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M 31 as a probe for diffuse VHE gamma ray emission with VERITAS

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VERITAS, an array of 12 m imaging atmospheric Cherenkov telescopes in southern Arizona, is one of the world's most sensitive detectors of astrophysical very-high-energy (VHE, > 100 GeV) gamma rays. The current status of the VERITAS observations of M 31 (Andromeda Galaxy) including an upper limit on the VHE flux, an updated analysis of the Fermi-LAT data and a comparison with theoretical predictions, including the potential dark matter contribution, will be presented. The dominant mechanism for the formation of diffuse gamma rays is expected to be through the inelastic collision of high-energy cosmic rays with the interstellar medium (ISM). M 31 provides an opportunity to probe this mechanism due to its proximity and spatial extent, with the VERITAS point-spread function sufficient to resolve features of M 31 like its dense, gas rich star-forming ring and the core of the galaxy with its large population of supernova remnants.

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