

Polarisation Measurements of Soft Gamma Rays from the Crab and Cygnus X-1 using a Small Compton Polarimeter to Fly on a Cubesat

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Measurement of polarization is important in understanding radiation mechanisms of pulsars and coronal geometry of X-ray binaries. In this study, we propose to implement a small Compton Polarimeter on-board a 6U Cubesat to study the gamma ray polarization of the Crab and Cygnus X-1. The instrument is based on Gadolinium Aluminum Gallium Garnet (GAGG, chemical formula: $Gd_3Al_2Ga_3O_{12}$) scintillator arrays and silicon photomultipliers (SiPM) to convert the scintillation light to electric signals. In this paper, we estimate the Minimum Detectable Polarization (MDP) using the MEGAlib package for certain variations of the instrument models, including different configurations, energy threshold and read-out size of detectors. We will discuss the results for four energy ranges: 80-160 keV, 160-250 keV, 250-400 keV, and 400-2000 keV and try to obtain the optimised criteria for the lowest MDP, thus estimating the most sensitive instrument configuration to detect useful polarization information in the soft gamma-ray regime.

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