

Columbia University

Department of Physics



Theory Seminar

“Composite Dark Matter Exclusions from the Lattice”

One intriguing coincidence in cosmology is how the observed dark matter and baryonic densities are within a factor of 5 in magnitude. A natural explanation for such a coincidence is that the origin of the dark matter density is intimately related to the early universe processes that led to the baryon asymmetry. The majority of these “asymmetric” dark matter scenarios favor a strongly coupled composite sector ala QCD, where neutral, long-lived composites can survive to be observed today, but still have charged constituents to interact with early universe baryogenesis. As a result, these neutral composites are expected to have non-zero electromagnetic properties, such as magnetic moments, charge radii, and polarizabilities, which

can be observed in direct detection experiments. The values of these properties are inherent to the dynamics of these strongly coupled theories, where non-perturbative lattice methods allow for a reliable exploration with controlled systematics. In this talk, I will present some initial results for a three-color, QCD-like theory with two and six light fermion flavors, including implications on the latest exclusions from the Xenon100 collaboration.

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