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TeV Emission in NGC 4278: Shock Energetics Insufficient, Compact Origin Favored

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Abstract

The Large High Altitude Air Shower Observatory recently detected TeV emission from the low luminosity active galactic nucleus (LLAGN) NGC 4278. Integral field spectroscopy with MEGARA revealed ionized outflows on hundred parsec scales with kinetic power about 10^{38} erg/s, well below the TeV luminosity greater than 10^{41} erg/s. The implied efficiencies, greater than 1000, are far above unity, showing that shocks cannot account for the TeV emission. Contemporaneous Fermi Large Area Telescope and Swift data, consistent with a compact synchrotron self Compton jet component, favor a nuclear origin. NGC 4278 is the first low ionization nuclear emission line region (LINER)/LLAGN of its class detected at TeV energies, a benchmark for LINERs with outflows and a prime target for the Cherenkov Telescope Array Observatory. I conclude that the TeV photons arise from a compact nuclear accelerator, while optical outflows trace larger scale jet ISM interactions that coexist but do not power the TeV radiation.

