

Role of the Earth atmosphere scattering in the RHESSI measurements of the solar flare polarization

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The RHESSI spectrometer consists of 9 large Ge detectors that can be used as a gamma ray polarimeter in the energy range from tens to hundreds keV. The polarization signal is extracted using Compton scattering in either single or coincidence mode. The modulation factor can be as high 50% assuming no background conditions. We determined a modified polarimetric performance of RHESSI using detailed computer mass model of the whole satellite and Monte Carlo simulations of the Solar Flares reaching satellite either directly or after scattering in the Earth atmosphere. In the single mode the modulation factor can be smaller due to contamination from the strongly oscillating background signal that depends on the relative position between Sun, RHESSI and Earth. The coincidence mode is influenced by a position dependent pattern from accidental coincidences as well as by true coincidences coming from the Earth scattered photons that can introduce a false polarization signal. We will discuss contamination levels and background reduction methods for both modes of the polarization detection.