathcal{A}(\Xi_b^- \to \Xi^{*-} D_s^+ \pi^-)\big] \\ &= 0, \end{aligned} \tag{C246}$$

$$\begin{aligned} Sum I_-^4[\Xi_b^-, \Sigma^{*+}, D^+, \pi^+] &= 24\big[2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0 \pi^0) \\ &\quad + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ \pi^-) \\ &\quad - \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^0 \pi^+) \\ &\quad + \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 \pi^-) \\ &\quad + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^+ \pi^0) \\ &\quad - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^0 \pi^-) \\ &\quad - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^0 \pi^0) \\ &\quad - \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^+ \pi^-)\big] \\ &= 0, \end{aligned} \tag{C247}$$

$$\begin{aligned} Sum I_-^3[\Xi_b^-, \Sigma^{*+}, D^+, \eta_8] &= -6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0 \eta_8) \\ &\quad + \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^+ \eta_8) \\ &\quad - \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^0 \eta_8)\big] \\ &= 0, \end{aligned} \tag{C248}$$

$$\begin{aligned} Sum I_-^3[\Xi_b^-, \Sigma^{*+}, D_s^+, \overline{K}^0] &= 6\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D_s^+ K^-) \\ &\quad - 6\big[\mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D_s^+ \overline{K}^0) \\ &\quad + \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D_s^+ K^-)\big] \\ &= 0, \end{aligned} \tag{C249}$$

$$\begin{aligned} Sum I_-^4[\Xi_b^-, \Delta^{++}, D^+, \overline{K}^0] &= -24\big[\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 D^0 \overline{K}^0) \\ &\quad - \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 D^+ K^-) \\ &\quad - \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+ D^0 K^-) \\ &\quad + \mathcal{A}(\Xi_b^0 \to \Delta^- D^+ \overline{K}^0) \\ &\quad + \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0 D^0 K^-) \\ &\quad - \mathcal{A}(\Xi_b^- \to \Delta^- D^0 \overline{K}^0) \\ &\quad + \mathcal{A}(\Xi_b^- \to \Delta^- D^+ K^-)\big] \\ &= 0, \end{aligned} \tag{C250}$$

$$\begin{aligned} Sum I_-^2[\Lambda_b^0, \Xi^{*0}, D^+, K^+] &= 2\big[\mathcal{A}(\Lambda_b^0 \to \Xi^{*0} D^0 K^0) \\ &\quad + \mathcal{A}(\Lambda_b^0 \to \Xi^{*-} D^0 K^+) \\ &\quad + \mathcal{A}(\Lambda_b^0 \to \Xi^{*-} D^+ K^0)\big] \end{aligned}$$

$$= 0, \quad \text{(C251)}$$

$$SumI_-^2[\Lambda_b^0, \Xi^{*0}, D_s^+, \pi^+] = -2\big[\mathcal{A}(\Lambda_b^0 \to \Xi^{*0} D_s^+ \pi^-) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi^{*-} D_s^+ \pi^0)\big] = 0, \quad \text{(C252)}$$

$$SumI_-^3[\Lambda_b^0, \Sigma^{*+}, D^+, \pi^+] = -6\big[2\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^0 \pi^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^+ \pi^-) - \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D^0 \pi^+) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^0 \pi^-) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D^+ \pi^0)\big] = 0, \quad \text{(C253)}$$

$$SumI_-^2[\Lambda_b^0, \Sigma^{*+}, D^+, \eta_8] = 2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^0 \eta_8) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D^+ \eta_8)\big] = 0, \quad \text{(C254)}$$

$$SumI_-^2[\Lambda_b^0, \Sigma^{*+}, D_s^+, \overline{K}^0] = -2\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D_s^+ K^-) + 2\mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} D_s^+ \overline{K}^0) = 0, \quad \text{(C255)}$$

$$SumI_-^3[\Lambda_b^0, \Delta^{++}, D^+, \overline{K}^0] = 6\big[\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^0 \overline{K}^0) - \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^+ K^-) - \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 K^-) + \mathcal{A}(\Lambda_b^0 \to \Delta^- D^+ \overline{K}^0)\big] = 0, \quad \text{(C256)}$$

$$SumI_-^2[\Xi_b^-, \Omega^-, D^+, K^+] = -2\big[\mathcal{A}(\Xi_b^0 \to \Omega^- D^0 K^+) + \mathcal{A}(\Xi_b^0 \to \Omega^- D^+ K^0) - \mathcal{A}(\Xi_b^- \to \Omega^- D^0 K^0)\big] = 0, \quad \text{(C257)}$$

$$SumI_-^2[\Xi_b^-, \Omega^-, D_s^+, \pi^+] = 2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Omega^- D_s^+ \pi^0) - 2\mathcal{A}(\Xi_b^- \to \Omega^- D_s^+ \pi^-) = 0, \quad \text{(C258)}$$

$$SumI_-^2[\Xi_b^-, \Xi^{*0}, D^+, \eta_8] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^0 \eta_8) + \mathcal{A}(\Xi_b^0 \to \Xi^{*-} D^+ \eta_8) - \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^0 \eta_8)\big] = 0, \quad \text{(C259)}$$

$$SumI_-^2[\Xi_b^-, \Xi^{*0}, D_s^+, \overline{K}^0] = 2\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D_s^+ K^-) - \mathcal{A}(\Xi_b^0 \to \Xi^{*-} D_s^+ \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Xi^{*-} D_s^+ K^-)\big] = 0, \quad \text{(C260)}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*+}, D^+, \overline{K}^0] = -6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0 \overline{K}^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ K^-) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 K^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^+ \overline{K}^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^0 K^-) - \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^0 \overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^+ K^-)\big] = 0, \quad \text{(C261)}$$

$$SumI_-^3[\Lambda_b^0, \Delta^+, D^+, \pi^+] = -6\big[2\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^0 \pi^0) + 2\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^+ \pi^-) - \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^- D^0 \pi^+) + \mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 \pi^-) + \sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^- D^+ \pi^0)\big] = 0, \quad \text{(C262)}$$

$$SumI_-^3[\Lambda_b^0, \Delta^{++}, D^0, \pi^+] = -6\big[\sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^0 \pi^0) - \mathcal{A}(\Lambda_b^0 \to \Delta^- D^0 \pi^+) + \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 \pi^-)\big] = 0, \quad \text{(C263)}$$

$$SumI_-^3[\Lambda_b^0, \Delta^{++}, D^+, \pi^0] = 6\big[\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^0 \pi^0) + \sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^+ \pi^-) + \sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^0 \pi^-) + \mathcal{A}(\Lambda_b^0 \to \Delta^- D^+ \pi^0)\big] = 0, \quad \text{(C264)}$$

$$SumI_-^3[\Xi_b^0, \Sigma^{*+}, D^+, \pi^+] = -6\big[2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0 \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ \pi^-) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^0 \pi^+) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 \pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^+ \pi^0)\big] = 0, \quad \text{(C265)}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*0}, D^+, \pi^+] = 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0 \pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ \pi^-) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^0 \pi^+) + 2\mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^+ \pi^0) - \mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^0 \pi^-) - 2\mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^0 \pi^0) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^+ \pi^-)\big] = 0, \quad \text{(C266)}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*+}, D^0, \pi^+] = -6\big[-2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0 \pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} D^0 \pi^+) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 \pi^-) + \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^0 \pi^-) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^0 \pi^0)\big)\big] = 0, \quad \text{(C267)}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*+}, D^+, \pi^0] = -6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^0 \pi^0) + 2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^+ \pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^0 \pi^-)$$

$$\begin{aligned}&+\mathcal{A}(\Xi_b^0\to\Sigma^{*-}D^+\pi^0)\\&-2\mathcal{A}(\Xi_b^-\to\Sigma^{*0}D^0\pi^-)\\&-\mathcal{A}(\Xi_b^-\to\Sigma^{*-}D^0\pi^0)\\&-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^{*-}D^+\pi^-)\big]\\&=0,\end{aligned}\tag{C268}$$

$$\begin{aligned}SumI_-^3[\Xi_b^0,\Delta^{++},D^+,\overline{K}^0]=&\,6\big[\sqrt{3}\mathcal{A}(\Xi_b^0\to\Delta^0D^0\overline{K}^0)\\&-\sqrt{3}\mathcal{A}(\Xi_b^0\to\Delta^0D^+K^-)\\&-\sqrt{3}\mathcal{A}(\Xi_b^0\to\Delta^+D^0K^-)\\&+\mathcal{A}(\Xi_b^0\to\Delta^-D^+\overline{K}^0)\big]\\=&\,0,\end{aligned}\tag{C269}$$

$$\begin{aligned}SumI_-^3[\Xi_b^-,\Delta^{+},D^+,\overline{K}^0]=&\,6\big[-2\mathcal{A}(\Xi_b^0\to\Delta^0D^0\overline{K}^0)\\&+2\mathcal{A}(\Xi_b^0\to\Delta^0D^+K^-)\\&+\mathcal{A}(\Xi_b^0\to\Delta^+D^0K^-)\\&-\sqrt{3}\mathcal{A}(\Xi_b^0\to\Delta^-D^+\overline{K}^0)\\&-2\mathcal{A}(\Xi_b^-\to\Delta^0D^0K^-)\\&+\sqrt{3}\big(\mathcal{A}(\Xi_b^-\to\Delta^-D^0\overline{K}^0)\\&-\mathcal{A}(\Xi_b^-\to\Delta^-D^+K^-)\big)\big]\\=&\,0,\end{aligned}\tag{C270}$$

$$\begin{aligned}SumI_-^3[\Xi_b^-,\Delta^{++},D^0,\overline{K}^0]=&\,6\big[-\sqrt{3}\mathcal{A}(\Xi_b^0\to\Delta^0D^0\overline{K}^0)\\&+\sqrt{3}\mathcal{A}(\Xi_b^0\to\Delta^+D^0K^-)\\&-\sqrt{3}\mathcal{A}(\Xi_b^-\to\Delta^0D^0K^-)\\&+\mathcal{A}(\Xi_b^-\to\Delta^-D^0\overline{K}^0)\big]\\=&\,0,\end{aligned}\tag{C271}$$

$$\begin{aligned}SumI_-^3[\Xi_b^-,\Delta^{++},D^+,K^-]=&\,6\big[-\sqrt{3}\mathcal{A}(\Xi_b^0\to\Delta^0D^+K^-)\\&-\sqrt{3}\mathcal{A}(\Xi_b^0\to\Delta^+D^0K^-)\\&+\sqrt{3}\mathcal{A}(\Xi_b^-\to\Delta^0D^0K^-)\\&+\mathcal{A}(\Xi_b^-\to\Delta^-D^+K^-)\big]\\=&\,0,\end{aligned}\tag{C272}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Sigma^{*0},D^+,\pi^+]=&-2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}D^0\pi^0)\\&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}D^+\pi^-)\\&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}D^0\pi^+)\\&+2\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}D^+\pi^0)\big]\\=&\,0,\end{aligned}\tag{C273}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Sigma^{*+},D^0,\pi^+]=&-2\big[2\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}D^0\pi^0)\\&-\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}D^0\pi^+)\\&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}D^0\pi^-)\big]\\=&\,0,\end{aligned}\tag{C274}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Sigma^{*+},D^+,\pi^0]=&\,2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}D^0\pi^0)\\&+2\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}D^+\pi^-)\\&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}D^0\pi^-)\\&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}D^+\pi^0)\big]\\=&\,0,\end{aligned}\tag{C275}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Delta^{+},D^+,\overline{K}^0]=&\,4\mathcal{A}(\Lambda_b^0\to\Delta^0D^0\overline{K}^0)\\&-4\mathcal{A}(\Lambda_b^0\to\Delta^0D^+K^-)\\&-2\mathcal{A}(\Lambda_b^0\to\Delta^+D^0K^-)\\&+2\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^-D^+\overline{K}^0)\\=&\,0,\end{aligned}\tag{C276}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Delta^{++},D^0,\overline{K}^0]=&\,2\sqrt{3}\big[\mathcal{A}(\Lambda_b^0\to\Delta^0D^0\overline{K}^0)\\&-\mathcal{A}(\Lambda_b^0\to\Delta^+D^0K^-)\big]\\=&\,0,\end{aligned}\tag{C277}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Delta^{++},D^+,K^-]=&\,2\sqrt{3}\big[\mathcal{A}(\Lambda_b^0\to\Delta^0D^+K^-)\\&+\mathcal{A}(\Lambda_b^0\to\Delta^+D^0K^-)\big]\\=&\,0,\end{aligned}\tag{C278}$$

$$\begin{aligned}SumI_-^2[\Xi_b^0,\Sigma^{*+},D^+,\overline{K}^0]=&\,2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*0}D^0\overline{K}^0)\\&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*0}D^+K^-)\\&-\mathcal{A}(\Xi_b^0\to\Sigma^{*+}D^0K^-)\\&+\mathcal{A}(\Xi_b^0\to\Sigma^{*-}D^+\overline{K}^0)\big]\\=&\,0,\end{aligned}\tag{C279}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^{*0},D^+,\overline{K}^0]=&-2\big[\mathcal{A}(\Xi_b^0\to\Sigma^{*0}D^0\overline{K}^0)\\&-\mathcal{A}(\Xi_b^0\to\Sigma^{*0}D^+K^-)\\&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*-}D^+\overline{K}^0)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^{*0}D^0K^-)\\&+\sqrt{2}\big(-\mathcal{A}(\Xi_b^-\to\Sigma^{*-}D^0\overline{K}^0)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^{*-}D^+K^-)\big)\big]\\=&\,0,\end{aligned}\tag{C280}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^{*+},D^0,\overline{K}^0]=&\,2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*0}D^0\overline{K}^0)\\&+\mathcal{A}(\Xi_b^0\to\Sigma^{*+}D^0K^-)\\&-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^{*0}D^0K^-)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^{*-}D^0\overline{K}^0)\big]\\=&\,0,\end{aligned}\tag{C281}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^{*+},D^+,K^-]=&\,2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*0}D^+K^-)\\&-\mathcal{A}(\Xi_b^0\to\Sigma^{*+}D^0K^-)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^{*0}D^0K^-)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^{*-}D^+K^-)\big]\\=&\,0.\end{aligned}\tag{C282}$$

