Paper ID: 66578
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IAF SYMPOSIUM ON ONGOING AND NEAR FUTURE SPACE ASTRONOMY AND SOLAR-SYSTEM SCIENCE MISSIONS (A7)
Science Goals and Drivers for Future Exoplanet, Space Astronomy and Space Physics (2)

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THE GRASS INSTRUMENT FOR STRATOSPHERIC BALLOON GAMMA-RAY MEASUREMENTS

Abstract

For high energy astronomy, modelling of instrumental background is essential for a correct reduction of the data. Satellite instruments are providing a wealth of data on which to develop models according to orbital parameters, but in the case of balloon flights the typical integration times do not allow a very detailed characterization. The GRASS instrument (Gamma-Ray Astronomy Small Sensor), is a low mass payload for the stratospheric flights of the European program HEMERA. The instrument is based on a low energy ($\sim 0.1 - 10$ MeV) gamma ray scintillation detector which has as its baseline the use of a GAGG scintillator and a readout system with latest generation solid state sensors (SiPM). The latter allows a compact design while maintaining the high TRL typical of these instruments. GRASS is scheduled onboard HEMERA zero-pressure balloon flights in 2021 and 2022. The probable launch sites are Esrange, Sweden; Timmins, Canada). The purpose of using GRASS on HEMERA flights is to acquire data as a function of altitude, cutoff rigidity and other parameters. These data will be exploited to characterize the atmospheric gamma-ray background and provide a useful tool for cross-correlation with other experiments, including payloads approved in the public calls of the HEMERA program.