



Contribution ID: 931

Type: **Talk**

Dark Matter Searches in Dwarf Galaxies with VERITAS

Friday 18 July 2025 13:20 (15 minutes)

The nature of dark matter (DM) remains mysterious despite decades of indirect, direct and collider searches. Indirect searches for DM attempt to observe the gamma rays produced in DM decay or annihilation. Depending on the DM particle mass, these gamma rays may be in the very-high-energy regime (>100 GeV). The Very Energetic Radiation Imaging Telescope Array System (VERITAS), an imaging atmospheric Cherenkov telescope array, can detect gamma rays in an energy range of 100 GeV to >30 TeV and is therefore an ideal instrument for an indirect DM search. A popular target category for indirect searches is dwarf spheroidal galaxies (dSphs), due to their large inferred DM content. We present two searches conducted by VERITAS using observations of dSphs. In the first, we set constraints on wino and quintuplet dark matter models, using 638 hours of VERITAS observations of 17 dSph targets. In the second, we present recent observations of Ursa Major III, a recently discovered dSph. Ursa Major III has a predicted DM density that is ~ 2 times more than that of the next most DM-dense dSph, making it a particularly promising candidate for DM detection. We derive limits on the velocity-weighted annihilation cross section in a DM mass range of 200 GeV to 30 PeV.

Collaboration(s)

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Session Classification: DM

Track Classification: Dark-Matter Physics