3. $b\to u\bar{u}d/s$ modes

$$\begin{aligned}SumI_-^3[\Lambda_b^0,\Sigma^{*+},\pi^+,K^+]=&-6\big[2\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^0K^0)\\&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^-K^+)\\&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}\pi^0K^+)\\&-\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}\pi^+K^0)\end{aligned}$$

$$\begin{aligned}
&-\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}\pi^-K^0)\big]\\
&=0, \qquad \text{(C283)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^4[\Lambda_b^0,\Delta^{++},\pi^+,\pi^+] &= 24\big[2\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^0\pi^0)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^-\pi^+)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^+\pi^-)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Delta^-\pi^0\pi^+)\\
&+\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^0\pi^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Delta^{++}\pi^-\pi^-)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Delta^-\pi^+\pi^0)\\
&+\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^-\pi^0)\big]\\
&=0, \qquad \text{(C284)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^3[\Lambda_b^0,\Delta^{+},\pi^+,\pi^+] &= 6\big[4\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^0\pi^0)\\
&-2\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^-\pi^+)\\
&-2\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^+\pi^-)\\
&+\sqrt{2}\big(-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^-\pi^0\pi^+)\\
&+\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^0\pi^-)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^-\pi^+\pi^0)\\
&+\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^-\pi^0)\big)\big]\\
&=0, \qquad \text{(C285)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^3[\Lambda_b^0,\Delta^{++},\pi^0,\pi^+] &= -6\big[\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^0\pi^0)\\
&-\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^-\pi^+)\\
&-\mathcal{A}(\Lambda_b^0\to\Delta^-\pi^0\pi^+)\\
&+\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^0\pi^-)\\
&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Delta^{++}\pi^-\pi^-)\\
&+2\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^-\pi^0)\big]\\
&=0, \qquad \text{(C286)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^3[\Lambda_b^0,\Delta^{++},\pi^+,\eta_8] &= -6\big[\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^0\eta_8)\\
&-\mathcal{A}(\Lambda_b^0\to\Delta^-\pi^+\eta_8)\\
&+\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^-\eta_8)\big]\\
&=0, \qquad \text{(C287)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^3[\Lambda_b^0,\Delta^{++},K^+,\overline{K}^0] &= 6\big[\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^0K^0\overline{K}^0)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^0K^+K^-)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^+K^0K^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Delta^-K^+\overline{K}^0)\big]\\
&=0, \qquad \text{(C288)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^3[\Xi_b^-,\Xi^{*0},\pi^+,K^+] &= 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^{*0}\pi^0K^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi^{*0}\pi^-K^+)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^{*-}\pi^0K^+)\\
&-\mathcal{A}(\Xi_b^0\to\Xi^{*-}\pi^+K^0)\\
&-\mathcal{A}(\Xi_b^-\to\Xi^{*0}\pi^-K^0)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi^{*-}\pi^0K^0)\\
&-\mathcal{A}(\Xi_b^-\to\Xi^{*-}\pi^-K^+)\big]\\
&=0, \qquad \text{(C289)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^4[\Xi_b^-,\Sigma^{*+},\pi^+,\pi^+] &= 24\big[-2\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^0\pi^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^+\pi^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^-\pi^+)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*-}\pi^0\pi^+)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*+}\pi^0\pi^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*-}\pi^+\pi^0)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^{*+}\pi^-\pi^0)\\
&+2\mathcal{A}(\Xi_b^-\to\Sigma^{*0}\pi^0\pi^-)\\
&+2\mathcal{A}(\Xi_b^-\to\Sigma^{*0}\pi^-\pi^0)\\
&+2\mathcal{A}(\Xi_b^-\to\Sigma^{*-}\pi^0\pi^0)\\
&-\mathcal{A}(\Xi_b^-\to\Sigma^{*-}\pi^-\pi^+)\\
&-\mathcal{A}(\Xi_b^-\to\Sigma^{*-}\pi^+\pi^-)\\
&+\mathcal{A}(\Xi_b^-\to\Sigma^{*+}\pi^-\pi^-)\big]\\
&=0, \qquad \text{(C290)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^3[\Xi_b^0,\Sigma^{*+},\pi^+,\pi^+] &= -6\sqrt{2}\big[-2\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^0\pi^0)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^+\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^-\pi^+)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^{*-}\pi^0\pi^+)\\
&-\mathcal{A}(\Xi_b^0\to\Sigma^{*+}\pi^0\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^{*-}\pi^+\pi^0)\\
&-\mathcal{A}(\Xi_b^0\to\Sigma^{*+}\pi^-\pi^0)\big]\\
&=0, \qquad \text{(C291)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^3[\Xi_b^-,\Sigma^{*0},\pi^+,\pi^+] &= 6\big[-2\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^0\pi^0)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^+\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^-\pi^+)\\
&+2\mathcal{A}(\Xi_b^0\to\Sigma^{*-}\pi^0\pi^+)\\
&+2\mathcal{A}(\Xi_b^0\to\Sigma^{*-}\pi^+\pi^0)\\
&+\sqrt{2}\big(\mathcal{A}(\Xi_b^-\to\Sigma^{*0}\pi^0\pi^-)\\
&+\mathcal{A}(\Xi_b^-\to\Sigma^{*0}\pi^-\pi^0)\\
&+2\mathcal{A}(\Xi_b^-\to\Sigma^{*-}\pi^0\pi^0)\\
&-\mathcal{A}(\Xi_b^-\to\Sigma^{*-}\pi^-\pi^+)\\
&-\mathcal{A}(\Xi_b^-\to\Sigma^{*-}\pi^+\pi^-)\big)\big]\\
&=0, \qquad \text{(C292)}
\end{aligned}$$

$$\begin{aligned}
SumI_-^3[\Xi_b^-,\Sigma^{*+},\pi^+,\pi^0] &= -6\big[-2\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^0\pi^0)\\
&+2\mathcal{A}(\Xi_b^0\to\Sigma^{*0}\pi^+\pi^-)\\
&-2\mathcal{A}(\Xi_b^0\to\Sigma^{*+}\pi^0\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^{*-}\pi^+\pi^0)\\
&-\mathcal{A}(\Xi_b^0\to\Sigma^{*+}\pi^-\pi^0)\\
&+\sqrt{2}\big(2\mathcal{A}(\Xi_b^-\to\Sigma^{*0}\pi^0\pi^-)
\end{aligned}$$

$$+\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^-\pi^0) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^0\pi^0) - \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^+\pi^-) + \mathcal{A}(\Xi_b^- \to \Sigma^{*+}\pi^-\pi^-))\big] = 0, \tag{C293}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*+}, \pi^+, \eta_8] = -6\big[-2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^0\eta_8) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*-}\pi^+\eta_8) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^-\eta_8) + \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^-\eta_8) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^0\eta_8)\big)\big] = 0, \tag{C294}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*+}, K^+, \overline{K}^0] = -6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}K^0\overline{K}^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}K^+K^-) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}K^0K^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*-}K^+\overline{K}^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}K^0K^-) - \mathcal{A}(\Xi_b^- \to \Sigma^{*-}K^0\overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-}K^+K^-)\big] = 0, \tag{C295}$$

$$SumI_-^4[\Xi_b^-, \Delta^{++}, \pi^+, \overline{K}^0] = 24\big[\sqrt{6}\mathcal{A}(\Xi_b^0 \to \Delta^0\pi^0\overline{K}^0) + \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0\pi^+K^-) - \sqrt{6}\mathcal{A}(\Xi_b^0 \to \Delta^+\pi^0K^-) - \mathcal{A}(\Xi_b^0 \to \Delta^{++}\pi^-K^-) - \mathcal{A}(\Xi_b^0 \to \Delta^-\pi^+\overline{K}^0) + \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+\pi^-\overline{K}^0) + \sqrt{6}\mathcal{A}(\Xi_b^- \to \Delta^0\pi^0K^-) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0\pi^-\overline{K}^0) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Delta^-\pi^0\overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Delta^-\pi^+K^-) + \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^+\pi^-K^-)\big] = 0, \tag{C296}$$

$$SumI_-^3[\Xi_b^0, \Delta^{++}, \pi^+, \overline{K}^0] = 6\big[-\sqrt{6}\mathcal{A}(\Xi_b^0 \to \Delta^0\pi^0\overline{K}^0) - \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0\pi^+K^-) + \sqrt{6}\mathcal{A}(\Xi_b^0 \to \Delta^+\pi^0K^-) + \mathcal{A}(\Xi_b^0 \to \Delta^{++}\pi^-K^-) + \mathcal{A}(\Xi_b^0 \to \Delta^-\pi^+\overline{K}^0) - \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+\pi^-\overline{K}^0)\big] = 0, \tag{C297}$$

$$SumI_-^3[\Xi_b^-, \Delta^+, \pi^+, \overline{K}^0] = 6\big[2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Delta^0\pi^0\overline{K}^0) + 2\mathcal{A}(\Xi_b^0 \to \Delta^0\pi^+K^-) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Delta^+\pi^0K^-) - \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^-\pi^+\overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Delta^+\pi^-\overline{K}^0) + 2\sqrt{2}\mathcal{A}(\Xi_b^- \to \Delta^0\pi^0K^-) - 2\mathcal{A}(\Xi_b^- \to \Delta^0\pi^-\overline{K}^0) - \sqrt{6}\mathcal{A}(\Xi_b^- \to \Delta^-\pi^0\overline{K}^0) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^-\pi^+K^-) + \mathcal{A}(\Xi_b^- \to \Delta^+\pi^-K^-)\big] = 0, \tag{C298}$$

$$SumI_-^3[\Xi_b^-, \Delta^{++}, \pi^0, \overline{K}^0] = 6\big[-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0\pi^0\overline{K}^0) + \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+\pi^0K^-) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Delta^{++}\pi^-K^-) - \sqrt{6}\mathcal{A}(\Xi_b^0 \to \Delta^+\pi^-\overline{K}^0) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0\pi^0K^-) + \sqrt{6}\mathcal{A}(\Xi_b^- \to \Delta^0\pi^-\overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Delta^-\pi^0\overline{K}^0) - \sqrt{6}\mathcal{A}(\Xi_b^- \to \Delta^+\pi^-K^-)\big] = 0, \tag{C299}$$

$$SumI_-^3[\Xi_b^-, \Delta^{++}, \pi^+, K^-] = 6\big[-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0\pi^+K^-) + \sqrt{6}\mathcal{A}(\Xi_b^0 \to \Delta^+\pi^0K^-) + \mathcal{A}(\Xi_b^0 \to \Delta^{++}\pi^-K^-) - \sqrt{6}\mathcal{A}(\Xi_b^- \to \Delta^0\pi^0K^-) + \mathcal{A}(\Xi_b^- \to \Delta^-\pi^+K^-) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^+\pi^-K^-)\big] = 0, \tag{C300}$$

$$SumI_-^3[\Xi_b^-, \Delta^{++}, \overline{K}^0, \eta_8] = 6\big[-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0\overline{K}^0\eta_8) + \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+K^-\eta_8) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0K^-\eta_8) + \mathcal{A}(\Xi_b^- \to \Delta^-\overline{K}^0\eta_8)\big] = 0, \tag{C301}$$

