Contribution ID: **21** Type: **not specified**

Electromagnetic interaction and freeze-out abundance of sexaquarks

Tuesday 27 June 2023 14:20 (20 minutes)

The sexaquark, a hypothesized six-quark bound state, has garnered interest as a potential dark matter candidate. At the same time, there are many arguments in the literature that place severe limitations on this possibility. Assuming it exists and is stable, I will advance a compelling case for the limited viability of the sexaquark as a dark matter candidate by presenting the first calculation of its scattering electromagnetic cross section with Standard Model particles and by investigating its freeze-out abundance. The leading-order term in the electromagnetic cross section is due to the sexaquark's polarizability, which we obtained using lattice QCD. I will show that this implies a direct detection cross section that would be visible for a stable sexaquark constituting even a tiny fraction of the dark matter. I will also explore the expected sexaquark abundance derived from the freeze-out of its interactions in the early universe, and explore the detectability of such a thermally produced sexaquark component.

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Session Classification: Parallel

Track Classification: Particle