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The bosonic side of composite dark matter

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One intriguing coincidence in cosmology is that 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. Many 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 interact with ordinary matter through Higgs exchange or higher dimensional electromagnetic interactions such as magnetic moments, charge radii, and polarizabilties; the last of which cannot be avoided and can provide a lower bound for these theories. In this talk, I will discuss a theory of bosonic baryons in SU(4) gauge theory that only interact via Higgs exchange and polarizabilities. In particular, I will focus on the spectrum and Higgs exchange properties, whose interaction strength can vary based on ratios of the chiral to vector-like mass couplings. These calculations provide the foundation for future calculations of polarizabilities, which will ultimately bound this class of composite dark matter.

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