Title: Long-range non-perturbative effects in dark matter phenomenology

Abstract:
In recent years, it has been shown how an accurate computation of the Dark Matter (DM) relic abundance that would take into consideration different non-trivial effects on the DM annihilation cross-section is necessary to precisely determine its allowed parameter space. In this talk, in particular, I will present the impact of non-perturbative effects on the DM production mechanism induced by long-range forces, namely the Sommerfeld effect (SE) and bound state formation (BSF). After an introduction to the formalism, I will focus on a specific phenomenological case: a simplified t-channel model with a Majorana fermion DM candidate, coupled to the standard model (SM) quarks via a colored scalar. For DM masses in the GeV-TeV range, direct detection experiments strongly constrain the DM coupling to the SM quarks. From a cosmological point of view, however, a large coupling to the SM is not mandatory if the mass splitting between the colored scalar and the DM candidate is sufficiently small (co-annihilating scenario). This region of the parameter space is subject to colored non-perturbative effects, namely the SE and BSF via gluon emission, which can significantly enhance the effective DM (co)annihilation cross-section. I will present the impact of these effects on current and upcoming collider searches as well as on direct detection experiments.