$$SumI_-^3[\Lambda_b^0, \Sigma^+, \pi^+, K^+] = 6\big[2\mathcal{A}(\Lambda_b^0 \to \Sigma^0\pi^0K^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0\pi^-K^+) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^-\pi^0K^+) - \mathcal{A}(\Lambda_b^0 \to \Sigma^-\pi^+K^0) - \mathcal{A}(\Lambda_b^0 \to \Sigma^+\pi^-K^0)\big] = 0, \tag{C302}$$

$$SumI_-^3[\Lambda_b^0, p, \pi^+, \pi^+] = 6\big[2\mathcal{A}(\Lambda_b^0 \to n\pi^0\pi^0) - \mathcal{A}(\Lambda_b^0 \to n\pi^+\pi^-) - \mathcal{A}(\Lambda_b^0 \to n\pi^-\pi^+) + \sqrt{2}\big(\mathcal{A}(\Lambda_b^0 \to p\pi^0\pi^-)$$

$$+ \mathcal{A}(\Lambda_b^0 \to p\pi^-\pi^0))] = 0, \quad (C303)$$

$$SumI_-^4[\Xi_b^-, \Sigma^+, \pi^+, \pi^+] = -24\big[-2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^0\pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^+\pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^-\pi^+) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^0\pi^+) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^0\pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^+\pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^-\pi^0) + 2\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^0\pi^-) + 2\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^-\pi^0) + 2\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^0\pi^0) - \mathcal{A}(\Xi_b^- \to \Sigma^-\pi^-\pi^+) - \mathcal{A}(\Xi_b^- \to \Sigma^-\pi^+\pi^-) - \mathcal{A}(\Xi_b^- \to \Sigma^+\pi^-\pi^-)\big] = 0, \quad (C304)$$

$$SumI_-^3[\Xi_b^0, \Sigma^+, \pi^+, \pi^+] = 6\sqrt{2}\big[-2\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^0\pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^+\pi^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^-\pi^+) + \mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^0\pi^+) + \mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^0\pi^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^+\pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^-\pi^0)\big] = 0, \quad (C305)$$

$$SumI_-^3[\Xi_b^-, \Sigma^+, \pi^+, \eta_8] = 6\big[-2\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^0\eta_8) + \mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^+\eta_8) + \mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^-\eta_8) + \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^-\eta_8) + \mathcal{A}(\Xi_b^- \to \Sigma^-\pi^0\eta_8)\big)\big] = 0, \quad (C306)$$

$$SumI_-^3[\Xi_b^-, \Sigma^+, K^+, \overline{K}^0] = 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0K^0\overline{K}^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0K^+K^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^+K^0K^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^-K^+\overline{K}^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0K^0K^-) - \mathcal{A}(\Xi_b^- \to \Sigma^-K^0\overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Sigma^-K^+K^-)\big] = 0, \quad (C307)$$

$$SumI_-^3[\Xi_b^-, p, \pi^+, \overline{K}^0] = 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to n\pi^0\overline{K}^0) + \mathcal{A}(\Xi_b^0 \to n\pi^+K^-) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to p\pi^0K^-) + \mathcal{A}(\Xi_b^0 \to p\pi^-\overline{K}^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to n\pi^0K^-) - \mathcal{A}(\Xi_b^- \to n\pi^-\overline{K}^0) + \mathcal{A}(\Xi_b^- \to p\pi^-K^-)\big] = 0, \quad (C308)$$

$$SumI_-^3[\Xi_b^-, \Xi^0, \pi^+, K^+] = 6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0\pi^0K^0) + \mathcal{A}(\Xi_b^0 \to \Xi^0\pi^-K^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^-\pi^0K^+) + \mathcal{A}(\Xi_b^0 \to \Xi^-\pi^+K^0) - \mathcal{A}(\Xi_b^- \to \Xi^0\pi^-K^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^-\pi^0K^0) + \mathcal{A}(\Xi_b^- \to \Xi^-\pi^-K^+)\big] = 0, \quad (C309)$$

$$SumI_-^3[\Xi_b^-, \Lambda^0, \pi^+, \pi^+] = 6\big[-2\mathcal{A}(\Xi_b^0 \to \Lambda^0\pi^0\pi^0) + \mathcal{A}(\Xi_b^0 \to \Lambda^0\pi^+\pi^-) + \mathcal{A}(\Xi_b^0 \to \Lambda^0\pi^-\pi^+) + \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Lambda^0\pi^0\pi^-) + \mathcal{A}(\Xi_b^- \to \Lambda^0\pi^-\pi^0)\big)\big] = 0, \quad (C310)$$

$$SumI_-^3[\Xi_b^-, \Xi^0, \pi^+, \pi^+] = 6\big[-2\mathcal{A}(\Xi_b^0 \to \Xi^0\pi^0\pi^0) + \mathcal{A}(\Xi_b^0 \to \Xi^0\pi^-\pi^+) + \mathcal{A}(\Xi_b^0 \to \Xi^0\pi^+\pi^-) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^-\pi^0\pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^-\pi^+\pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^0\pi^0\pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^0\pi^-\pi^0) - 2\mathcal{A}(\Xi_b^- \to \Xi^-\pi^0\pi^0) + \mathcal{A}(\Xi_b^- \to \Xi^-\pi^+\pi^-) + \mathcal{A}(\Xi_b^- \to \Xi^-\pi^-\pi^+)\big] = 0, \quad (C311)$$

$$SumI_-^3[\Xi_b^-, \Sigma^0, \pi^+, \pi^+] = 6\big[-2\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^0\pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^+\pi^-) + \mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^-\pi^+) + 2\mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^0\pi^+) + 2\mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^+\pi^0) + \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^0\pi^-) + \mathcal{A}(\Xi_b^- \to \Sigma^0\pi^-\pi^0) + 2\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^0\pi^0) - \mathcal{A}(\Xi_b^- \to \Sigma^-\pi^-\pi^+) - \mathcal{A}(\Xi_b^- \to \Sigma^-\pi^+\pi^-)\big)\big] = 0, \quad (C312)$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-,\Sigma^+,\pi^0,\pi^+] = 6\big[&-2\mathcal{A}(\Xi_b^0\to\Sigma^0\pi^0\pi^0)\\
&+2\mathcal{A}(\Xi_b^0\to\Sigma^0\pi^-\pi^+)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^-\pi^0\pi^+)\\
&+\mathcal{A}(\Xi_b^0\to\Sigma^+\pi^0\pi^-)\\
&+2\mathcal{A}(\Xi_b^0\to\Sigma^+\pi^-\pi^0)\\
&+\sqrt{2}\big(\mathcal{A}(\Xi_b^-\to\Sigma^0\pi^0\pi^-)\\
&+2\mathcal{A}(\Xi_b^-\to\Sigma^0\pi^-\pi^0)\\
&+\mathcal{A}(\Xi_b^-\to\Sigma^-\pi^0\pi^0)\\
&-\mathcal{A}(\Xi_b^-\to\Sigma^-\pi^-\pi^+)\\
&-\mathcal{A}(\Xi_b^-\to\Sigma^+\pi^-\pi^-)\big)\big]\\
=0,& \qquad \text{(C313)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Xi^{*0},\pi^+,K^+] = -2\big[&\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Xi^{*0}\pi^0K^0)\\
&+\mathcal{A}(\Lambda_b^0\to\Xi^{*0}\pi^-K^+)\\
&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Xi^{*-}\pi^0K^+)\\
&-\mathcal{A}(\Lambda_b^0\to\Xi^{*-}\pi^+K^0)\big]\\
=0,& \qquad \text{(C314)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Lambda_b^0,\Sigma^{*+},\pi^+,\pi^+] = -6\sqrt{2}\big[&-2\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^0\pi^0)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^-\pi^+)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^+\pi^-)\\
&-\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}\pi^0\pi^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}\pi^0\pi^+)\\
&-\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}\pi^-\pi^0)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}\pi^+\pi^0)\big]\\
=0,& \qquad \text{(C315)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Sigma^{*0},\pi^+,\pi^+] = 4&\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^0\pi^0)\\
&-2\big[\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^-\pi^+)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^+\pi^-)\\
&+2\big(\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}\pi^0\pi^+)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}\pi^+\pi^0)\big)\big]\\
=0,& \qquad \text{(C316)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Sigma^{*+},\pi^0,\pi^+] = -2\big[&2\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^0\pi^0)\\
&-2\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^-\pi^+)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}\pi^0\pi^-)\\
&-\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}\pi^0\pi^+)\\
&+2\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}\pi^-\pi^0)\big]\\
=0,& \qquad \text{(C317)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Sigma^{*+},\pi^+,\eta_8] = -2\big[&2\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}\pi^0\eta_8)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}\pi^-\eta_8)\\
&-\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}\pi^+\eta_8)\big]\\
=0,& \qquad \text{(C318)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Sigma^{*+},K^+,\overline{K}^0] = 2\big[&\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}K^0\overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^{*0}K^+K^-)\\
&-\mathcal{A}(\Lambda_b^0\to\Sigma^{*+}K^0K^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Sigma^{*-}K^+\overline{K}^0)\big]\\
=0,& \qquad \text{(C319)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Lambda_b^0,\Delta^{++},\pi^+,\overline{K}^0] = 6\big[&-\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^0\overline{K}^0)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^+K^-)\\
&+\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^0K^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Delta^{++}\pi^-K^-)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^-\overline{K}^0)\\
&+\mathcal{A}(\Lambda_b^0\to\Delta^-\pi^+\overline{K}^0)\big]\\
=0,& \qquad \text{(C320)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Delta^+,\pi^+,\overline{K}^0] = -2\big[&2\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^0\overline{K}^0)\\
&+2\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^+K^-)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^0K^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^-\overline{K}^0)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^-\pi^+\overline{K}^0)\big]\\
=0,& \qquad \text{(C321)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Delta^{++},\pi^0,\overline{K}^0] = 2\big[&\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^0\overline{K}^0)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^0K^-)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Delta^{++}\pi^-K^-)\\
&+\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^-\overline{K}^0)\big]\\
=0,& \qquad \text{(C322)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Delta^{++},\pi^+,K^-] = 2\sqrt{3}&\mathcal{A}(\Lambda_b^0\to\Delta^0\pi^+K^-)\\
&-2\big[\sqrt{6}\mathcal{A}(\Lambda_b^0\to\Delta^+\pi^0K^-)\\
&+\mathcal{A}(\Lambda_b^0\to\Delta^{++}\pi^-K^-)\big]\\
=0,& \qquad \text{(C323)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0,\Delta^{++},\overline{K}^0,\eta_8] = 2\sqrt{3}\big[&\mathcal{A}(\Lambda_b^0\to\Delta^0\overline{K}^0\eta_8)\\
&-\mathcal{A}(\Lambda_b^0\to\Delta^+K^-\eta_8)\big]\\
=0,& \qquad \text{(C324)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-,\Omega^-,\pi^+,K^+] = 2\sqrt{2}&\mathcal{A}(\Xi_b^0\to\Omega^-\pi^0K^+)\\
&-2\big[\mathcal{A}(\Xi_b^0\to\Omega^-\pi^+K^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Omega^-\pi^0K^0)\\
&+\mathcal{A}(\Xi_b^-\to\Omega^-\pi^-K^+)\big]\\
=0,& \qquad \text{(C325)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-,\Xi^{*0},\pi^+,\pi^+] = 6\big[&-2\mathcal{A}(\Xi_b^0\to\Xi^{*0}\pi^0\pi^0)\\
&+\mathcal{A}(\Xi_b^0\to\Xi^{*0}\pi^+\pi^-)\\
&+\mathcal{A}(\Xi_b^0\to\Xi^{*0}\pi^-\pi^+)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^{*-}\pi^0\pi^+)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^{*-}\pi^+\pi^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi^{*0}\pi^0\pi^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi^{*0}\pi^-\pi^0)\\
&+2\mathcal{A}(\Xi_b^-\to\Xi^{*-}\pi^0\pi^0)
\end{aligned}
$$

