

# 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  $\pi^\pm$  in  $\sigma$ . 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  $uuddss$  quarks with (isospin)  $I = (\text{spin}) J = 0$ . The E45 is baryon spectroscopy experiment and we can confirm the  $N^*$  and  $\Delta^*$  baryons. The E72 experiment searches for a narrow  $\Lambda$  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