

# JOINT TUFTS/MIT COSMOLOGY SEMINAR

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## *Cosmology of the String Axiverse*

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Axions have strong theoretical motivation within the standard model as a solution to the strong CP problem, and in addition provide a dark matter candidate. They are also generic in string theory, with a large number of axions arising due to the topological complexity of typical compactifications. The masses of these string axions are exponentially sensitive to the details of moduli stabilisation, and therefore it is plausible that they can be extremely light. This idea that there may be many light axions is known as the “String Axiverse” (Arvanitaki et al, 2010). The lightest axions have interesting cosmological signatures arising from a scale dependent sound speed and resulting large Jeans scale. I will review the rich phenomenology of light axions in astrophysics and cosmology: direct and indirect detection; effects on the CMB spectral distortions, lensing, and power spectrum; the possibility of using axion isocurvature to probe the energy scale of inflation; uses of light axions in solving potential problems with large scale structure in pure CDM (where I will argue they excel over WDM and are less constrained); and finally current (new) and future (forecasted) constraints to the axion parameter space. More precise answers to some of the questions raised by these experimental signatures requires the development of N-body and hydrodynamical simulations with light axions, such as those already available with CDM, WDM, and dark energy. I will also briefly cover some of the expected cosmology to result from the associated moduli (saxions) in both reheating and dark energy.

Tuesday, September 17, 2013, 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