$$
\begin{aligned}
&- \mathcal{A}(\Xi_b^- \to \Xi^{*-}\pi^+\pi^-)\\
&- \mathcal{A}(\Xi_b^- \to \Xi^{*-}\pi^-\pi^+)\big]\\
&= 0, \qquad \text{(C326)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^0, \Xi^{*0}, \pi^+, \pi^+] = &-2\big[-2\mathcal{A}(\Xi_b^0 \to \Xi^{*0}\pi^0\pi^0)\\
&+ \mathcal{A}(\Xi_b^0 \to \Xi^{*0}\pi^+\pi^-)\\
&+ \mathcal{A}(\Xi_b^0 \to \Xi^{*0}\pi^-\pi^+)\\
&+ \sqrt{2}\big(\mathcal{A}(\Xi_b^0 \to \Xi^{*-}\pi^0\pi^+)\\
&+ \mathcal{A}(\Xi_b^0 \to \Xi^{*-}\pi^+\pi^0)\big)\big]\\
&= 0, \qquad \text{(C327)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Xi^{*-}, \pi^+, \pi^+] = &\,2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*-}\pi^0\pi^+)\\
&+ \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*-}\pi^+\pi^0)\\
&+ 2\mathcal{A}(\Xi_b^- \to \Xi^{*-}\pi^0\pi^0)\\
&- \mathcal{A}(\Xi_b^- \to \Xi^{*-}\pi^+\pi^-)\\
&- \mathcal{A}(\Xi_b^- \to \Xi^{*-}\pi^-\pi^+)\big]\\
&= 0, \qquad \text{(C328)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Xi^{*0}, \pi^0, \pi^+] = &\,2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*0}\pi^0\pi^0)\\
&- 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*0}\pi^-\pi^+)\\
&+ \mathcal{A}(\Xi_b^0 \to \Xi^{*-}\pi^0\pi^+)\\
&+ \mathcal{A}(\Xi_b^- \to \Xi^{*0}\pi^0\pi^-)\\
&+ 2\mathcal{A}(\Xi_b^- \to \Xi^{*0}\pi^-\pi^0)\\
&+ \sqrt{2}\big(\mathcal{A}(\Xi_b^- \to \Xi^{*-}\pi^0\pi^0)\\
&- \mathcal{A}(\Xi_b^- \to \Xi^{*-}\pi^-\pi^+)\big)\big]\\
&= 0, \qquad \text{(C329)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Xi^{*0}, \pi^+, \eta_8] = &\,2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*0}\pi^0\eta_8)\\
&- 2\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*-}\pi^+\eta_8)\\
&+ \mathcal{A}(\Xi_b^- \to \Xi^{*0}\pi^-\eta_8)\\
&+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*-}\pi^0\eta_8)\big]\\
&= 0, \qquad \text{(C330)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Xi^{*0}, K^+, \overline{K}^0] = &-2\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0}K^0\overline{K}^0)\\
&- \mathcal{A}(\Xi_b^0 \to \Xi^{*0}K^+K^-)\\
&+ \mathcal{A}(\Xi_b^0 \to \Xi^{*-}K^+\overline{K}^0)\\
&+ \mathcal{A}(\Xi_b^- \to \Xi^{*0}K^0K^-)\\
&- \mathcal{A}(\Xi_b^- \to \Xi^{*-}K^0\overline{K}^0)\\
&+ \mathcal{A}(\Xi_b^- \to \Xi^{*-}K^+K^-)\big]\\
&= 0, \qquad \text{(C331)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-, \Sigma^{*+}, \pi^+, \overline{K}^0] = &\,6\big[2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^0\overline{K}^0)\\
&+ \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^+K^-)\\
&- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^0K^-)\\
&- \mathcal{A}(\Xi_b^0 \to \Sigma^{*-}\pi^+\overline{K}^0)\\
&+ \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^-\overline{K}^0)\\
&+ 2\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^0K^-)\\
&- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^-\overline{K}^0)\\
&- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^0\overline{K}^0)\\
&- \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^+K^-)\\
&+ \mathcal{A}(\Xi_b^- \to \Sigma^{*+}\pi^-K^-)\big]\\
&= 0, \qquad \text{(C332)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^0, \Sigma^{*+}, \pi^+, \overline{K}^0] = &-2\big[2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^0\overline{K}^0)\\
&+ \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^+K^-)\\
&- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^0K^-)\\
&- \mathcal{A}(\Xi_b^0 \to \Sigma^{*-}\pi^+\overline{K}^0)\\
&+ \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^-\overline{K}^0\big]\\
&= 0, \qquad \text{(C333)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Sigma^{*0}, \pi^+, \overline{K}^0] = &\,2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^0\overline{K}^0)\\
&+ \mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^+K^-)\\
&- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*-}\pi^+\overline{K}^0)\\
&+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^0K^-)\\
&- \mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^-\overline{K}^0)\\
&- 2\mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^0\overline{K}^0)\\
&- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^+K^-)\big]\\
&= 0, \qquad \text{(C334)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Sigma^{*+}, \pi^0, \overline{K}^0] = &-2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^0\overline{K}^0)\\
&- \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^0K^-)\\
&+ \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^-\overline{K}^0)\\
&+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^0K^-)\\
&- 2\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^-\overline{K}^0)\\
&- \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^0\overline{K}^0)\\
&+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*+}\pi^-K^-)\big]\\
&= 0, \qquad \text{(C335)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Sigma^{*+}, \pi^+, K^-] = &-2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\pi^+K^-)\\
&- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\pi^0K^-)\\
&+ 2\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\pi^0K^-)\\
&- \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\pi^+K^-)\\
&+ \mathcal{A}(\Xi_b^- \to \Sigma^{*+}\pi^-K^-)\big]\\
&= 0, \qquad \text{(C336)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Sigma^{*+}, \overline{K}^0, \eta_8] = &\,2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\overline{K}^0\eta_8)\\
&+ \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}K^-\eta_8)\\
&- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}K^-\eta_8)\\
&+ \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\overline{K}^0\eta_8)\big]\\
&= 0, \qquad \text{(C337)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-, \Delta^{++}, \overline{K}^0, \overline{K}^0] = &-6\big[\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0\overline{K}^0\overline{K}^0)\\
&+ \mathcal{A}(\Xi_b^0 \to \Delta^{++}K^-K^-)
\end{aligned}
$$

$$
\begin{aligned}
&-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+ K^- \overline{K}^0)\\
&-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+ \overline{K}^0 K^-)\\
&+\sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0 K^- \overline{K}^0)\\
&+\sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0 \overline{K}^0 K^-)\\
&-\sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^+ K^- K^-)\\
&-\mathcal{A}(\Xi_b^- \to \Delta^- \overline{K}^0 \overline{K}^0)\big]\\
&=0, \qquad \text{(C338)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^0, \Delta^{++}, \overline{K}^0, \overline{K}^0] &= 2\big[\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 \overline{K}^0 \overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0 \to \Delta^{++} K^- K^-)\\
&-\sqrt{3}\big(\mathcal{A}(\Xi_b^0 \to \Delta^+ K^- \overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0 \to \Delta^+ \overline{K}^0 K^-)\big)\big]\\
&=0, \qquad \text{(C339)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Delta^+, \overline{K}^0, \overline{K}^0] &= 2\big[-2\mathcal{A}(\Xi_b^0 \to \Delta^0 \overline{K}^0 \overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0 \to \Delta^+ K^- \overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0 \to \Delta^+ \overline{K}^0 K^-)\\
&-2\mathcal{A}(\Xi_b^- \to \Delta^0 K^- \overline{K}^0)\\
&-2\mathcal{A}(\Xi_b^- \to \Delta^0 \overline{K}^0 K^-)\\
&+\mathcal{A}(\Xi_b^- \to \Delta^+ K^- K^-)\\
&+\sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^- \overline{K}^0 \overline{K}^0)\big]\\
&=0, \qquad \text{(C340)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Delta^{++}, K^-, \overline{K}^0] &= 2\big[\mathcal{A}(\Xi_b^0 \to \Delta^{++} K^- K^-)\\
&-\sqrt{3}\big(\mathcal{A}(\Xi_b^0 \to \Delta^+ K^- \overline{K}^0)\\
&-\mathcal{A}(\Xi_b^- \to \Delta^0 K^- \overline{K}^0)\\
&+\mathcal{A}(\Xi_b^- \to \Delta^+ K^- K^-)\big)\big]\\
&=0, \qquad \text{(C341)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Delta^{++}, \overline{K}^0, K^-] &= 2\big[\mathcal{A}(\Xi_b^0 \to \Delta^{++} K^- K^-)\\
&-\sqrt{3}\big(\mathcal{A}(\Xi_b^0 \to \Delta^+ \overline{K}^0 K^-)\\
&-\mathcal{A}(\Xi_b^- \to \Delta^0 \overline{K}^0 K^-)\\
&+\mathcal{A}(\Xi_b^- \to \Delta^+ K^- K^-)\big)\big]\\
&=0, \qquad \text{(C342)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0, \Delta^+, \pi^+, \overline{K}^0] &= -2\big[2\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^0 \pi^0 \overline{K}^0)\\
&+2\mathcal{A}(\Lambda_b^0 \to \Delta^0 \pi^+ K^-)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^+ \pi^0 K^-)\\
&+\mathcal{A}(\Lambda_b^0 \to \Delta^+ \pi^- \overline{K}^0)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^- \pi^+ \overline{K}^0)\big]\\
&=0, \qquad \text{(C343)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0, \Delta^{++}, \pi^0, \overline{K}^0] &= 2\big[\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 \pi^0 \overline{K}^0)\\
&-\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ \pi^0 K^-)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^{++} \pi^- K^-)\\
&+\sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^+ \pi^- \overline{K}^0)\big]\\
&=0, \qquad \text{(C344)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0, \Delta^{++}, \pi^+, K^-] &= 2\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 \pi^+ K^-)\\
&-2\big[\sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^+ \pi^0 K^-)\\
&+\mathcal{A}(\Lambda_b^0 \to \Delta^{++} \pi^- K^-)\big]\\
&=0, \qquad \text{(C345)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Lambda_b^0, \Sigma^+, \pi^+, \pi^+] &= 6\sqrt{2}\big[-2\mathcal{A}(\Lambda_b^0 \to \Sigma^0 \pi^0 \pi^0)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^0 \pi^- \pi^+)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^0 \pi^+ \pi^-)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^+ \pi^0 \pi^-)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^- \pi^0 \pi^+)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^+ \pi^- \pi^0)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^- \pi^+ \pi^0)\big]\\
&=0, \qquad \text{(C346)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0, \Sigma^+, \pi^+, \eta_8] &= 4\mathcal{A}(\Lambda_b^0 \to \Sigma^0 \pi^0 \eta_8)\\
&-2\big(\mathcal{A}(\Lambda_b^0 \to \Sigma^+ \pi^- \eta_8)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^- \pi^+ \eta_8)\big)\\
&=0, \qquad \text{(C347)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0, \Sigma^+, K^+, \overline{K}^0] &= -2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 K^0 \overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 K^+ K^-)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^+ K^0 K^-)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^- K^+ \overline{K}^0)\big]\\
&=0, \qquad \text{(C348)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0, p, \pi^+, \overline{K}^0] &= -2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to n\pi^0 \overline{K}^0)\\
&+\mathcal{A}(\Lambda_b^0 \to n\pi^+ K^-)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0 \to p\pi^0 K^-)\\
&+\mathcal{A}(\Lambda_b^0 \to p\pi^- \overline{K}^0)\big]\\
&=0, \qquad \text{(C349)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0, \Xi^0, \pi^+, K^+] &= -2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi^0 \pi^0 K^0)\\
&+\mathcal{A}(\Lambda_b^0 \to \Xi^0 \pi^- K^+)\\
&-\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Xi^- \pi^0 K^+)\\
&+\mathcal{A}(\Lambda_b^0 \to \Xi^- \pi^+ K^0)\big]\\
&=0, \qquad \text{(C350)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Lambda_b^0, \Lambda^0, \pi^+, \pi^+] &= 4\mathcal{A}(\Lambda_b^0 \to \Lambda^0 \pi^0 \pi^0)\\
&-2\big[\mathcal{A}(\Lambda_b^0 \to \Lambda^0 \pi^- \pi^+)\\
&+\mathcal{A}(\Lambda_b^0 \to \Lambda^0 \pi^+ \pi^-)\big]\\
&=0, \qquad \text{(C351)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^3[\Xi_b^-, \Sigma^+, \pi^+, \overline{K}^0] &= 6\big[-2\mathcal{A}(\Xi_b^0 \to \Sigma^0 \pi^0 \overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 \pi^+ K^-)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^+ \pi^0 K^-)\\
&+\mathcal{A}(\Xi_b^0 \to \Sigma^- \pi^+ \overline{K}^0)
\end{aligned}
$$

