GAMMA RAY GENERATION BY INTERACTIONS OF FLARE ENERGETIC PARTICLES WITH STELLAR WIND MATTER

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For different types of local stars with flare activity we calculate expected gamma-ray fluxes in periods of flare energetic particle (FEP) generation. We suppose that main processes of FEP generation and propagation in the stellar-sphere are similar with processes in the Heliosphere but with much bigger energetic. We calculate the space-time-energy distribution of these particles in the stellar-sphere in the periods of FEP events. On the basis of investigations of cosmic ray nonlinear processes we determine the space-time distribution of stellar wind matter. Then we calculate the generation of gamma rays by decay of neutral pions generated in nuclear interactions of FEP with stellar wind matter and determine the expected space-time distribution of gamma-ray emissivity. Then we calculate the expected time variation of the angle distribution and spectra of gamma ray fluxes. For some simple diffusion models of stellar FEP propagation we obtain analytical approximation described the time evolution of gamma ray flux angle distribution as well as time evolution of gamma ray spectrum. It is shown that by observations from local stars of gamma rays generated by stellar FEP interactions with stellar wind matter can be obtain important information on stellar activity, on FEP spectrum, on mode of FEP propagation, and on matter distribution in the inner stellar-sphere.