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Advancing Monolithic Active Pixel Sensors for Space Applications: Results from the ARCADIA MD3 Demonstrator

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Monolithic Active Pixel Sensors (MAPS) have emerged as a key enabling technology in particle physics, offering µm-level spatial resolution, low material budget, simplified assembly, and lower production costs compared to alternative detector technologies.
Following the success of ALPIDE, designed by the ALICE collaboration and currently operational in LHC Run 3, interest in MAPS has expanded beyond collider experiments. In particular, astroparticle physics has begun exploring this technology with the development of a MAPS-based tracker for the HEPD-02 detector onboard the CSES-02 satellite.

The ARCADIA collaboration, funded by INFN CSN 5, developed a versatile fully-depleted MAPS platform based on a 110nm CIS technology node, and ultra low-power architectures for frontier detectors in space. This contribution will discuss the architecture of the ARCADIA-MD3 system-grade demonstrator, highlighting the key design solutions implemented to meet the strict requirements of space environments, particularly for minimizing power consumption. We will discuss the detector characterisation and performance, and present the plans for space qualification and current and future developments of the MAPS technology.

Eligibility for ”Best presentation for young researcher” or ”Best poster for young researcher” prize

No

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