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Simulating Cherenkov Telescope Array observation of RX J1713.7–3946

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We perform simulations of Cherenkov Telescope Array (CTA) observations of a young supernova remnant RX J1713.7–3946. This target is not only one of the brightest sources ever discovered in very high-energy (VHE) gamma-rays but also well observed in other wavebands. In X-rays, the emission is dominated by synchrotron radiation, which links directly to the existence of high-energy electrons. Radio observations of CO and HI gas have revealed a highly inhomogeneous medium surrounding the SNR, such as clumpy molecular clouds. Therefore gamma-rays from hadronic interactions are naturally expected. However, the spectrum in GeV energy range measured by Fermi/LAT indicates more typical of leptonic emission from accelerated electrons. Despite lots of multi-wavelength information, the competing interpretations have led to much uncertainty in the quest of unraveling the true origin of the gamma-ray emission from RX J1713.7–3946. CTA will achieve highest performance ever in sensitivity, angular resolution, and energy resolution. We estimate CTA capability to examine the emission mechanisms of the gamma-rays through simulated spatial distribution, spectra, and their time variation.

Collaboration

CTA

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