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Indirect Dark Matter Searches with Gamma-ray Observatories

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Astrophysical observations of high-energy gamma-rays play a crucial role in the exploration of non-thermal phenomena in the Universe in their most extreme and violent forms. It can also provide unique information about exotic Particle Physics phenomena beyond the Standard Model of Particle Physics, which complements the studies performed at particle accelerators such as the Large Hadron Collider (LHC). For instance, an intense gamma-ray production might be expected from the annihilation of non-baryonic dark matter in dense environments. Therefore one of the main goals of gamma-ray astronomy is to observe structures in which dark matter is expected to be highly concentrated, such as the dwarf spheroidal galaxies of the Local Group and the Galactic Centre, in order to detect a possible annihilation signal. Several observation campaigns were launched by ground-based Cherenkov telescopes and gamma-ray telescopes embarked on satellites towards these objects. In the absence of clear signals, constraints on the dark matter particle annihilation cross-section have been derived in different particle physics scenarios expecting to produce both a continuum and a line-like gamma-ray flux. A highlight of the most recent and sensitive results of Imaging Atmospheric Cherenkov Telescopes (H.E.S.S., MAGIC and VERITAS) and Fermi-LAT telescope is presented. Lastly, in the light of the future Cherenkov Telescope Array (CTA) and the Southern Wide-Filed Gamma-ray Observatory (SWGO), the prospects and strategies in the search for dark matter annihilation signals are discussed.

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