

COSMIC RAYS IN SUPERBUBBLES: SPECTRA AND COMPOSITION ABOVE THE KNEE

A.M. Bykov (1) and I.N.Toptygin (2)

(1) A.F.Ioffe Institute of Physics and Technology, St.Petersburg, 194021, Russia, (2) State Technical University, St.Petersburg, 195251, Russia.

byk@astro.ioffe.rssi.ru

A model of particle acceleration up to energies $\sim 10^9$ GeV/particle in galactic superbubbles is considered. During the stage of multiple supernova explosions in superbubbles containing many young massive stars a violent cavern is formed. We propose a two-step mechanism of particle acceleration. At the first stage the diffusive shock wave acceleration by strong isolated SNR shocks is operating. The second stage is particle acceleration by multiple shocks and large-scale MHD motions in the turbulent cavern. We calculated the energy spectra, the composition of high-energy cosmic rays and the energy dependence of $\langle \ln A \rangle$. The model allows to explain the recent observational data on the spectra and composition of high-energy galactic cosmic rays.