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An indirect search for Dark Matter with a combined analysis of dwarf spheroidal galaxies from VERITAS

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The nature and characteristics of dark matter (DM) have long been a mystery in cosmology and astrophysics. Various DM theories propose that weakly interacting massive particles (WIMPs; mass ~ 1 TeV) can decay or annihilate into standard model particles, producing electromagnetic radiation, specifically very-high-energy (VHE) gamma rays exceeding 100 GeV. Additionally, ultra-heavy DM (mass > 100 TeV) has been proposed as another possible candidate for DM.

The Very Energetic Radiation Imaging Telescope Array System (VERITAS) consists of four imaging atmospheric Cherenkov telescopes (IACTs) that can indirectly detect VHE gamma rays in the energy range of 100 GeV to over 30 TeV. Dwarf spheroidal galaxies (dSphs) are considered excellent targets for the search for DM signal due to their high DM density and low gamma-ray emissions from other sources.

This study uses a larger dataset and improved analysis methods than previous VERITAS DM searches. The analysis results of the extended VERITAS dSph dataset, including the derived upper limits on the DM velocity-weighted cross section, will be presented in this contribution.

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