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Inflight Proton Activation and Damage on a CdTe Detection Plane

N. Simões^{1,2}, J. M. Maia^{3,1}, R. M. Curado da Silva^{1,2}, S. Ghithan^{1,2}, P. Crespo^{1,2}, S.J.C. do Carmo⁴, Francisco
Alves^{4,5}, M. Moita^{1,2}, N. Auricchio⁶, E. Caroli⁶

Corresponding authors: R. M. Curado da Silva (rui.silva@coimbra.lip.pt) and J. M. Maia (jmaia@ubi.pt)

¹*LIP-Laboratório de Instrumentação e Física Experimental de Partículas, Portugal*

²*Physics Department, University of Coimbra, Coimbra, Portugal*

³*Physics Department, University of Beira-Interior, Covilhã, Portugal*

⁴*ICNAS - Instituto de Ciências Nucleares Aplicadas à Saúde, University of Coimbra, Coimbra, Portugal*

⁵*IPC - Instituto Politécnico de Coimbra - Coimbra Health School; 3046-854 Coimbra*

⁶*INAF-IASF-Bologna, Bologna, Italy*

1 **Abstract**– Future high-energy space telescope missions require further analysis of orbital environment induced activation and
2 radiation damage on main instruments. A scientific satellite is exposed to the charged particles harsh environment, mainly
3 geomagnetically trapped protons (up to ~300 MeV) that interact with the payload materials, generating nuclear activation background
4 noise within instruments' operational energy range and causing radiation damage in detector material. As a consequence, instruments'
5 performances deteriorate during the mission time-frame. In order to optimize inflight operational performances of future CdTe high-
6 energy telescope detection planes under orbital radiation environment, we measured and analyzed the effects generated by protons on
7 CdTe ACRO RAD detectors with 2.56 cm² sensitive area and 2 mm thickness. To carry-out this study, several sets of measurements
8 were performed under a ~14 MeV cyclotron proton beam. Nuclear activation radionuclides' identification was performed. Estimation
9 of activation background generated by short-lived radioisotopes during one day was less than $\sim 1.3 \times 10^{-5}$ counts.cm⁻².s⁻¹.keV⁻¹ up to 800

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