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Indirect search for dark matter in Dwarf Galaxies with the Southern Wide field-of-view Gamma-ray Observatory

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One of the biggest mysteries in astrophysics is the nature of dark matter and its properties. Among the existing particle models, Weakly Interacting Massive Particles (WIMPs), which are predicted in several beyond Standard Model theories, are one of the most prominent candidates to explain dark matter. The reason behind that is that a WIMP-type particle would reproduce naturally the relic density of dark matter observed, this fact is known as the WIMP miracle. Among the ways of searching for signals of dark matter, indirect searches refers to the detection of Standard Model particles produced by the decay or self-annihilation of dark matter particles. When the dark matter particle has masses in the GeV-TeV range, this type of search can be done through the detection of gamma rays in astrophysical objects with high density of dark matter. (1) Among the astrophysical objects searched, dwarf galaxies may not have the highest density, but since they are dominated by dark matter and relatively close to earth, they are key dark matter targets for observation. Especially if they are dwarf spheroidal galaxies, which have an older stellar population and do not have active star formation, seeing as this type of dwarf galaxy would have almost no gamma-ray emission if dark matter did not exist. This work aims to make predictions of the detectability of dark matter annihilation or decay signals from dwarf galaxies by the Southern Wide field-of-view Gammaray Observatory (SWGGO), a future observatory to be built in South America. This wide field-of-view survey instrument will be able to probe many important dark matter targets in the Southern Hemisphere. (2) The combined observation of all targets will be able to produce competitive, if not the best, limits for dark matter with masses from 500 GeV to 1 PeV.

Palavras-chave: Dark matter. Gamma-Ray astronomy. Dwarf galaxies.

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