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Commissioning of the PRIOR prototype at GSI

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High energy proton microscopy (HEPM) or radiography is a novel technique for probing the interior of dense objects in static or dynamic experiments by mono-energetic beams of GeV-energy protons. A special system of magnetic lenses is employed for imaging and aberrations correction. Using this technique, one can measure the areal density distribution of a thick sample with sub-percent accuracy, micrometer-scale spatial and nanosecond-scale temporal resolutions. HEPM is of considerable interest for materials research, plasma physics, biophysics and medicine.

The future PRIOR (Proton Microscope for FAIR) facility will use 1 - 10 GeV intense proton beams and will allow for a significant step forward in spatial ($\sim 10\text{-}15\ \mu\text{m}$) and temporal ($\sim 5\text{-}10\ \text{ns}$) resolution. A PRIOR prototype has been constructed and successfully commissioned at GSI in 2014 using 3.5 - 4.5 GeV intense proton beams from the SIS-18 synchrotron. The status of the PRIOR project and the first results obtained in static and dynamic experiments with the PRIOR prototype are presented.

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