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## **Constraining neutrino mass using three-point mean relative velocity statistics**

*Thursday, 8 July 2021 18:00 (20 minutes)*

Velocity field provides an alternative avenue to constrain cosmological information, and one of the commonly used statistics is the mean radial pairwise velocity. In this talk, we consider the three-point mean relative velocity (i.e. the mean relative velocities between pairs in a triplet), and show that it is a novel probe of neutrino mass estimation. We explore the full cosmological information content of the halo mean pairwise velocities, and the mean relative velocities between halo pairs in a triplet using 22,000 simulations from the Quijote suite. We find that the mean relative velocities in a triplet allows a 1-sigma neutrino mass constraint of 0.065 eV, an order of magnitude better than the mean pairwise velocity constraint. We also introduce a new estimator based on three-point mean relative velocities, and showcase how it can constrain neutrino mass independent of  $\sigma_8$  and optical depth alleviating the degeneracy with these parameters. These results illustrate the possibility of exploiting the mean three-point relative velocities for constraining the cosmological parameters accurately from future cosmic microwave background experiments and peculiar velocity surveys.

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