Contribution ID: **8** Type: **not specified**

Beyond decay: late-time conversion of dark matter to invisible radiation

Tuesday 19 November 2024 09:00 (1 hour)

In the cosmological concordance model, dark matter is assumed to be cold, non-interacting and covariantly conserved. An interesting possibility to consider is a violation of the third assumption in this simple picture, namely the conversion of a small fraction of dark matter to an invisible form of radiation.

So far, surprisingly little attention has been given to this option without theoretical bias towards a specific scenario like decaying dark matter. Here I will discuss how cosmic microwave and large-scale structure observations can probe dark matter conversion in a model-independent way, thus putting a conservative bound on how much dark matter could have disappeared at any point during the cosmological evolution. For late conversion times, but still before the onset of structure formation, such a 'disappearance' of a few percent of dark matter would even mitigate some of the well-known tensions between these datasets.

There is a variety of more concrete scenarios that can be mapped to this general idea, such as decaying dark matter or merging primordial black holes. In the second part of the talk, I will discuss yet another concrete particle physics realization, featuring a second era of dark matter annihilation after thermal freeze-out. As a bonus, this model naturally allows for velocity-dependent dark matter self-interactions strong enough to affect structure formation at dwarf galaxy scales in potentially observable ways.

Presenter: BRINGMANN, Torsten (University of Oslo (NO))