Time Projection Chamber at SPring-8

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We have constructed a Time Projection Chamber (TPC) as the 4π detector for hadron photoproduction experiments at SPring-8/LEPS. The specific feature of this TPC is to detect the tracks as close from the target as a few millimeter. The nuclear target of 12.5 mm in radius is mounted on the center of the active volume, and denser pad rows span from 13 mm in radius, as shown in fig.1 . This configuration enables us to detect short life particles like Σ which decays in a few centimeter.
One of the purpose of this TPC is to measure the invariant mass of $\Lambda^*(1405)$. To obtain the clean invariant mass spectrum, it's important to distinguish $\Lambda^*(1405)$ from $\Sigma^*(1385)$ by the decay topology. $\Lambda^*(1405)$ decays into $\Sigma\pi$, on the other hand $\Sigma^*(1385)$ decays into $\Lambda\pi$. The TPC has a big advantage to detect decay topology because of its multi-track separation capability, and enables us to separate $\Lambda^*(1405)$ from $\Sigma^*(1385)$ by detecting Σ. The active volume of the TPC is 700 mm in length and 350 mm in diameter, and installed in a solenoid magnet of 2 T.
The signals are read out with 1055 cathode pads and digitized by flash ADCs.
There are two different pad configurations. The inner section has a denser pad configuration, which consists of 6 pad rows with 4×7 mm^2 pad. The outer section has 8 pad rows of 8×13 mm^2. The denser pad configuration is also useful to detect Σ.
We studied the basic performance of the TPC such as the drift velocity, the tracking resolution and dE/dx resolution with cosmic rays. We obtained the spatial resolution of 400 μm for smaller pads and further improvement is under way.
In this presentation, the current status of the TPC and the results of test measurements will be shown.

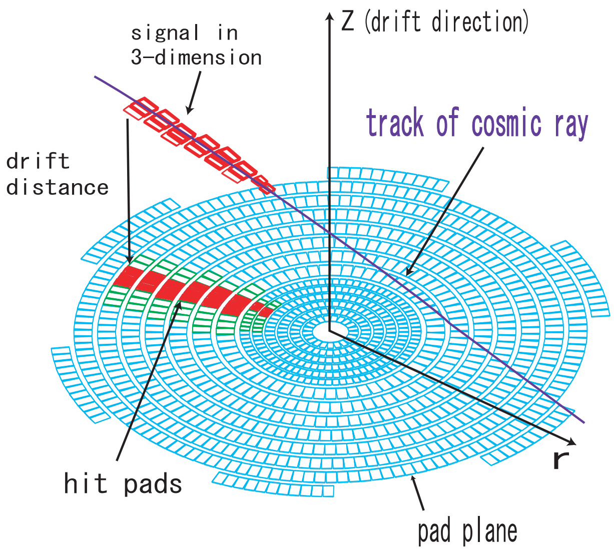

Figure 1: The event display of the TPC with a reconstructed cosmic ray track.