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# Particle acceleration in Tycho's SNR

Supernova Remnants (SNRs) have long been considered as unique candidates for cosmic-ray sources. Observations of several SNRs in the TeV gamma-rays will help in solving the problem of the origin of cosmic rays and are key to understanding the mechanism of particle acceleration at a propagating shock wave. Tycho's supernova remnant is of a rare Galactic SNR subclass known as historical supernovae that was observed by Tycho Brahe in 1572. Tycho's SNR has been widely studied across the electromagnetic spectrum. Non-thermal emission from the Tycho SNR has been detected in radio and X-rays. These studies show a shell-like morphology of Tycho's SNR, whose configuration makes the cosmic ray acceleration at the supernova shock very efficient. Thus, Tycho's SNR became a candidate for the investigation of particle acceleration in SNR shocks at high- and very high energies. At TeV energies, the SHALON telescopes discovered the emission having a hard spectrum, enhanced from 800 GeV up to 80 TeV with the contribution to the very-high-energy γ-ray fluxes given by the regions correlated with the supernova shells. A nonlinear kinetic model of cosmic-ray acceleration in SNRs was applied to Tycho's SNR to compare the gamma-ray emission spectra at TeV energies obtained in observations with the model results. The collected experimental data confirmed the prediction of the theory about the hadronic generation mechanism of very high energy 800 GeV - 100 TeV gamma-rays in Tycho's SNR.

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