

Search for dark matter annihilation towards the inner Milky Way halo with the H.E.S.S. Inner Galaxy Survey

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The presence of dark matter (DM) is suggested by a wealth of astrophysical and cosmological measurements. However, its underlying nature is yet unknown. Among the most promising candidates are weakly interacting massive particles (WIMPs): particles with mass and coupling strength at the electroweak scale and thermally-produced in the early universe have a present relic density consistent with that observed today. WIMP self-annihilation would produce Standard Model particles including gamma-rays, which have been long-time recognized as a prime messenger to indirectly detect dark matter signals. The centre of the Milky Way is predicted as the brightest source of DM annihilations. The H.E.S.S. collaboration is currently performing a survey of the inner region of the Milky Way, the Inner Galaxy Survey (IGS), intended to achieve the best sensitivity to faint and diffuse emissions in a region of several degrees around the Galactic Centre. We analyzed 2014-2020 observations taken with the five-telescope array to search for a DM annihilation signal. With the current dataset of about 600 hours, we found no significant excess and therefore derived the strongest constraints on the velocity-weighted annihilation cross-section so far. TeV thermal WIMPs can be probed in different annihilation channels.

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Experimental Results

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