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Red dwarf stars as a new source type of Galactic Cosmic Rays

The experimental data obtained with Pamela, Fermi, AMS-02, spectrometers cannot be explained using the diffusive models of propagation of cosmic-rays accelerated at the supernova shocks and require the existence of nearby sources of cosmic rays at the distances less than one kpc. These sources could explain the growth of the ratio of galactic positrons to electrons with an increase of their energy, the complex dependence of the exponent of the proton and alpha spectra from the energy of these particles, the appearance of anomaly component in cosmic rays. We consider active dwarf stars as possible sources of galactic cosmic rays in the energy range up to $\sim 10^{14}$ eV. These stars produce powerful stellar flares sometimes with energy release more than 10^{36} erg. The generation of high-energy cosmic rays should be accompanied by high-energy gamma-ray emission, which may be detected. Here we present the SHALON long-term observation data aimed to search for gamma-ray emission above 800 GeV from the active red dwarf stars: V388 Cas, V547 Cas, V780 Tau, V962 Tau, V1589 Cyg, GJ 3684, GJ 1078 and GL 851.1. The TeV gamma-ray emission mostly of flaring type from these sources was detected. This result confirms that active dwarf stars are also the sources of high-energy galactic cosmic rays.

Authors: Dr SINITSYNA, Vera Y. (P.N. Lebedev Physical Institute, RAS); Prof. SINITSYNA, Vera G. (P.N. Lebedev Physical Institute, RAS); Prof. STOZHKOV, Yurii I. (P.N. Lebedev Physical Institute, RAS)

Presenter: Dr SINITSYNA, Vera Y. (P.N. Lebedev Physical Institute, RAS)

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