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Cosmic and gamma rays from young supernovae

Supernovae issued from massive star explosion produce collisionless shocks after the breakout. These shocks propagate in the dense circum-stellar wind of the progenitor star. The combination of a high density medium and shock speeds at a fraction of c make these places as potential sites of high energy cosmic ray acceleration because particles can self-drive an efficient magnetic field amplification. Under some favorable circumstances multi PeV cosmic ray energies can be reached within day timescales after the shock breakout. As Cosmic Rays propagate in dense medium they are prone to produce gamma-rays from nuclear interaction. These GeV-TeV gamma-rays if detected would be strong evidences these objects can be the missing Pevatrons. However, the gamma-ray signal detection is hampered by strong gamma-gamma absorption on soft photospheric photons within the first weeks after the explosion. A detailed time-dependent calculation is hence necessary to evaluate their detectability by the Cerenkov Telescope Array. This detectability as well as the multi-wavelength /-messager signatures of different classes of supernovae is the main object of this talk.

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