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Phantom fluid cosmology: constraints and direct detection

Tuesday 26 September 2023 15:00 (1h 20m)

Phantom fields have been widely invoked as a source of dark energy in cosmology, but rarely taken seriously as quantum theories. The vacuum is automatically unstable to production of negative-energy ghost particles plus normal particles, requiring such theories to be effective only, below some UV cutoff. I will present recent cosmological constraints arising from the vacuum instability, both at the level of the homogeneous background, and the density perturbations. We find that the fluid of particles produced from vacuum decay can ameliorate but not solve the notorious Hubble tension problem, and cannot fully replace the cosmological constant as a source of dark energy. The vacuum decay can be a source of boosted dark radiation, which might be detectable if it interacts with ordinary matter. I will show that this could fit recent excess events reported by the DAMIC experiment at SNOLAB.

Presenter: CLINE, James (McGill University)