$$
\begin{aligned}
&+\mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^-\overline{K}^0)\\
&-2\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^0K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^-\overline{K}^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^+K^-)\\
&+\mathcal{A}(\Xi_b^- \to \Sigma^+\pi^-K^-)\big]\\
&=0, \qquad \text{(C352)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^-, \Sigma^+, \overline{K}^0, \eta_8] = {}& 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0\overline{K}^0\eta_8)\\
&+\mathcal{A}(\Xi_b^0 \to \Sigma^+K^-\eta_8)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0K^-\eta_8)\\
&-\mathcal{A}(\Xi_b^- \to \Sigma^-\overline{K}^0\eta_8)\big]\\
&=0, \qquad \text{(C353)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^-, p, \overline{K}^0, \overline{K}^0] = {}& -2\big[\mathcal{A}(\Xi_b^0 \to n\overline{K}^0\overline{K}^0)\\
&-\mathcal{A}(\Xi_b^0 \to pK^-\overline{K}^0)\\
&-\mathcal{A}(\Xi_b^0 \to p\overline{K}^0K^-)\\
&+\mathcal{A}(\Xi_b^- \to nK^-\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^- \to n\overline{K}^0K^-)\\
&-\mathcal{A}(\Xi_b^- \to pK^-K^-)\big]\\
&=0, \qquad \text{(C354)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^-, \Xi^0, \pi^+, \eta_8] = {}& 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0\pi^0\eta_8)\\
&+\mathcal{A}(\Xi_b^0 \to \Xi^-\pi^+\eta_8)\\
&-\mathcal{A}(\Xi_b^- \to \Xi^0\pi^-\eta_8)\\
&+\sqrt{2}(\Xi_b^- \to \Xi^-\pi^0\eta_8)\big]\\
&=0, \qquad \text{(C355)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^-, \Xi^0, K^+, \overline{K}^0] = {}& -2\big[\mathcal{A}(\Xi_b^0 \to \Xi^0K^0\overline{K}^0)\\
&-\mathcal{A}(\Xi_b^0 \to \Xi^0K^+K^-)\\
&-\mathcal{A}(\Xi_b^0 \to \Xi^-K^+\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^- \to \Xi^0K^0K^-)\\
&+\mathcal{A}(\Xi_b^- \to \Xi^-K^0\overline{K}^0)\\
&-\mathcal{A}(\Xi_b^- \to \Xi^-K^+K^-)\big]\\
&=0, \qquad \text{(C356)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^-, \Lambda^0, \pi^+, \overline{K}^0] = {}& 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Lambda^0\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0 \to \Lambda^0\pi^+K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Lambda^0\pi^0K^-)\\
&-\mathcal{A}(\Xi_b^- \to \Lambda^0\pi^-\overline{K}^0)\big]\\
&=0, \qquad \text{(C357)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Lambda_b^0, \Sigma^0, \pi^+, \pi^+] = {}& 4\mathcal{A}(\Lambda_b^0 \to \Sigma^0\pi^0\pi^0)\\
&-2\big[\mathcal{A}(\Lambda_b^0 \to \Sigma^0\pi^-\pi^+)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^0\pi^+\pi^-)\\
&+2\big(\mathcal{A}(\Lambda_b^0 \to \Sigma^-\pi^0\pi^+)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^-\pi^+\pi^0)\big)\big]\\
&=0, \qquad \text{(C358)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Lambda_b^0, \Sigma^+, \pi^0, \pi^+] = {}& 4\mathcal{A}(\Lambda_b^0 \to \Sigma^0\pi^0\pi^0)\\
&-2\big[2\mathcal{A}(\Lambda_b^0 \to \Sigma^0\pi^-\pi^+)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^+\pi^0\pi^-)\\
&+\mathcal{A}(\Lambda_b^0 \to \Sigma^-\pi^0\pi^+)\\
&+2\mathcal{A}(\Lambda_b^0 \to \Sigma^+\pi^-\pi^0)\big]\\
&=0, \qquad \text{(C359)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^0, \Sigma^+, \pi^+, \overline{K}^0] = {}& 2\big[2\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^0\overline{K}^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^+K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^0K^-)\\
&-\mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^+\overline{K}^0)\\
&-\mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^-\overline{K}^0)\big]\\
&=0, \qquad \text{(C360)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^-, \Sigma^0, \pi^+, \overline{K}^0] = {}& 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^+K^-)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^-\pi^+\overline{K}^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^0K^-)\\
&-\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^-\overline{K}^0)\\
&-2\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^0\overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^+K^-)\big]\\
&=0, \qquad \text{(C361)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^-, \Sigma^+, \pi^0, \overline{K}^0] = {}& 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^0K^-)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^-\overline{K}^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^0K^-)\\
&-2\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^-\overline{K}^0)\\
&-\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^0\overline{K}^0)\\
&-\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^+\pi^-K^-)\big]\\
&=0, \qquad \text{(C362)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^-, \Sigma^+, \pi^+, K^-] = {}& 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0\pi^+K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^+\pi^0K^-)\\
&+2\mathcal{A}(\Xi_b^- \to \Sigma^0\pi^0K^-)\\
&-\mathcal{A}(\Xi_b^- \to \Sigma^-\pi^+K^-)\\
&-\mathcal{A}(\Xi_b^- \to \Sigma^+\pi^-K^-)\big]\\
&=0, \qquad \text{(C363)}
\end{aligned}
$$

$$
\begin{aligned}
Sum I_-^2[\Xi_b^0, \Xi^0, \pi^+, \pi^+] = {}& 4\mathcal{A}(\Xi_b^0 \to \Xi^0\pi^0\pi^0)\\
&-2\big[\mathcal{A}(\Xi_b^0 \to \Xi^0\pi^-\pi^+)\\
&+\mathcal{A}(\Xi_b^0 \to \Xi^0\pi^+\pi^-)\\
&-\sqrt{2}\big(\mathcal{A}(\Xi_b^0 \to \Xi^-\pi^0\pi^+)
\end{aligned}
$$

$$\begin{aligned}&+\mathcal{A}(\Xi_b^0\to\Xi^-\pi^+\pi^0))]\\&=0,\end{aligned}\tag{C364}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Xi^-,\pi^+,\pi^+]=&\,2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^-\pi^0\pi^+)\\&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^-\pi^+\pi^0)\\&+2\mathcal{A}(\Xi_b^-\to\Xi^-\pi^0\pi^0)\\&-\mathcal{A}(\Xi_b^-\to\Xi^-\pi^+\pi^-)\\&-\mathcal{A}(\Xi_b^-\to\Xi^-\pi^-\pi^+)\big]\\&=0,\end{aligned}\tag{C365}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Xi^0,\pi^0,\pi^+]=&\,2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^0\pi^0\pi^0)\\&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^0\pi^-\pi^+)\\&+\mathcal{A}(\Xi_b^0\to\Xi^-\pi^0\pi^+)\\&-\mathcal{A}(\Xi_b^-\to\Xi^0\pi^0\pi^-)\\&-2\mathcal{A}(\Xi_b^-\to\Xi^0\pi^-\pi^0)\\&+\sqrt{2}\big(\mathcal{A}(\Xi_b^-\to\Xi^-\pi^0\pi^0)\\&-\mathcal{A}(\Xi_b^-\to\Xi^-\pi^-\pi^+)\big)\big]\\&=0.\end{aligned}\tag{C366}$$

4. $b\to u\bar{c}d/s$ modes

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Sigma^+,\overline{D}^0,K^+]=&-2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^0D^-K^+)\\&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^0\overline{D}^0K^0)\\&-\mathcal{A}(\Lambda_b^0\to\Sigma^+D^-K^0)\\&+\mathcal{A}(\Lambda_b^0\to\Sigma^-\overline{D}^0K^+)\big]\\&=0,\end{aligned}\tag{C367}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,p,\overline{D}^0,\pi^+]=&\,2\mathcal{A}(\Lambda_b^0\to nD^-\pi^+)\\&-2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to n\overline{D}^0\pi^0)\\&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to pD^-\pi^0)\\&+\mathcal{A}(\Lambda_b^0\to p\overline{D}^0\pi^-)\big]\\&=0,\end{aligned}\tag{C368}$$

$$\begin{aligned}SumI_-^3[\Xi_b^-,\Sigma^+,\overline{D}^0,\pi^+]=&\,6\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^-\pi^+)\\&-2\mathcal{A}(\Xi_b^0\to\Sigma^0\overline{D}^0\pi^0)\\&+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^+D^-\pi^0)\\&+\mathcal{A}(\Xi_b^0\to\Sigma^-\overline{D}^0\pi^+)\\&+\mathcal{A}(\Xi_b^0\to\Sigma^+\overline{D}^0\pi^-)\\&+2\mathcal{A}(\Xi_b^-\to\Sigma^0D^-\pi^0)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^0\overline{D}^0\pi^-)\\&-\mathcal{A}(\Xi_b^-\to\Sigma^-D^-\pi^+)\\&-\mathcal{A}(\Xi_b^-\to\Sigma^+D^-\pi^-)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^-\overline{D}^0\pi^0)\big]\\&=0,\end{aligned}\tag{C369}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^+,\overline{D}^0,\eta_8]=&\,2\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0\overline{D}^0\eta_8)\\&-2\big[\mathcal{A}(\Xi_b^0\to\Sigma^+D^-\eta_8)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^0D^-\eta_8)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^-\overline{D}^0\eta_8)\big]\\&=0,\end{aligned}\tag{C370}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^+,D_s^-,K^+]=&\,2\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D_s^-K^+)\\&-2\big[\mathcal{A}(\Xi_b^0\to\Sigma^+D_s^-K^0)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^0D_s^-K^0)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^-D_s^-K^+)\big]\\&=0,\end{aligned}\tag{C371}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,p,\overline{D}^0,\overline{K}^0]=&-2\big[\mathcal{A}(\Xi_b^0\to n\overline{D}^0\overline{K}^0)\\&+\mathcal{A}(\Xi_b^0\to pD^-\overline{K}^0)\\&-\mathcal{A}(\Xi_b^0\to p\overline{D}^0K^-)<\\&-\mathcal{A}(\Xi_b^-\to>nD^-\overline{K}^0)\\&+\mathcal{A}(\Xi_b^-\to n\overline{D}^0K^-)\\&+\mathcal{A}(\Xi_b^-\to pD^-K^-)\big]\\&=0,\end{aligned}\tag{C372}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,p,D_s^-,\pi^+]=&-2\big[\mathcal{A}(\Xi_b^0\to nD_s^-\pi^+)\\&-\sqrt{2}\mathcal{A}(\Xi_b^0\to pD_s^-\pi^0)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to nD_s^-\pi^0)\\&+\mathcal{A}(\Xi_b^-\to pD_s^-\pi^-)\big]\\&=0,\end{aligned}\tag{C373}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Xi^0,\overline{D}^0,K^+]=&-2\big[\mathcal{A}(\Xi_b^0\to\Xi^0D^-K^+)\\&+\mathcal{A}(\Xi_b^0\to\Xi^0\overline{D}^0K^0)\\&-\mathcal{A}(\Xi_b^0\to\Xi^-\overline{D}^0K^+)\\&-\mathcal{A}(\Xi_b^-\to\Xi^0D^-K^0)\\&+\mathcal{A}(\Xi_b^-\to\Xi^-D^-K^+)\\&+\mathcal{A}(\Xi_b^-\to\Xi^-\overline{D}^0K^0)\big]\\&=0,\end{aligned}\tag{C374}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Lambda^0,\overline{D}^0,\pi^+]=&-2\big[\mathcal{A}(\Xi_b^0\to\Lambda^0D^-\pi^+)\\&-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Lambda^0\overline{D}^0\pi^0)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Lambda^0D^-\pi^0)\\&+\mathcal{A}(\Xi_b^-\to\Lambda^0\overline{D}^0\pi^-)\big]\\&=0,\end{aligned}\tag{C375}$$

$$\begin{aligned}SumI_-^2[\Lambda_b^0,\Sigma^+,\overline{D}^0,\pi^+]=&-2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^0D^-\pi^+)\\&-2\mathcal{A}(\Lambda_b^0\to\Sigma^0\overline{D}^0\pi^0)\\&+\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^+D^-\pi^0)\\&+\mathcal{A}(\Lambda_b^0\to\Sigma^-\overline{D}^0\pi^+)\\&+\mathcal{A}(\Lambda_b^0\to\Sigma^+\overline{D}^0\pi^-)\big]\\&=0,\end{aligned}\tag{C376}$$

$$SumI_-[\Lambda_b^0,\Sigma^+,\overline{D}^0,\eta_8]=-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^0\overline{D}^0\eta_8)$$

$$+\mathcal{A}(\Lambda_b^0\to\Sigma^+D^-\eta_8)=0, \tag{C377}$$

$$SumI_-[\Lambda_b^0,\Sigma^+,D_s^-,K^+]=-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Sigma^0D_s^-K^+)+\mathcal{A}(\Lambda_b^0\to\Sigma^+D_s^-K^0)=0, \tag{C378}$$

$$SumI_-[\Lambda_b^0,p,\overline{D}^0,\overline{K}^0]=\mathcal{A}(\Lambda_b^0\to n\overline{D}^0\overline{K}^0)+\mathcal{A}(\Lambda_b^0\to pD^-\overline{K}^0)-\mathcal{A}(\Lambda_b^0\to p\overline{D}^0K^-)=0, \tag{C379}$$

