MATTER AND TECHNOLOGIES

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Silicon pixel detectors for Relativistic Heavy Ion Physics, the present, the future and some dreams.

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Originally developed for heavy-ion experiments such as STAR, CBM, and future Higgs factories, depleted CMOS Monolithic Active Pixel Sensors (DMAPS) have evolved into a competitive pixel detector technology. They combine an ultra-light material budget and exceptional spatial resolution with vastly improved radiation tolerance and rate capability. The technological advancements of the sensors themselves have been complemented by groundbreaking innovations in sensor integration, particularly driven by the ALICE collaboration. This presentation will provide an overview of the current DMAPS technologies. More importantly, it will introduce some potentially transformative innovations being explored within the newly established Detector Research and Development (DRD) communities, highlight their relevance for the design of next-generation silicon tracking detectors, and showcase the contributions of various Helmholtz Centers to this progress.

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