

Linear polarization of solar flares studied with RHESSI.

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We measured the linear polarization of 7 X class and 1 M class solar flares using RHESSI satellite as a Compton polarimeter. Flares situated close to the solar limb, which are expected to present higher levels of polarization were selected, and images of them were produced to determine the most probable location of the photon emitting source. We studied the energy band from 100 to 350 keV in the non-thermal Bremsstrahlung part of the spectrum and we performed fits to determine the regions of different emission mechanisms. Photons which experience Compton scattering between two of the germanium detectors of RHESSI were selected by applying strict cuts in energy, time and geometry to the eventlist, and posteriorly subtracting accidental and background coincidences. Comparing the distribution of scattering directions with the Monte Carlo simulation of a 100% polarized photon flux, the degree of linear polarization was obtained. The atmospherical Earth scattering effect was also studied in detail to determine its influence in the results.

Final values of linear polarization are low, mutually consistent and compatible with zero in a 3σ level. Images suggest that photon emission in the energy range considered comes mainly from the foot points. Photons which come to RHESSI after being scattered in the Earth's atmosphere do not affect the result, as they are mostly rejected by the selection cuts.