Contribution ID: **52** Type: **not specified**

Enhancement of p-wave dark matter annihilation by quasi-bound states

Thursday 26 September 2024 15:00 (15 minutes)

In this talk we scrutinize the Sommerfeld enhancement in dark matter pair annihilation for p-wave and higher-ℓ partial waves. For the Yukawa potential these feature a super-resonant Breit-Wigner peak in their velocity-dependence close to Sommerfeld resonances as well as a universal scaling with velocity for all $\ell \geq 1$ that differs from the s-wave case.
We provide a quantum mechanical explanation for these phenomena in terms of quasi-bound states sustained by the centrifugal barrier of the partial-wave potential, and give approximate WKB expressions capturing the main effects. The impact of quasi-bound states is exemplified for wino dark matter and models with light mediators, with a focus on indirect detection signals.
We note that quasi-bound states also explain similar peaks in the bound-state formation and self-scattering cross sections.

Primary author: DE ROS, Lorenzo (TUM Technische Universität München)

Co-authors: BENEKE, M (TUM); GARNY, Mathias (Desy); BINDER, Tobias (Kavli IPMU)

Presenter: DE ROS, Lorenzo (TUM Technische Universität München)

Session Classification: Parallel Thursday Pheno 1

Track Classification: Particle Phenomenology