$$SumI_-[\Lambda_b^0,p,D_s^-,\pi^+]=\mathcal{A}(\Lambda_b^0\to nD_s^-\pi^+)-\sqrt{2}\mathcal{A}(\Lambda_b^0\to pD_s^-\pi^0)=0, \tag{C380}$$

$$SumI_-[\Lambda_b^0,\Xi^0,\overline{D}^0,K^+]=\mathcal{A}(\Lambda_b^0\to\Xi^0D^-K^+)+\mathcal{A}(\Lambda_b^0\to\Xi^0\overline{D}^0K^0)-\mathcal{A}(\Lambda_b^0\to\Xi^-\overline{D}^0K^+)=0, \tag{C381}$$

$$SumI_-[\Lambda_b^0,\Lambda^0,\overline{D}^0,\pi^+]=\mathcal{A}(\Lambda_b^0\to\Lambda^0D^-\pi^+)-\sqrt{2}\mathcal{A}(\Lambda_b^0\to\Lambda^0\overline{D}^0\pi^0)=0, \tag{C382}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^+,\overline{D}^0,\overline{K}^0]=&\,2\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0\overline{D}^0\overline{K}^0)-2\big[\mathcal{A}(\Xi_b^0\to\Sigma^+D^-\overline{K}^0)-\mathcal{A}(\Xi_b^0\to\Sigma^+\overline{D}^0K^-)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^0D^-\overline{K}^0)-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^0\overline{D}^0K^-)+\mathcal{A}(\Xi_b^-\to\Sigma^+D^-K^-)\\&+\mathcal{A}(\Xi_b^-\to\Sigma^-\overline{D}^0\overline{K}^0)\big]=0,\end{aligned} \tag{C383}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^+,D_s^-,\pi^+]=&\,2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D_s^-\pi^+)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^+D_s^-\pi^0)+2\mathcal{A}(\Xi_b^-\to\Sigma^0D_s^-\pi^0)\\&-\mathcal{A}(\Xi_b^-\to\Sigma^-D_s^-\pi^+)-\mathcal{A}(\Xi_b^-\to\Sigma^+D_s^-\pi^-)\big]=0,\end{aligned} \tag{C384}$$

$$SumI_-[\Xi_b^-,\Sigma^+,D_s^-,\eta_8]=-\mathcal{A}(\Xi_b^0\to\Sigma^+D_s^-\eta_8)-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^0D_s^-\eta_8)=0, \tag{C385}$$

$$SumI_-[\Xi_b^-,p,D_s^-,\overline{K}^0]=-\mathcal{A}(\Xi_b^0\to pD_s^-\overline{K}^0)+\mathcal{A}(\Xi_b^-\to nD_s^-\overline{K}^0)-\mathcal{A}(\Xi_b^-\to pD_s^-K^-)=0, \tag{C386}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Xi^0,\overline{D}^0,\pi^+]=&-2\big[\mathcal{A}(\Xi_b^0\to\Xi^0D^-\pi^+)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Xi^0\overline{D}^0\pi^0)-\mathcal{A}(\Xi_b^0\to\Xi^-\overline{D}^0\pi^+)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi^0D^-\pi^0)+\mathcal{A}(\Xi_b^-\to\Xi^0\overline{D}^0\pi^-)+\mathcal{A}(\Xi_b^-\to\Xi^-D^-\pi^+)\\&-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Xi^-\overline{D}^0\pi^0)\big]=0,\end{aligned} \tag{C387}$$

$$SumI_-[\Xi_b^-,\Xi^0,\overline{D}^0,\eta_8]=-\mathcal{A}(\Xi_b^0\to\Xi^0\overline{D}^0\eta_8)+\mathcal{A}(\Xi_b^-\to\Xi^0D^-\eta_8)-\mathcal{A}(\Xi_b^-\to\Xi^-\overline{D}^0\eta_8)=0, \tag{C388}$$

$$SumI_-[\Xi_b^-,\Xi^0,D_s^-,K^+]=-\mathcal{A}(\Xi_b^0\to\Xi^0D_s^-K^+)+\mathcal{A}(\Xi_b^-\to\Xi^0D_s^-K^0)-\mathcal{A}(\Xi_b^-\to\Xi^-D_s^-K^+)=0, \tag{C389}$$

$$SumI_-[\Xi_b^-,\Lambda^0,\overline{D}^0,\overline{K}^0]=-\mathcal{A}(\Xi_b^0\to\Lambda^0\overline{D}^0\overline{K}^0)+\mathcal{A}(\Xi_b^-\to\Lambda^0D^-\overline{K}^0)-\mathcal{A}(\Xi_b^-\to\Lambda^0\overline{D}^0K^-)=0, \tag{C390}$$

$$SumI_-[\Xi_b^-,\Lambda^0,D_s^-,\pi^+]=-\mathcal{A}(\Xi_b^0\to\Lambda^0D_s^-\pi^+)-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Lambda^0D_s^-\pi^0)=0, \tag{C391}$$

$$\begin{aligned}SumI_-^2[\Xi_b^0,\Sigma^+,\overline{D}^0,\pi^+]=&-2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^-\pi^+)-2\mathcal{A}(\Xi_b^0\to\Sigma^0\overline{D}^0\pi^0)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^+D^-\pi^0)\\&+\mathcal{A}(\Xi_b^0\to\Sigma^-\overline{D}^0\pi^+)+\mathcal{A}(\Xi_b^0\to\Sigma^+\overline{D}^0\pi^-)\big]=0,\end{aligned} \tag{C392}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^0,\overline{D}^0,\pi^+]=&-2\big[\mathcal{A}(\Xi_b^0\to\Sigma^0D^-\pi^+)-\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0\overline{D}^0\pi^0)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^-\overline{D}^0\pi^+)\\&+\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^0D^-\pi^0)+\mathcal{A}(\Xi_b^-\to\Sigma^0\overline{D}^0\pi^-)-\sqrt{2}\mathcal{A}(\Xi_b^-\to\Sigma^-D^-\pi^+)\\&+2\mathcal{A}(\Xi_b^-\to\Sigma^-\overline{D}^0\pi^0)\big]=0,\end{aligned} \tag{C393}$$

$$\begin{aligned}SumI_-^2[\Xi_b^-,\Sigma^+,D^-,\pi^+]=&\,2\big[\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^0D^-\pi^+)+\sqrt{2}\mathcal{A}(\Xi_b^0\to\Sigma^+D^-\pi^0)+2\mathcal{A}(\Xi_b^-\to\Sigma^0D^-\pi^0)\\&-\mathcal{A}(\Xi_b^-\to\Sigma^-D^-\pi^+)\end{aligned}$$

$$- \mathcal{A}(\Xi_b^- \to \Sigma^+ D^- \pi^-)\big] = 0, \quad (C394)$$

$$SumI_-^2[\Xi_b^-, \Sigma^+, \overline{D}^0, \pi^0] = 2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 \overline{D}^0 \pi^0) - 2\big[\mathcal{A}(\Xi_b^0 \to \Sigma^+ D^- \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^+ \overline{D}^0 \pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 D^- \pi^0) + 2\mathcal{A}(\Xi_b^- \to \Sigma^0 \overline{D}^0 \pi^-) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^+ D^- \pi^-) + \mathcal{A}(\Xi_b^- \to \Sigma^- \overline{D}^0 \pi^0)\big] = 0, \quad (C395)$$

$$SumI_-[\Lambda_b^0, \Sigma^0, \overline{D}^0, \pi^+] = \mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^- \pi^+) + \sqrt{2}\big[-\mathcal{A}(\Lambda_b^0 \to \Sigma^0 \overline{D}^0 \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^- \overline{D}^0 \pi^+)\big] = 0, \quad (C396)$$

$$SumI_-[\Lambda_b^0, \Sigma^+, D^-, \pi^+] = -\sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Sigma^0 D^- \pi^+) + \mathcal{A}(\Lambda_b^0 \to \Sigma^+ D^- \pi^0)\big] = 0, \quad (C397)$$

$$SumI_-[\Lambda_b^0, \Sigma^+, \overline{D}^0, \pi^0] = -\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^0 \overline{D}^0 \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^+ D^- \pi^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^+ \overline{D}^0 \pi^-) = 0, \quad (C398)$$

$$SumI_-[\Xi_b^0, \Sigma^+, \overline{D}^0, \overline{K}^0] = -\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^0 \overline{D}^0 \overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^+ D^- \overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^+ \overline{D}^0 K^-) = 0, \quad (C399)$$

$$SumI_-[\Xi_b^-, \Sigma^0, \overline{D}^0, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Sigma^0 \overline{D}^0 \overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Sigma^0 D^- \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Sigma^0 \overline{D}^0 K^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^- \overline{D}^0 \overline{K}^0) = 0, \quad (C400)$$

$$SumI_-[\Xi_b^-, \Sigma^+, D^-, \overline{K}^0] = -\mathcal{A}(\Xi_b^0 \to \Sigma^+ D^- \overline{K}^0) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 D^- \overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Sigma^+ D^- K^-) = 0, \quad (C401)$$

$$SumI_-[\Xi_b^-, \Sigma^+, \overline{D}^0, K^-] = -\mathcal{A}(\Xi_b^0 \to \Sigma^+ \overline{D}^0 K^-) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^0 \overline{D}^0 K^-) + \mathcal{A}(\Xi_b^- \to \Sigma^+ D^- K^-) = 0, \quad (C402)$$

$$SumI_-[\Xi_b^0, \Sigma^+, D_s^-, \pi^+] = -\sqrt{2}\big[\mathcal{A}(\Xi_b^0 \to \Sigma^0 D_s^- \pi^+) + \mathcal{A}(\Xi_b^0 \to \Sigma^+ D_s^- \pi^0)\big] = 0, \quad (C403)$$

$$SumI_-[\Xi_b^-, \Sigma^0, D_s^-, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Sigma^0 D_s^- \pi^+) + \sqrt{2}\big[-\mathcal{A}(\Xi_b^- \to \Sigma^0 D_s^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Sigma^- D_s^- \pi^+)\big] = 0, \quad (C404)$$

$$SumI_-[\Xi_b^-, \Sigma^+, D_s^-, \pi^0] = -\mathcal{A}(\Xi_b^0 \to \Sigma^+ D_s^- \pi^0) + \sqrt{2}\big[-\mathcal{A}(\Xi_b^- \to \Sigma^0 D_s^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Sigma^+ D_s^- \pi^-)\big] = 0, \quad (C405)$$

$$SumI_-[\Xi_b^0, \Xi^0, \overline{D}^0, \pi^+] = \mathcal{A}(\Xi_b^0 \to \Xi^0 D^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^0 \overline{D}^0 \pi^0) - \mathcal{A}(\Xi_b^0 \to \Xi^- \overline{D}^0 \pi^+) = 0, \quad (C406)$$

$$SumI_-[\Xi_b^-, \Xi^-, \overline{D}^0, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Xi^- \overline{D}^0 \pi^+) + \mathcal{A}(\Xi_b^- \to \Xi^- D^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^- \overline{D}^0 \pi^0) = 0, \quad (C407)$$

$$SumI_-[\Xi_b^-, \Xi^0, \overline{D}^0, \pi^0] = -\mathcal{A}(\Xi_b^0 \to \Xi^0 \overline{D}^0 \pi^0) + \mathcal{A}(\Xi_b^- \to \Xi^0 D^- \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^0 \overline{D}^0 \pi^-) - \mathcal{A}(\Xi_b^- \to \Xi^- \overline{D}^0 \pi^0) = 0, \quad (C408)$$

$$SumI_-[\Xi_b^-, \Xi^0, D^-, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Xi^0 D^- \pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^0 D^- \pi^0) - \mathcal{A}(\Xi_b^- \to \Xi^- D^- \pi^+) = 0, \quad (C409)$$

$$SumI_-^2[\Lambda_b^0, \Sigma^{*+}, \overline{D}^0, K^+] = 2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^- K^+) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} \overline{D}^0 K^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^- K^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} \overline{D}^0 K^+)\big] = 0, \quad (C410)$$

$$SumI_-^2[\Lambda_b^0, \Delta^{++}, \overline{D}^0, \eta_8] = 2\sqrt{3}\big[\mathcal{A}(\Lambda_b^0 \to \Delta^0 \overline{D}^0 \eta_8) + \mathcal{A}(\Lambda_b^0 \to \Delta^+ D^- \eta_8)\big] = 0, \quad (C411)$$

$$SumI_-^3[\Lambda_b^0, \Delta^{++}, \overline{D}^0, \pi^+] = -6\big[-\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^- \pi^+) + \sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^0 \overline{D}^0 \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Delta^{++} D^- \pi^-) + \sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^- \pi^0) - \mathcal{A}(\Lambda_b^0 \to \Delta^- \overline{D}^0 \pi^+) + \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ \overline{D}^0 \pi^-)\big]$$

