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Sommerfeld enhancement in neutralino dark matter relic abundance calculation

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The Sommerfeld enhancement effect has been studied in dark matter annihilations in the present universe as a means to boost the dark matter annihilation cross section. It has also been applied to relic abundance calculations in the MSSM with the neutralino LSP as dark matter candidate, where however the enhancement effect is milder due to the larger relative velocities of the annihilating particles.

In this talk we consider the Sommerfeld effect on the neutralino dark matter relic abundance in the MSSM using non-relativistic effective field theory techniques. Compared to previous results, we compute analytically coannihilations with nearly mass degenerate particles of the neutralino/chargino sector including the off-diagonal annihilation amplitudes through order- v^2 in the velocity expansion; include separately the S-wave and P-wave as well as order v^2 S-Wave enhancements. We account for all spin-independent and spin-dependent potential interactions through lighter Higgs and gauge boson exchange as well as all accessible annihilation rates into Standard model and Higgs final states.

We discuss numerical results for realistic MSSM scenarios with Wino- or Higgsino-like neutralino LSP.

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