

Free streaming of warm wave dark matter

Monday, July 21, 2025 4:00 PM (25 minutes)

In models of warm dark matter, there is an appreciable population of high momentum particles in the early universe, which free stream out of primordial over/under densities, thereby prohibiting the growth of structure on small length scales. The distance that a dark matter particle travels without obstruction, known as the free streaming length, depends on the particle's mass and momentum, but also on the cosmological expansion rate. In this way, measurements of the linear matter power spectrum serve to probe warm dark matter as well as the cosmological expansion history. In this work, we focus on ultra-light wave dark matter (WWDM) characterized by a typical comoving momentum q_* and mass m . We derive constraints on the WWDM parameter space (q_*, m) using Lyman- α forest observations due to a combination of the free-streaming effect and the white-noise effect.

Presenter: VENEGAS, Moira (Rice University)

Session Classification: Contributions