



Contribution ID: 49

Type: Oral

Neutron Background Detection for a Hard X-ray Balloon-borne Polarimeter

Thursday, 5 June 2014 12:00 (20 minutes)

PoGOLite is a balloon-borne hard X-ray polarimeter. It determines polarisation by measuring the azimuthal angular distribution of Compton scattered photons in a plastic scintillator array. The use of an all plastic target yields a relatively large but low mass detection area. The dominant source of background for the polarisation measurements has been shown through Geant4 simulations to originate from high energy (MeV range) atmospheric neutrons. Neutrons can pass the instrument's Bismuth Germanium Oxide (BGO) anticoincidence shield undetected and subsequently scatter between plastic scintillator elements to produce a polarisation signature. A passive 15 cm thick polyethylene shield surrounding the polarimeter reduces the neutron induced background by an order of magnitude. The background level remains however significant, prompting the need for active monitoring of the continuously changing neutron flux. For this purpose PoGOLite makes use of a neutron sensitive phoswich scintillator cell. The phoswich cell consists of a 5 mm thick Lithium Calcium Aluminium Fluoride (LiCAF) scintillator, used for neutron detection. The LiCAF is surrounded by a BGO anticoincidence system. This small light weight detector can therefore be used to measure the neutron flux even in high radiation environments. This type of neutron detector was tested on a separate dedicated stratospheric balloon mission, called PoGOLino, prior to the PoGOLite flight which took place in July 2013. Results from both flights will be presented and implications on the polarisation measurements of PoGOLite from 2013 will be discussed.

Primary author: Mr KOLE, Merlin (KTH - Royal Institute of Technology)

Co-authors: Dr MORETTI, Elena (KTH - Royal Institute of Technology); Dr TAKAHASHI, Hiromitsu (Hiroshima University); Dr FUKUDA, Kentaro (Tokuyama Corporation); Prof. PEARCE, Mark (KTH - Royal Institute of Technology); Dr CHAUVIN, Maxime (KTH - Royal Institute of Technology); Mr VICTOR, Mikhalev (KTH - Royal Institute of Technology); Dr JACKSON, Miranda (KTH - Royal Institute of Technology); Dr KISS, Mozsi (KTH - Royal Institute of Technology); Dr KAWAGUCHI, Noriaki (Tokuyama Corporation); Mr RYDSTROM, Stefan (KTH - Royal Institute of Technology); Mr ISHIZU, Sumito (Tokuyama Corporation); Mr KAWANO, Takafumi (Hiroshima University); Dr YANAGIDA, Takayuki (Kyushu Institute of Technology); Prof. FUKAZAWA, Yasushi (Hiroshima University)

Presenter: Mr KOLE, Merlin (KTH - Royal Institute of Technology)

Session Classification: II.b Astro & Space

Track Classification: Experiments: 2b) Astrophysics and Space Instrumentation