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Coordenadores

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Diretor do Instituto de Física de São Carlos – Universidade de São Paulo

Prof. Dr. Javier Alcides Ellena

Presidente da Comissão de Pós Graduação do Instituto de Física de São Carlos – Universidade de São Paulo

Profa. Dra. Tereza Cristina da Rocha Mendes

Presidente da Comissão de Graduação do Instituto de Física de São Carlos – Universidade de São Paulo

Comissão Organizadora

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Gabriel dos Santos Araujo Pinto

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Jeffer Santiago Mares

João Victor Pimenta

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Normalização e revisão – SBI/IFSC

Ana Mara Marques da Cunha Prado

Maria Cristina Cavarette Dziabas

Maria Neusa de Aguiar Azevedo

Sabrina di Salvo Mastrantonio

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Searching for heavy dark matter with gamma-rays

JUSTINO, Lucca Radicce; VIANA, Aion; SIQUEIRA, Clarissa

lradicce@usp.br

The true nature of the largest matter density component of the Universe, the so-called dark matter (DM), is one of the most elusive problems of Physics. One of the primary direction for DM searches lies in the particle physics point of view, through the Weakly Interacting Massive Particles (WIMPs). These are particles with masses in the GeV – TeV range and weak-scale interaction strength. In high-density environments of the Universe, WIMPs may self-annihilate and produce a strong gamma-ray signal. Dwarf galaxies, galaxy clusters and the Galactic Center (GC) are compelling candidates to harbour such sizeable high-energy γ -ray signals. This project aims to estimate the sensitivity of future gamma-ray observatories, such as the Southern Wide field-of-view Gamma-ray Observatory (SWGGO) and the Cherenkov Telescope Array (CTA), to probe the non-canonical DM models. The first scenario analyzed is the Inert Doublet Model (IDM), which postulates an extra Higgs doublet to the Standard Model (SM). (1) This new doublet is stable due to a Z_2 symmetry which stabilizes the lightest scalar, leading to a good DM candidate, more easily detectable because of its higher cross-section. (1) We are now analyzing the capacity of the CTA and SWGGO to probe the IDM on targets like the GC and dwarf spheroidal galaxies (dSph), moving forward in the results pointed out by recent studies. (1-2)

Palavras-chave: Particle astrophysics. Gamma-ray astronomy. Dark matter.

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