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Multimessenger signals from Pevatrons

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The origin of Cosmic Rays (CR), more than 100 years after their discovery, remains a “century-old mystery”. Therefore the identification of the astronomical sources responsible for the locally measured fluxes of CRs remains one of the highest priorities of the field. Although the discovery of TeV gamma-radiation from SNRs generally supports the SNR paradigm of Galactic CRs, the lack of the extension of gamma-ray spectra of young SNRs well beyond 10 TeV raises doubts about their ability to contribute to the highest energy galactic CRs in the so-called “knee” region around 1 PeV. Meanwhile, the ultra-high-energy (UHE; $E > 100$ TeV) gamma-ray observations of young clusters of massive stars demonstrate mounting evidence of these objects being prime contributors to Galactic CRs at PeV energies. I will highlight the implications of these observations in the context of “Young Stars versus Dead Stars” and discuss the perspectives linked to the studies of PeVatrons in UHE neutrinos, gamma-rays and the synchrotron emission of secondary electrons produced in hadronic interactions.

Summary

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