Contribution ID: **166** Type: **Oral**

Zero-Range Effective Field Theory for Resonant Wino Dark Matter

Wednesday 9 August 2017 16:15 (15 minutes)

The most dramatic "Sommerfeld enhancements" of neutral-wino-pair annihilation occur when the wino mass is near a critical value where there is a zero-energy S-wave resonance at the neutral-wino-pair threshold. Near a critical mass, 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-wino scattering amplitudes calculated by solving the Schrödinger equation for winos interacting through a potential due to the exchange of weak gauge bosons. If the wino mass is larger than the critical value, the resonance is a wino-pair bound state. 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.

Primary authors: JOHNSON, Evan (Ohio State University); BRAATEN, Eric (Ohio State University); ZHANG, Hong

Presenter: JOHNSON, Evan (Ohio State University)

Session Classification: Dark matter

Track Classification: Dark matter (direct detection, indirect detection, theory, etc.)