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Modeling evolution of dark matter substructure and annihilation boost

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The structure of dark matter halo is hierarchical. Among them, small-scale structures in dark matter halo, (so-called subhalos,) can enhance dark matter annihilation signals. It is necessary to quantify boost factors by those subhalos to derive the property of dark matter with current/future gamma-ray observations. In order to derive the subhalo boost factors, calculations of halo structure covering more than 20 orders-of-magnitude in the halo mass up to a redshift of ˜10 are required. This is beyond the capability of the current state-of-art cosmological N-body simulation which is a widely-adopted method to study the halo structure. In this talk, I introduce our analytical approach for the formalism of subhalo evolutions and the resultant boost factors. I show that the constraints on the annihilation cross-section obtained by isotropic gamma-ray observations can be updated by several factors by taking the contribution from subhalos into account.

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