

## Shedding light on the small-scale crisis with CMB spectral distortions

*Friday, 23 June 2017 10:10 (20 minutes)*

The small-scale crisis, discrepancies between observations and N-body simulations, may imply suppressed matter fluctuations on subgalactic distance scales. Such a suppression could be caused by some early-universe mechanism (e.g., broken scale-invariance during inflation), leading to a modification of the primordial power spectrum at the onset of the radiation-domination era. Alternatively, it may be due to nontrivial dark-matter properties (e.g., new dark-matter interactions or warm dark matter) that affect the matter power spectrum at late times, during radiation domination, after the perturbations re-enter the horizon. We show that early- and late-time suppression mechanisms can be distinguished by measurement of the  $\mu$  distortion to the frequency spectrum of the cosmic microwave background. This is because the  $\mu$  distortion is suppressed, if the power suppression is primordial, relative to the value expected from the dissipation of standard nearly-scale-invariant fluctuations. We emphasize that the standard prediction of the  $\mu$  distortion remains unchanged in late-time scenarios even if the dark-matter effects occur before or during the era (redshifts  $5 \times 10^4$  *less*  $sim 2 \times 10^6$ ) at which  $\mu$  distortions are generated.

**Primary author:** Dr NAKAMA, Tomohiro (Johns Hopkins University)

**Presenter:** Dr NAKAMA, Tomohiro (Johns Hopkins University)

**Session Classification:** Working Group: Astroparticle physics and cosmology

**Track Classification:** Astroparticle Physics and Cosmology Working Group