

Performance of the CAT-TPC based on two-dimensional readout strips

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A gas detector with a size of $140 \times 140 \times 140 \text{ mm}^3$, named the Compact Active Target Time Projection Chamber (CAT-TPC), has been developed aiming to measure resonant scattering associated with cluster structures in unstable nuclei. The CAT-TPC consists of an electronic field cage, double thick gas-electron-multiplier foils, a general purpose digital data acquisition system, and especially a newly developed two-dimensional strip-readout structure. The CAT-TPC was operated with ^4He (96%) + CO_2 (4%) gas mixture at 400 mbar. The working gas also serves as an active target for tracking of charged particles. The overall performances of this CAT-TPC were evaluated by using a collimated alpha-particle source. A time resolution of less than 20 ns and a position resolution of less than 0.2 mm was observed along the electron drift direction. The three-dimensional images of incident trajectories and scattering events can be clearly reconstructed with an angular resolution of about 0.45 degree.

Experimental nuclear physics

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Theoretical nuclear physics

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