

Physics Colloquium

Michigan Technological University

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Room 101 Fisher Hall

Very High Energy Gamma-ray Observation of the Radio Galaxy M87

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Abstract: The majority of the known extragalactic very high energy ($E > 100$ GeV) gamma ray emitting objects are blazars, active galactic nuclei with relativistic jets aligned close to the line of sight. Due to this geometry, the location of the gamma-ray emission along the jet is unclear. M87 is a nearby radio galaxy with its jet misaligned with the line of sight. The proximity of M87 and the jet misalignment allow detailed studies of spatially resolved emission regions in the radio, optical, and X-ray wavebands. The jet is unresolved in the gamma-ray regime, but contemporaneous flux variability measurements with other wavelengths provide a unique opportunity to constrain the emission origin and mechanisms responsible for high energy gamma-ray emission from an active galactic nucleus.

Ground-based imaging telescopes are used to observe the gamma-ray sky by detecting the Cherenkov light from the electromagnetic cascade initiated by gamma rays interacting with the Earth's atmosphere. The Very Energetic Radiation Imaging Telescope Array System (VERITAS) has monitored very high energy gamma-ray emission from M87 since 2007. Over 170 hours of M87 observations have been performed by the VERITAS array between 2007 and 2010. Flaring activities have been observed in 2008 and 2010 with flux variability in the time scale of days. In this talk, I will present the comprehensive results from VERITAS observation of M87 between 2007 and 2010 and their implications.