

# Effect of thermal fluctuations on dark matter annihilation cross section

Friday, 19 July 2024 20:40 (20 minutes)

We are interested in thermal corrections to dark matter (DM) annihilation cross sections in a MSSM-inspired BSM theory, having bino-like Majorana DM ( $\chi$ ), annihilating to SM fermions through Yukawa interactions via a charged scalar channel in freeze-out scenario. We apply real-time formalism of thermal field theory (TFT) to investigate corrections due to thermal fluctuations of DM annihilation cross section at NLO. We utilize generalized Grammer and Yennie approach in TFT to assure IR divergence cancellation with  $K$ -polarization sum of real and virtual corrections at NLO to DM annihilation processes ( $\chi\bar{\chi} \rightarrow f\bar{f}$ ). We calculate the thermal correction to the finite remainder in TFT. Our Calculations shows quadratic thermal dependence of annihilation cross section of DM ( $\sigma_T \propto \mathcal{O}(T^2)$ ) considering scalar to be heavy compared to DM and SM fermions.

## Alternate track

1. Beyond the Standard Model

## I read the instructions above

Yes

**Primary author:** BUTOLA, Prabhat (Homi Bhabha National Institute, Mumbai & The Institute of Mathematical Sciences, Chennai)

**Co-authors:** INDUMATHI, D (The Institute of Mathematical Sciences, Chennai); SEN, Pritam (Tata Institute of Fundamental Research)

**Presenter:** BUTOLA, Prabhat (Homi Bhabha National Institute, Mumbai & The Institute of Mathematical Sciences, Chennai)

**Session Classification:** Poster Session 2

**Track Classification:** 08. Astro-particle Physics and Cosmology