JOINT TUFTS/MIT COSMOLOGY SEMINAR

Early dressing of primordial black holes with cold dark matter particles

Julien Lavalle

Laboratoire Univers et Particules de Montpellier (LUPM), France

If primordial black holes make up a fraction of the cosmological dark matter, then they could efficiently capture other dark matter species soon after their collapse. Considering thermal relics as the main dark matter component, I will show that the subsequent building up of very compact dark matter spikes around black holes is a linear process in the radiation-domination epoch, which can be predicted almost fully analytically (a result first obtained by Eroshenko, which some colleagues and I have slightly corrected since then). This takes the form of scale invariant solutions describing compact dark matter halos with different profile indices, which depend not only on the black hole and particle masses, but also on the kinetic decoupling time of the latter. All this can further translate into mutual exclusion limits if dark matter particles can self-annihilate, which has important consequences if one of these dark matter candidates happens to be discovered in future observations.

Tuesday, April 8, 2025, 2:30 pm

Cosman Seminar Room

Center for Theoretical Physics

Building 6C, Room 6C-442

Massachusetts Institute of Technology