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Hard X-Ray Polarimetry using Double-Sided Segmented Solid-State Detectors as Compton Polarimeters

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Studies of the polarization of hard x-rays emitted in energetic heavy-ion atom collisions provide detailed information of the collision dynamics as well as of the atomic structure at high-Z [1]. Moreover, hard x-ray polarimetry also opens a route for polarization diagnosis of spin-polarized ion and electron beams as are discussed for future PNC experiments at FAIR [2]. However, due to the lack of efficient polarimeters previous studies of the radiation stemming from highly-charged ions were mainly restricted to measurements of the spectral and angular distribution. Owing to recent progress in the development of highly segmented solid-state detectors, a novel type of polarimeter for the hard x-ray regime has become available. Applied as Compton polarimeters, two-dimensional position-sensitive x-ray detectors now allow for precise and efficient measurements of photon linear polarization properties in the energy region between 70 and a few 100 keV [3,4,5]. An overview on recent measurements performed at the ESR storage ring at GSI [6,7,8], the polarized electron source SPIN at TU Darmstadt [9] and the PETRA III synchrotron at DESY will be presented. Also future experimental possibilities at the HESR of the FAIR facility will be discussed.

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