Multi-gap resistive plate chambers (MRPCs) are gaseous detectors consisting of multiple parallel resistive plates.
MRPCs offer excellent time resolution (better than 100 ps) and can cover large areas of several square meters at relatively low cost.
Recently, we have been developing MRPCs for use as tracking detectors.
By reducing the readout strip pitch and arranging the readout strips on opposite sides of the detector orthogonally, two-dimensional position measurements can be achieved.
Our 1-m-scale prototype detector achieves a position resolution better than 1 mm and a time resolution better than 70 ps.
The combination of high spatial and temporal resolutions offers new opportunities for energy-sensitive particle imaging.
Time-of-flight (TOF) measurements between two MRPCs can provide information on particle velocity, enabling energy or particle species selection depending on the sample properties and thickness.
In this talk, we will present our R&D activities on the detector, including gas sealing and front-end electronics, and discuss the performance of the prototype detector and its potential applications to energy-sensitive imaging.