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New developments in the protoMIRAX balloon telescope

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Braga, Joao; D'Amico, Flavio; Rodrigues, Barbara; Avila, Manuel; Santiago, Valdivino, Jr.; Mattiello-Francisco, Fatima; Varela, Ricardo; Mejia, Jorge

The protoMIRAX X-ray imaging telescope is a balloon-borne experiment under development at INPE as a pathfinder for the MIRAX (Monitor Imageador de Raios X) satellite mission. The main objective of protoMIRAX is to test several subsystems of MIRAX in a near-space environment, including hardware components, software for data acquisition and handling, and the implementation of novel coded-aperture techniques. A modified and space-qualified protoMIRAX camera will be one of the MIRAX instruments onboard the Lattes scientific satellite, scheduled to be launched in 2015 as part of the Brazilian space program. The experiment consists essentially in an X-ray (30-200 keV) coded-aperture imager which employs a square array of 196 10mm x 10mm x 2mm CdZnTe (CZT) detectors. A collimator defines a fully-coded field-of-view of $20^\circ \times 20^\circ$, with $4^\circ \times 4^\circ$ of full sensitivity. In this paper we show new detailed simulations of the protoMIRAX camera background both at balloon-altitudes and at equatorial LEO using the GEANT-based MGGPOD package. We show results of simulations that identify the optimum mask pattern to use in this experiment in order to achieve the best combination of signal-to-noise ratio and angular resolution. We also present calibration results of the CZT detectors in the lab.

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