

Combined Dark Matter Searches Towards Dwarf Spheroidal Galaxies with Fermi-LAT, HAWC, H.E.S.S., MAGIC, and VERITAS

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The search for new physics beyond the Standard Model (SM) is closely tied to understanding the nature of Dark Matter (DM). Dwarf spheroidal galaxies (dSphs) are prime targets for indirect DM searches because their ratios of DM mass to baryonic mass is high. We present a novel combination analysis with multiple gamma-ray observatories. We established a collaboration of three Imaging Air Cherenkov Telescopes (IACTs): H.E.S.S., MAGIC, and VERITAS; the Fermi-LAT satellite, and the water Cherenkov detector, HAWC. Our collaboration maximizes the sensitivity of DM searches towards 20 dSphs by combining dSph data for the first time across these observatories. We focus our search on Weakly Interacting Massive Particles (WIMPs) DM annihilation to SM particles. This analysis uses a joint maximum likelihood to constrain DM self-annihilation cross sections to SM particles versus DM particle mass. Our constraints are over a DM mass range [5 GeV, 100 TeV] which is the widest range ever considered for indirect DM searches. Our limits will be the strictest for indirect detection to date with a factor 2-3 improvement over individual experiments' limits.

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Dark matter

Primary authors: ZITZER, Benjamin (McGill University); ARMAND, Celine (University of Geneva; 18 Univ. Grenoble Alpes, Univ. Savoie Mont Blanc); GUIRI, Chiara (DESY Zeuthen); KERSZBERG, Daniel (IFAE-BIST, Spain); SALAZAR-GALLEGOS, Daniel (Michigan State University); PUESCHEL, Elisa (DESY Zeuthen); Dr MOULIN, Emmanuel (CEA Saclay); CHARLES, Eric (SLAC); HARDING, J. Patrick (Los Alamos National Laboratory); Dr RICO, Javier (Institut de Fisica d'Altes Energies, Barcelona, Spain); TOLLEFSON, Kirsten (Michigan State University); RINCHIUSO, Lucia (CEA Saclay); DI MAURO, Mattia (SLAC); TJARK, Meiner (IPARCOS, Universidad Complutense de Madrid); POIREAU, Vincent (LAPP)

Presenter: SALAZAR-GALLEGOS, Daniel (Michigan State University)

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