

## Low material budget floating strip Micromegas for ion transmission radiography

Floating strip Micromegas are high-accuracy and discharge insensitive gaseous detectors, able to track single particles at fluxes of  $7\text{MHz}/\text{cm}^2$  with  $100\mu\text{m}$  resolution. We developed low-material-budget detectors with one-dimensional strip readout, suitable for tracking at highest particle rates as encountered in medical ion transmission radiography or inner tracker applications. Recently we additionally developed Kapton-based floating strip Micromegas with two-dimensional strip readout, featuring an overall water-equivalent-thickness of 0.3mm.

These detectors were tested in high-rate proton and carbon-ion beams at the tandem accelerator in Garching and the Heidelberg Ion Beam Therapy Center, operated with an optimized Neon:CF<sub>4</sub> gas mixture. By coupling the Micromegas detectors to a new scintillator based range detector, ion transmission radiographies of PMMA and tissue equivalent phantoms were acquired. The range detector with 18 layers is read out via wavelength shifting fibers, coupled to a multi-anode photomultiplier.

We present the performance of the Micromegas detectors in particle beams and under irradiation with a <sup>55</sup>Fe source, discuss the energy resolution of the scintillator range telescope and present the image reconstruction capabilities of the combined system. We acknowledge support for the measurements at HIT by the DFG project on Ion Based Computed Tomography.

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