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SOFT GAMMA-RAY ASTRONOMY WITH THE GRASS INSTRUMENT: STATUS AND PROSPECTS

Abstract

Stratospheric ballooning represents a primary approach to the testing of space-borne devices at sub-orbital heights with a focus onto progress in design development and possible increase in TRL.
Designed as an advancement over legacy instrumentation that rely on PMT detection and discrete control/readout electronics, the Gamma-Ray Astronomical Small Sensor (GRASS) is a compact, low-weight and position-sensitive prototype for time-domain gamma detection in the 50 keV − 10 MeV energy range, which exploits a scalable array of high-density, fast-kinetics scintillators in the garnet class (GAGG:Ce), as well as a newest-generation SiPM-based readout electronics. In line with the current rush for payload miniaturization, the GRASS module is conceived as the basic element of a larger-area detector suitable for all-sky gamma astronomy.
Two different configurations of the GRASS instrument have been flown between 2021 and 2022 in the framework of the European HEMERA Project (Horizon 2020). These ZPB flight campaigns have offered precious benchmark information for future satellite missions, such as the GRINTA hard X-ray mission already proposed to ESA in 2021 and possible other missions to be studied in the context of the US Small Explorer class.

The present IAC communication details the current status of the GRASS Project and its potential for scientific advancement.