

Time Projection Chamber “HypTPC” for the hadron spectroscopy at J-PARC

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A Time Projection Chamber, called as “HypTPC”, is the central tracker of Hyperon Spectrometer (HS). The HypTPC measures the trajectory of charged particles in three dimension with high precision of about $300\ \mu\text{m}$. We can achieve a good momentum resolution of $\Delta p/p \sim 2.4\%$ for proton and 1.4% for π^\pm in σ . The HypTPC has a large acceptance because an experimental target will be installed inside the TPC volume. By using this powerful detector, we propose three experiments at J-PARC to search for the new hadronic states. The E42 experiment aims to search for H-dibaryon, which is composed of *udds**ss* quarks with (isospin) I = (spin) J = 0. The E45 is baryon spectroscopy experiment and we can confirm the N^* and Δ^* baryons. The E72 experiment searches for a narrow Λ resonance using $p(K^-, \eta)$ reaction. The HypTPC will open up the new possibility of hadron physics.

KEYWORDS: Time Projection Chamber, Gas Electron Multiplier, SiPM (MPPC), J-PARC

1. Introduction

We are developing a Hyperon Spectrometer (HS) for the J-PARC experiments. The HS consists of a large acceptance Superconducting Hyperon Magnet, a Time Projection Chamber (HypTPC), and a Time Of Flight detector (HTOF). Since an experimental target is installed inside the TPC volume, the HypTPC has a large acceptance with a good momentum resolution. By using this powerful detector, we plan to search for the new hadronic states at J-PARC. Three experiments (E42, E45, and E72) have already been approved for the “Stage-2” status in the J-PARC PAC. Recently, we have submitted the Letter Of Intent (LOI) to propose the new experiment to search for the double kaonic nucleus, K^-K^-pp . Since the HS is multi-purpose large acceptance spectrometer, not only proposed experiments but also the