

Cherenkov Telescope Array sensitivity to branon dark matter models

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TeV DM candidates are gradually earning more and more attention within the community. Among others, extra-dimensional brane-world models may produce thermal DM candidates with masses up to 100 TeV, which could be detected with the next generation of very-high-energy gamma-ray observatories such as the Cherenkov Telescope Array (CTA). In this work, we study the sensitivity of CTA to branon DM via the observation of dwarf spheroidal galaxies. We computed annihilation cross section values needed to reach a 5σ detection as a function of the branon mass. Additionally, in the absence of a predicted DM signal, we obtained 2σ upper limits on the annihilation cross section. These limits lie 1.5–2 orders of magnitude above the thermal relic cross section value. Yet, CTA will allow to exclude a significant portion of the brane tension-mass parameter space in the 0.1–60 TeV branon mass range, and up to tensions of ~ 10 TeV. More importantly, CTA will significantly enlarge the region already excluded by AMS and CMS, and will provide valuable complementary information to future SKA radio observations.

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Dark matter

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