JOINT TUFTS/MIT COSMOLOGY SEMINAR

Superfluids and the cosmological constant problem

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The old cosmological constant problem – why do we not see the gravitational effects of the large vacuum energy predicted by particle physics? – is an outstanding problem for cosmologists, relativists, and particle physicists alike. One possibility is that gravity is modified in such a way that the cosmological constant does not gravitate the way it does general relativity, though there are few (if any) concrete and realistic models along these lines. I will discuss a simple theory which takes a significant step towards accomplishing this goal by admitting stable Minkowski solutions in the presence of an arbitrarily large cosmological constant, without introducing obvious pathologies or contradictions with experiment. The model consists of a quartet of scalar fields invariant under internal time-dependent, volume-preserving spatial diffeomorphisms. Physically, this can be seen equivalently as either a theory of Lorentz-violating massive gravity or of a finite-temperature superfluid pervading the Universe, dynamically cancelling out the energy density of a cosmological constant.

Tuesday, November 13, 2018, 2:30 pm

Cosman Seminar Room

Center for Theoretical Physics

Building 6C, Room 6C-442

Massachusetts Institute of Technology

Refreshments at 2:00 in the same room