

[A Balloon-Borne 3D CZT Scattering Polarimeter for Hard X-Ray Astrophysics](#)

[E. Caroli](#)¹, J. M. Alvarez Pastor², N. Auricchio¹, C. Budtz-Jorgensen³, R. M. Curado da Silva⁴, S. Del Sordo⁵, J. L. Galvez², M. Hernanz², J. Isern², I. Kuvvetli³, J. M. Maia Pereira⁶, J. B. Stephen¹, A. Zappettini⁷

¹INAF/IASF-Bologna, Bologna, Italy

²IEEC-CSIC, Institut de Cincies de l'Espai, Barcelona, Spain

³DTU Space, Copenhagen, Denmark

⁴LIP, Coimbra, Portugal

⁵INAF/IASF-Palermo, Palermo, Italy

⁶Physics Dept., University of Breira Inerior, Covilha, Portugal

⁷IMEM/CNR, Parma, Italy

It is widely recognised that a measurement of the polarization of the high energy emission from cosmic sources is a key observational parameter which will aid in the understanding of the nature of high energy cosmic ray astrophysics. Therefore new instrumentation operating in this energy range should exhibit a good sensitivity also for this type of measurements. Herein we present the concept of a small high performance detector optimized for polarimetry between 100 and 500 keV suitable for use with a stratospheric balloon-borne payload dedicated to obtaining accurate measurements of the polarization of the Crab pulsar. The detector with 3D spatial resolution is based on CZT spectrometer sensitive units in a highly segmented configuration suitable for operation as a high quality scattering polarimeter. We describe recent development results and possible improvement currently under study. The proposed payload can be also considered as a pathfinder for a high performance focal plane detector for the next generation of hard X and soft gamma ray telescopes based on Laue lenses.