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## M. Cardillo: CR and SNR love story and re-acceleration between them

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In the last years, the improvement of performances of high-energy instruments, both from Earth and Space, has provided a great amount of data relating to Cosmic-Rays (CRs). In particular, in the gamma-ray band, we had the first evidence of CR energization at the Supernova Remnant (SNR) shocks. Several models were developed, assuming that the emission was due to freshly accelerated CRs, in order to isolate the hadronic component from the leptonic one and to find the first direct proof of CR acceleration at a SNR shock. Because of some spectral features in disagreement with the Diffusive Shock Acceleration (DSA) theory, however, the role of pre-existing CR re-acceleration was taken into account, finding that not only its contribution is not negligible but also that it could explain some important characteristic of CR particle and gamma-ray spectra. Here we briefly summarize the main results obtained in the study of CR re-acceleration, showing its fundamental contribution in the middle-aged SNR shocks and, likely, in the forward shock (FS) of stellar winds. Our aim is to fix the importance of re-energization of pre-existing CRs in the Galaxy and the need to consider it in the explanation of detected CR particle and gamma-ray spectra.

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