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The sources of galactic cosmic rays

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Many of the core-collapsed supernovae are expected to explode within or in the vicinity of their parent clouds. The manifestation of the supernova remnants (SNRs) can differ substantially for different type of their progenitor stars. For the relatively low mass progenitor the stellar wind and photoionizing radiation are not sufficient to clear up substantially the surrounding cloud and already at a radius of about a few pc the remnant is entering a radiative phase with a shock directly interacting with the molecular cloud. In contrast, the winds of the most massive stars blow much larger caverns filled with structured wind resulting in different CR particle acceleration regimes. Observations of SNRs and galactic cosmic rays (CRs) suggest that there is a high efficiency of conversion of the kinetic power of supernova shocks into CRs. We discuss the specific mechanisms to convert a sizable fraction of the power released by SNRs into CRs and fluctuating magnetic fields of wide dynamical range of scales and the observational appearance for the different types of SNRs. Star forming activity with clustered supernova explosions in superbubbles observed in galaxies may affect the observed non-thermal spectra of the starburst galaxies.

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Classification de Session: Massive stars and cosmic-ray sources