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# Resolving small-scale Dark Matter structures using multi-source Indirect Detection

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The extragalactic dark matter (DM) annihilation signal depends on the annihilation cross section, $\sigma v$, and the clumping or boost factor, $\langle \delta^2(z) \rangle$. The "clumping factor–$\sigma v$" degeneracy can however be broken by comparing DM annihilation signals from multiple sources. In particular, one can then constrain the minimum DM halo mass ($\mathrm{M_{min}}$), which reflects the cutoff scale of the primordial power spectrum, by comparing individual DM sources to the diffuse DM annihilation signal. We demonstrate this with careful analytic treatments of the DM contribution to the Isotropic Gamma-Ray Background (IGRB) and comparisons to two recent hints of DM towards the Galactic Center (GC), namely, a $\sim$ 130 GeV DM annihilating dominantly in the $\chi\chi \to \gamma\gamma$ channel, and a $(10 - 30)$ GeV DM annihilating in $\chi\chi \to \tau\bar{\tau}$ or $\chi\chi \to b\bar{b}$ channels. We show that these DM candidates are conservatively unconstrained by Fermi measurements, but by taking into account astrophysical backgrounds, spectral and anisotropy information, as well as a more careful treatment of the isotropic Galactic component, can be used to probe values of $\mathrm{M_{min}}$ down to $10^0\,\mathrm{M_\odot}$ for the 130 GeV candidate, and $10^{-6}\,\mathrm{M_\odot}$ for some parameter space of the light DM candidates. Increasing the substructure content within a reasonable amount further improves these constraints.

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