$$= 0, \tag{C412}$$

$$SumI_-^2[\Lambda_b^0, \Delta^+, \overline{D}^0, \pi^+] = 4\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^- \pi^+) - 2\big[2\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^0 \overline{D}^0 \pi^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^- \pi^0) - \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^- \overline{D}^0 \pi^+) + \mathcal{A}(\Lambda_b^0 \to \Delta^+ \overline{D}^0 \pi^-)\big] = 0, \tag{C413}$$

$$SumI_-^2[\Lambda_b^0, \Delta^{++}, D^-, \pi^+] = 2\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 D^- \pi^+) - 2\big(\mathcal{A}(\Lambda_b^0 \to \Delta^{++} D^- \pi^-) + \sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^- \pi^0)\big) = 0, \tag{C414}$$

$$SumI_-^2[\Lambda_b^0, \Delta^{++}, \overline{D}^0, \pi^0] = 2\big[\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0 \overline{D}^0 \pi^0) + \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^{++} D^- \pi^-) + \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^- \pi^0) + \sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^+ \overline{D}^0 \pi^-)\big] = 0, \tag{C415}$$

$$SumI_-^2[\Lambda_b^0, \Delta^{++}, D_s^-, K^+] = 2\sqrt{3}\big[\mathcal{A}(\Lambda_b^0 \to \Delta^0 D_s^- K^+) + \mathcal{A}(\Lambda_b^0 \to \Delta^+ D_s^- K^0)\big] = 0, \tag{C416}$$

$$SumI_-[\Lambda_b^0, \Xi^{*0}, \overline{D}^0, K^+] = \mathcal{A}(\Lambda_b^0 \to \Xi^{*0} D^- K^+) + \mathcal{A}(\Lambda_b^0 \to \Xi^{*0} \overline{D}^0 K^0) + \mathcal{A}(\Lambda_b^0 \to \Xi^{*-} \overline{D}^0 K^+) = 0, \tag{C417}$$

$$SumI_-^2[\Xi_b^-, \Xi^{*0}, \overline{D}^0, K^+] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^- K^+) + \mathcal{A}(\Xi_b^0 \to \Xi^{*0} \overline{D}^0 K^0) + \mathcal{A}(\Xi_b^0 \to \Xi^{*-} \overline{D}^0 K^+) - \mathcal{A}(\Xi_b^- \to \Xi^{*0} D^- K^0) - \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^- K^+) - \mathcal{A}(\Xi_b^- \to \Xi^{*-} \overline{D}^0 K^0)\big] = 0, \tag{C418}$$

$$SumI_-^3[\Xi_b^-, \Sigma^{*+}, \overline{D}^0, \pi^+] = -6\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D^- \pi^+) - 2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} \overline{D}^0 \pi^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^- \pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*-} \overline{D}^0 \pi^+) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} \overline{D}^0 \pi^-) + 2\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^- \pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} \overline{D}^0 \pi^-) - \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D^- \pi^+) + \mathcal{A}(\Xi_b^- \to \Sigma^{*+} D^- \pi^-) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-} \overline{D}^0 \pi^0)\big] = 0, \tag{C419}$$

$$SumI_-^2[\Xi_b^-, \Sigma^{*+}, \overline{D}^0, \eta_8] = 2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} \overline{D}^0 \eta_8) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^- \eta_8) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^- \eta_8) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-} \overline{D}^0 \eta_8)\big] = 0, \tag{C420}$$

$$SumI_-^2[\Xi_b^-, \Sigma^{*+}, D_s^-, K^+] = 2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D_s^- K^+) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D_s^- K^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D_s^- K^0) + \mathcal{A}(\Xi_b^- \to \Sigma^{*-} D_s^- K^+)\big] = 0, \tag{C421}$$

$$SumI_-^3[\Xi_b^-, \Delta^{++}, \overline{D}^0, \overline{K}^0] = 6\big[-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 \overline{D}^0 \overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Delta^{++} D^- K^-) - \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+ D^- \overline{K}^0) + \sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^+ \overline{D}^0 K^-) + \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0 D^- \overline{K}^0) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^0 \overline{D}^0 K^-) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^+ D^- K^-) + \mathcal{A}(\Xi_b^- \to \Delta^- \overline{D}^0 \overline{K}^0)\big] = 0, \tag{C422}$$

$$SumI_-^3[\Xi_b^-, \Delta^{++}, D_s^-, \pi^+] = 6\big[-\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 D_s^- \pi^+) + \mathcal{A}(\Xi_b^0 \to \Delta^{++} D_s^- \pi^-) + \sqrt{6}\mathcal{A}(\Xi_b^0 \to \Delta^+ D_s^- \pi^0) - \sqrt{6}\mathcal{A}(\Xi_b^- \to \Delta^0 D_s^- \pi^0) + \mathcal{A}(\Xi_b^- \to \Delta^- D_s^- \pi^+) - \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^+ D_s^- \pi^-)\big] = 0, \tag{C423}$$

$$SumI_-^2[\Xi_b^-, \Delta^{++}, D_s^-, \eta_8] = 2\sqrt{3}\big[-\mathcal{A}(\Xi_b^0 \to \Delta^+ D_s^- \eta_8) + \mathcal{A}(\Xi_b^- \to \Delta^0 D_s^- \eta_8)\big] = 0, \tag{C424}$$

$$SumI_-[\Lambda_b^0, \Xi^{*0}, \overline{D}^0, K^+] = \mathcal{A}(\Lambda_b^0 \to \Xi^{*0} D^- K^+) + \mathcal{A}(\Lambda_b^0 \to \Xi^{*0} \overline{D}^0 K^0) + \mathcal{A}(\Lambda_b^0 \to \Xi^{*-} \overline{D}^0 K^+) = 0, \tag{C425}$$

$$SumI_-^2[\Lambda_b^0, \Sigma^{*+}, \overline{D}^0, \pi^+] = 2\big[\sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^- \pi^+) - 2\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} \overline{D}^0 \pi^0) - \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^- \pi^0) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} \overline{D}^0 \pi^+) - \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} \overline{D}^0 \pi^-)\big] = 0, \tag{C426}$$

$$SumI_{-}[\Lambda_b^0, \Sigma^{*+}, \overline{D}^0, \eta_8] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0}\overline{D}^0\eta_8) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+}D^-\eta_8) = 0, \quad (C427)$$

$$SumI_{-}[\Lambda_b^0, \Sigma^{*+}, D_s^-, K^+] = \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0}D_s^-K^+) + \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+}D_s^-K^0) = 0, \quad (C428)$$

$$SumI_{-}^2[\Lambda_b^0, \Delta^{++}, \overline{D}^0, \overline{K}^0] = 2\big[\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0\overline{D}^0\overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to \Delta^{++}D^-K^-) + \sqrt{3}\big(\mathcal{A}(\Lambda_b^0 \to \Delta^+D^-\overline{K}^0) - \mathcal{A}(\Lambda_b^0 \to \Delta^+\overline{D}^0K^-)\big)\big] = 0, \quad (C429)$$

$$SumI_{-}^2[\Lambda_b^0, \Delta^{++}, D_s^-, \pi^+] = 2\sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^0D_s^-\pi^+) - 2\big[\mathcal{A}(\Lambda_b^0 \to \Delta^{++}D_s^-\pi^-) + \sqrt{6}\mathcal{A}(\Lambda_b^0 \to \Delta^+D_s^-\pi^0)\big] = 0, \quad (C430)$$

$$SumI_{-}[\Lambda_b^0, \Delta^{++}, D_s^-, \eta_8] = \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+D_s^-\eta_8) = 0, \quad (C431)$$

$$SumI_{-}[\Xi_b^-, \Omega^-, \overline{D}^0, K^+] = -\mathcal{A}(\Xi_b^0 \to \Omega^-\overline{D}^0K^+) + \mathcal{A}(\Xi_b^- \to \Omega^-D^-K^+) + \mathcal{A}(\Xi_b^- \to \Omega^-K^0\overline{D}^0) = 0, \quad (C432)$$

$$SumI_{-}^2[\Xi_b^-, \Xi^{*0}, \overline{D}^0, \pi^+] = -2\big[\mathcal{A}(\Xi_b^0 \to \Xi^{*0}D^-\pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*0}\overline{D}^0\pi^0) + \mathcal{A}(\Xi_b^0 \to \Xi^{*-}\overline{D}^0\pi^+) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*0}D^-\pi^0) + \mathcal{A}(\Xi_b^- \to \Xi^{*0}\overline{D}^0\pi^-) - \mathcal{A}(\Xi_b^- \to \Xi^{*-}D^-\pi^+) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*-}\overline{D}^0\pi^0)\big] = 0, \quad (C433)$$

$$SumI_{-}[\Xi_b^-, \Xi^{*0}, \overline{D}^0, \eta_8] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0}\overline{D}^0\eta_8) + \mathcal{A}(\Xi_b^- \to \Xi^{*0}D^-\eta_8) + \mathcal{A}(\Xi_b^- \to \Xi^{*-}\overline{D}^0\eta_8) = 0, \quad (C434)$$

$$SumI_{-}[\Xi_b^-, \Xi^{*0}, D_s^-, K^+] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0}D_s^-K^+) + \mathcal{A}(\Xi_b^- \to \Xi^{*0}D_s^-K^0) + \mathcal{A}(\Xi_b^- \to \Xi^{*-}D_s^-K^+) = 0, \quad (C435)$$

$$SumI_{-}^2[\Xi_b^-, \Sigma^{*+}, \overline{D}^0, \overline{K}^0] = -2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\overline{D}^0\overline{K}^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}D^-\overline{K}^0) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\overline{D}^0K^-) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}D^-\overline{K}^0) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\overline{D}^0K^-) + \mathcal{A}(\Xi_b^- \to \Sigma^{*+}D^-K^-) - \mathcal{A}(\Xi_b^- \to \Sigma^{*-}\overline{D}^0\overline{K}^0)\big] = 0, \quad (C436)$$

$$SumI_{-}^2[\Xi_b^-, \Sigma^{*+}, D_s^-, \pi^+] = -2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}D_s^-\pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}D_s^-\pi^0) + 2\mathcal{A}(\Xi_b^- \to \Sigma^{*0}D_s^-\pi^0) - \mathcal{A}(\Xi_b^- \to \Sigma^{*-}D_s^-\pi^+) + \mathcal{A}(\Xi_b^- \to \Sigma^{*+}D_s^-\pi^-)\big] = 0, \quad (C437)$$

$$SumI_{-}[\Xi_b^-, \Sigma^{*+}, D_s^-, \eta_8] = -\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}D_s^-\eta_8) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}D_s^-\eta_8) = 0, \quad (C438)$$

$$SumI_{-}^2[\Xi_b^-, \Delta^{++}, D_s^-, \overline{K}^0] = 2\big[\mathcal{A}(\Xi_b^0 \to \Delta^{++}D_s^-K^-) - \sqrt{3}\big(\mathcal{A}(\Xi_b^0 \to \Delta^+D_s^-\overline{K}^0) - \mathcal{A}(\Xi_b^- \to \Delta^0D_s^-\overline{K}^0) + \mathcal{A}(\Xi_b^- \to \Delta^+D_s^-K^-)\big)\big] = 0, \quad (C439)$$

$$SumI_{-}^2[\Xi_b^0, \Sigma^{*+}, \overline{D}^0, \pi^+] = 2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}D^-\pi^+) - 2\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\overline{D}^0\pi^0) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}D^-\pi^0) + \mathcal{A}(\Xi_b^0 \to \Sigma^{*-}\overline{D}^0\pi^+) - \mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\overline{D}^0\pi^-)\big] = 0, \quad (C440)$$

$$SumI_{-}^2[\Xi_b^-, \Sigma^{*0}, \overline{D}^0, \pi^+] = -2\big[\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}D^-\pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\overline{D}^0\pi^0) + \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*-}\overline{D}^0\pi^+) + \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}D^-\pi^0) + \mathcal{A}(\Xi_b^- \to \Sigma^{*0}\overline{D}^0\pi^-) - \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-}D^-\pi^+) + 2\mathcal{A}(\Xi_b^- \to \Sigma^{*-}\overline{D}^0\pi^0)\big] = 0, \quad (C441)$$

$$SumI_{-}^2[\Xi_b^-, \Sigma^{*+}, D^-, \pi^+] = -2\big[\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}D^-\pi^+) - \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}D^-\pi^0) + 2\mathcal{A}(\Xi_b^- \to \Sigma^{*0}D^-\pi^0) - \mathcal{A}(\Xi_b^- \to \Sigma^{*-}D^-\pi^+) + \mathcal{A}(\Xi_b^- \to \Sigma^{*+}D^-\pi^-)\big] = 0, \quad (C442)$$

