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Shell-type Supernova remnants and very high energy Cosmic rays

The investigation of supernova remnants at very high energy gamma-rays touches on the problem of the cosmic ray origin and, accordingly, the role of the Galaxy in their generation. As the presence of the electron cosmic-ray component is clearly seen by the emission generated by it in an SNR in a wide wavelength range, from radio to high-energy gamma-rays, while the nuclear cosmic-ray component can be detected only by very high energy gamma-ray emission. Recent observations at TeV energies have yielded the results on Galactic supernova remnants (SNR) of different ages. Among them are the shell-type SNRs: Tycho's SNR, Cas A, IC 443, γCygni SNR, G166.0+4.3 as well as the classical nova GK Per. Observational results like spectral energy distribution and emission maps are compared with other experimental data at high and very high energies. TeV images of SNRs by SHALON are overlaid with ones obtained with X-ray experiments Chandra ACIS, ROSAT, and radio-observations from Canadian Galactic Plane Survey DRAO in order to compare SNR TeV gamma-ray morphology with structures viewed through the X-ray and radio images and revealed its essential features. Also, the spectral energy distributions of discussed SNRs together with the theoretical predictions are shown. The collected experimental data confirm the prediction of the discussed models and estimations about the hadronic generation mechanism of very high energy gamma-rays in the Tycho's SNR, Cas A, IC 443, γCygni SNR and can help to solve the problem of cosmic ray origin.

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