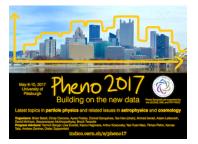
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Zero-Range Effective Field Theory for Resonant Wino Dark Matter

Monday, 8 May 2017 17:00 (15 minutes)

The most dramatic "Sommerfeld enhancements" of neutral-wino-pair annihilation occur when the wino mass is tuned to near critical values where there is a zero-energy S-wave resonance at the neutral-wino-pair threshold. If the wino mass is larger than the critical value, the resonance is a wino-pair bound state. If the wino mass is near a critical value, low-energy winos can be described by a zero-range effective field theory in which the winos interact nonperturbatively through a contact interaction. The effective field theory is controlled by a renormalization group fixed point at which the neutral and charged winos are degenerate in mass and their scattering length is infinite. The parameters of the zero-range effective field theory can be determined by matching wino scattering amplitudes calculated by solving the Schrödinger equation for winos interacting through a potential due to the exchange of weak gauge bosons. The power of the zero-range effective field theory is illustrated by calculating the rate for formation of the bound state in the collision of two neutral winos through the emission of two soft photons.

Summary

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