$$SumI_{-}^2[\Xi_b^-, \Sigma^{*+}, \overline{D}^0, \pi^0] = 2\big[-\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\overline{D}^0\pi^0)$$

$$
\begin{aligned}
&- \mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^- \pi^0) \\
&- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} \overline{D}^0 \pi^-) \\
&+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^- \pi^0) \\
&+ 2\mathcal{A}(\Xi_b^- \to \Sigma^{*0} \overline{D}^0 \pi^-) \\
&+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*+} D^- \pi^-) \\
&+ \mathcal{A}(\Xi_b^- \to \Sigma^{*-} \overline{D}^0 \pi^0)\big] \\
&= 0, \qquad \text{(C443)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^0, \Delta^{++}, \overline{D}^0, \overline{K}^0] = {}& 2\big[\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 \overline{D}^0 \overline{K}^0) \\
&- \mathcal{A}(\Xi_b^0 \to \Delta^{++} D^- K^-) \\
&+ \sqrt{3}\big(\mathcal{A}(\Xi_b^0 \to \Delta^+ D^- \overline{K}^0) \\
&- \mathcal{A}(\Xi_b^0 \to \Delta^+ \overline{D}^0 K^-)\big)\big] \\
&= 0, \qquad \text{(C444)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Delta^{+}, \overline{D}^0, \overline{K}^0] = {}& -2\big[2\mathcal{A}(\Xi_b^0 \to \Delta^0 \overline{D}^0 \overline{K}^0) \\
&+ \mathcal{A}(\Xi_b^0 \to \Delta^+ D^- \overline{K}^0) \\
&- \mathcal{A}(\Xi_b^0 \to \Delta^+ \overline{D}^0 K^-) \\
&- 2\mathcal{A}(\Xi_b^- \to \Delta^0 D^- \overline{K}^0) \\
&+ 2\mathcal{A}(\Xi_b^- \to \Delta^0 \overline{D}^0 K^-) \\
&+ \mathcal{A}(\Xi_b^- \to \Delta^+ D^- K^-) \\
&+ \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^- \overline{D}^0 \overline{K}^0)\big] \\
&= 0, \qquad \text{(C445)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Delta^{++}, D^-, \overline{K}^0] = {}& 2\big[\mathcal{A}(\Xi_b^0 \to \Delta^{++} D^- K^-) \\
&- \sqrt{3}\big(\mathcal{A}(\Xi_b^0 \to \Delta^+ D^- \overline{K}^0) \\
&- \mathcal{A}(\Xi_b^- \to \Delta^0 D^- \overline{K}^0) \\
&+ \mathcal{A}(\Xi_b^- \to \Delta^+ D^- K^-)\big)\big] \\
&= 0, \qquad \text{(C446)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Delta^{++}, \overline{D}^0, K^-] = {}& -2\big[\mathcal{A}(\Xi_b^0 \to \Delta^{++} D^- K^-) \\
&+ \sqrt{3}\big(\mathcal{A}(\Xi_b^0 \to \Delta^+ \overline{D}^0 K^-) \\
&- \mathcal{A}(\Xi_b^- \to \Delta^0 \overline{D}^0 K^-) \\
&- \mathcal{A}(\Xi_b^- \to \Delta^+ D^- K^-)\big)\big] \\
&= 0, \qquad \text{(C447)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^0, \Delta^{++}, D_s^-, \pi^+] = {}& 2\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^0 D_s^- \pi^+) \\
&- 2\big[\mathcal{A}(\Xi_b^0 \to \Delta^{++} D_s^- \pi^-) \\
&+ \sqrt{6}\mathcal{A}(\Xi_b^0 \to \Delta^+ D_s^- \pi^0)\big] \\
&= 0, \qquad \text{(C448)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Delta^{+}, D_s^-, \pi^+] = {}& -2\big[2\mathcal{A}(\Xi_b^0 \to \Delta^0 D_s^- \pi^+) \\
&- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Delta^+ D_s^- \pi^0) \\
&+ 2\sqrt{2}\mathcal{A}(\Xi_b^- \to \Delta^0 D_s^- \pi^0) \\
&- \sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^- D_s^- \pi^+) \\
&+ \mathcal{A}(\Xi_b^- \to \Delta^+ D_s^- \pi^-)\big] \\
&= 0, \qquad \text{(C449)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-^2[\Xi_b^-, \Delta^{++}, D_s^-, \pi^0] = {}& -2\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Delta^{++} D_s^- \pi^-) \\
&+ 2\sqrt{3}\big[-\mathcal{A}(\Xi_b^0 \to \Delta^+ D_s^- \pi^0) \\
&+ \mathcal{A}(\Xi_b^- \to \Delta^0 D_s^- \pi^0) \\
&+ \sqrt{2}\mathcal{A}(\Xi_b^- \to \Delta^+ D_s^- \pi^-)\big] \\
&= 0, \qquad \text{(C450)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Lambda_b^0, \Sigma^{*0}, \overline{D}^0, \pi^+] = {}& \mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^- \pi^+) \\
&+ \sqrt{2}\big[-\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} \overline{D}^0 \pi^0) \\
&+ \mathcal{A}(\Lambda_b^0 \to \Sigma^{*-} \overline{D}^0 \pi^+)\big] \\
&= 0, \qquad \text{(C451)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Lambda_b^0, \Sigma^{*+}, D^-, \pi^+] = {}& \sqrt{2}\big[\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} D^- \pi^+) \\
&- \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^- \pi^0)\big] \\
&= 0, \qquad \text{(C452)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Lambda_b^0, \Sigma^{*+}, \overline{D}^0, \pi^0] = {}& \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*0} \overline{D}^0 \pi^0) \\
&+ \mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} D^- \pi^0) \\
&+ \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Sigma^{*+} \overline{D}^0 \pi^-) \\
&= 0, \qquad \text{(C453)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Lambda_b^0, \Delta^{+}, \overline{D}^0, \overline{K}^0] = {}& 2\mathcal{A}(\Lambda_b^0 \to \Delta^0 \overline{D}^0 \overline{K}^0) \\
&+ \mathcal{A}(\Lambda_b^0 \to \Delta^+ D^- \overline{K}^0) \\
&- \mathcal{A}(\Lambda_b^0 \to \Delta^+ \overline{D}^0 K^-) \\
&= 0, \qquad \text{(C454)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Lambda_b^0, \Delta^{++}, D^-, \overline{K}^0] = {}& -\mathcal{A}(\Lambda_b^0 \to \Delta^{++} D^- K^-) \\
&+ \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D^- \overline{K}^0) \\
&= 0, \qquad \text{(C455)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Lambda_b^0, \Delta^{++}, \overline{D}^0, K^-] = {}& \mathcal{A}(\Lambda_b^0 \to \Delta^{++} D^- K^-) \\
&+ \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ \overline{D}^0 K^-) \\
&= 0, \qquad \text{(C456)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Lambda_b^0, \Delta^{+}, D_s^-, \pi^+] = {}& 2\mathcal{A}(\Lambda_b^0 \to \Delta^0 D_s^- \pi^+) \\
&- \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D_s^- \pi^0) \\
&= 0, \qquad \text{(C457)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Lambda_b^0, \Delta^{++}, D_s^-, \pi^0] = {}& \sqrt{2}\mathcal{A}(\Lambda_b^0 \to \Delta^{++} D_s^- \pi^-) \\
&+ \sqrt{3}\mathcal{A}(\Lambda_b^0 \to \Delta^+ D_s^- \pi^0) \\
&= 0, \qquad \text{(C458)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^0, \Xi^{*0}, \overline{D}^0, \pi^+] = {}& \mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^- \pi^+) \\
&- \sqrt{2}\mathcal{A}(\Xi_b^0 \to \Xi^{*0} \overline{D}^0 \pi^0) \\
&+ \mathcal{A}(\Xi_b^0 \to \Xi^{*-} \overline{D}^0 \pi^+) \\
&= 0, \qquad \text{(C459)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Xi^{*-}, \overline{D}^0, \pi^+] = {}& -\mathcal{A}(\Xi_b^0 \to \Xi^{*-} \overline{D}^0 \pi^+) \\
&+ \mathcal{A}(\Xi_b^- \to \Xi^{*-} D^- \pi^+) \\
&- \sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*-} \overline{D}^0 \pi^0) \\
&= 0, \qquad \text{(C460)}
\end{aligned}
$$

$$
SumI_-[\Xi_b^-, \Xi^{*0}, D^-, \pi^+] = -\mathcal{A}(\Xi_b^0 \to \Xi^{*0} D^- \pi^+)
$$

$$
\begin{aligned}
&-\sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*0} D^- \pi^0)\\
&+\mathcal{A}(\Xi_b^- \to \Xi^{*-} D^- \pi^+)\\
&=0, \qquad \text{(C461)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Xi^{*0}, \overline{D}^0, \pi^0] = &-\mathcal{A}(\Xi_b^0 \to \Xi^{*0}\overline{D}^0\pi^0)\\
&+\mathcal{A}(\Xi_b^- \to \Xi^{*0} D^- \pi^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Xi^{*0}\overline{D}^0\pi^-)\\
&+\mathcal{A}(\Xi_b^- \to \Xi^{*-}\overline{D}^0\pi^0)\\
&=0, \qquad \text{(C462)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^0, \Sigma^{*+}, \overline{D}^0, \overline{K}^0] = &\sqrt{2}\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\overline{D}^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^- \overline{K}^0)\\
&-\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\overline{D}^0 K^-)\\
&=0, \qquad \text{(C463)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Sigma^{*0}, \overline{D}^0, \overline{K}^0] = &-\mathcal{A}(\Xi_b^0 \to \Sigma^{*0}\overline{D}^0\overline{K}^0)\\
&+\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^- \overline{K}^0)\\
&-\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\overline{D}^0 K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*-}\overline{D}^0\overline{K}^0)\\
&=0, \qquad \text{(C464)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Sigma^{*+}, D^-, \overline{K}^0] = &-\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D^- \overline{K}^0)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D^- \overline{K}^0)\\
&-\mathcal{A}(\Xi_b^- \to \Sigma^{*+} D^- K^-)\\
&=0, \qquad \text{(C465)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Sigma^{*+}, \overline{D}^0, K^-] = &-\mathcal{A}(\Xi_b^0 \to \Sigma^{*+}\overline{D}^0 K^-)\\
&+\sqrt{2}\mathcal{A}(\Xi_b^- \to \Sigma^{*0}\overline{D}^0 K^-)\\
&+\mathcal{A}(\Xi_b^- \to \Sigma^{*+} D^- K^-)\\
&=0, \qquad \text{(C466)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^0, \Sigma^{*+}, D_s^-, \pi^+] = &\sqrt{2}[\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D_s^- \pi^+)\\
&-\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D_s^- \pi^0)]\\
&=0, \qquad \text{(C467)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Sigma^{*0}, D_s^-, \pi^+] = &-\mathcal{A}(\Xi_b^0 \to \Sigma^{*0} D_s^- \pi^+)\\
&+\sqrt{2}[-\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D_s^- \pi^0)\\
&+\mathcal{A}(\Xi_b^- \to \Sigma^{*-} D_s^- \pi^+)]\\
&=0, \qquad \text{(C468)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Sigma^{*+}, D_s^-, \pi^0] = &-\mathcal{A}(\Xi_b^0 \to \Sigma^{*+} D_s^- \pi^0)\\
&+\sqrt{2}[\mathcal{A}(\Xi_b^- \to \Sigma^{*0} D_s^- \pi^0)\\
&+\mathcal{A}(\Xi_b^- \to \Sigma^{*+} D_s^- \pi^-)\\
&=0, \qquad \text{(C469)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^0, \Delta^{++}, D_s^-, \overline{K}^0] = &-\mathcal{A}(\Xi_b^0 \to \Delta^{++} D_s^- K^-)\\
&+\sqrt{3}\mathcal{A}(\Xi_b^0 \to \Delta^{+} D_s^- \overline{K}^0)\\
&=0, \qquad \text{(C470)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Delta^{+}, D_s^-, \overline{K}^0] = &-\mathcal{A}(\Xi_b^0 \to \Delta^{+} D_s^- \overline{K}^0)\\
&+2\mathcal{A}(\Xi_b^- \to \Delta^{0} D_s^- \overline{K}^0)\\
&-\mathcal{A}(\Xi_b^- \to \Delta^{+} D_s^- K^-)\\
&=0, \qquad \text{(C471)}
\end{aligned}
$$

$$
\begin{aligned}
SumI_-[\Xi_b^-, \Delta^{++}, D_s^-, K^-] = &-\mathcal{A}(\Xi_b^0 \to \Delta^{++} D_s^- K^-)\\
&+\sqrt{3}\mathcal{A}(\Xi_b^- \to \Delta^{+} D_s^- K^-)\\
&=0. \qquad \text{(C472)}
\end{aligned}
$$

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