Contribution ID: **69** Type: **not specified**

Current constraints on dark matter-interacting stepped dark radiation

Saturday, 21 January 2023 16:30 (1h 30m)

The Hubble and S8 tensions exist between direct and indirect measurements of the universe's expansion rate today and the clustering of matter in the universe. We examine two models constructed to alleviate both tensions. Both models inject a strongly self-interacting dark radiation (DR) fluid that also interacts strongly or weakly with some or all of the dark matter (DM). The DR energy density increases at some redshift, increasing the size of the sound horizon and thus alleviating the Hubble tension. The DM interactions suppress the growth of matter perturbations alleviating the S8 tension. The weakly interacting model is able to resolve both tensions and provide a good fit for all data. However, the inclusion of high-resolution cosmic microwave background data (ACT DR4 and SPT-3G) constrains the model and limits its ability to resolve the Hubble tension and full-shape (i.e. 'EFT of LSS') BOSS DR12 and eBOSS galaxy clustering limits its ability to resolve the S8 tension. The strongly interacting model incorporates dynamics that extends to later times than the weakly interacting model, leading to tight constraints using Planck CMB data alone. We investigate how these data sets respond to these models in order to understand the requirements for mechanisms to address both tensions.

Presenters: BARTLETT, Alexa (Swarthmore College); PATEL, Yashvi (Swarthmore College)

Session Classification: Poster Session + Grad/Career Fair