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Design of a CubeSat flight-demonstrator for LGAD Si-microstrip devices

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In the context of the Pentadimensional Tracking Space Detector project (PTSD), we are currently developing a demonstrator to increase the Technological Readiness Level of LGAD Si-microstrip tracking detectors for applications in space-borne instruments. Low Gain Avalanche Diodes (LGAD) is a consolidated technology developed for particle detectors at colliders which allows for simultaneous and accurate time (<100 ps) and position (~ 10 μm) resolutions with segmented Si sensors. It is a candidate technology that could enable for the first time 5D tracking (position, charge, and time) in space using LGAD Si-microstrip tracking systems. The intrinsic gain of LGAD sensors may also allow decrease the sensor thickness while achieving signal yields similar to those of Si-microstrips currently operated in Space.

As part of the project activities, a conceptual flight-demonstrator is being designed to be housed in a 6U CubeSat platform. This demonstrator will serve as a proof-of-concept for 5D tracking in space and will open new diagnostic opportunities for cosmic-ray and gamma-ray detection. The successful development of LGAD Si-microstrip based 5D tracking will enable sensitivities to perform ambitious objectives otherwise hardly achievable in the next generation of space-borne cosmic-ray instruments, paving the way for future discoveries in particle astrophysics. In this contribution we discuss the ongoing activities for the definition of preliminary CubeSat mission requirements in view of their consolidation in a dedicated study to be carried at the Concurrent Engineering Facility (CEF) of the Italian Space Agency in the second half of 2025.

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

No

Authors: BARBANERA, Mattia (Universita e INFN, Perugia (IT)); CAVAZZUTI, Elisabetta (Agenzia Spaziale Italiana); DURANTI, Matteo (INFN); FORMATO, Valerio (INFN); HU, Jiayu (INFN); IONICA, Maria (INFN); MERGÈ, Matteo (Agenzia Spaziale Italiana); MILIUCCI, Marco (Agenzia Spaziale Italiana); NEGRI, Maria Barbara (Agenzia Spaziale Italiana); OLIVA, Alberto (INFN); SAVINELLI, Martina (Università di Perugia); VAGELLI, Valerio (Agenzia Spaziale Italiana)

Presenters: CAVAZZUTI, Elisabetta (Agenzia Spaziale Italiana); MILIUCCI, Marco (Agenzia Spaziale Italiana)

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