

Solving tensions faster with velocities

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Peculiar velocity surveys using supernovae or standard sirens can be combined with large-scale galaxy surveys to great benefit. I will present a new methodology to analyse in a comprehensive way standard candles and galaxy data at the linear level. I will show that this methodology also allows for competitive model-independent measurements of the expansion rate, i.e. without any assumptions on the cosmological model besides the FLRW metric. For supernovae, I will provide forecasts for future surveys like 4MOST, DESI and LSST, and show that this leads to increased precision in σ_8 and the growth rate compared to the traditional method using only galaxies. The measurements can have similar precision to those of the CMB but exhibit orthogonal degeneracies, and the combined constraints yield huge improvements in both cosmological background and perturbation parameters. For standard sirens observed with next-gen telescopes, similar precision can be achieved in σ_8 and the growth rate, but we can also get a very high precision of 0.1% in H_0 . This means that this methodology can help solve both the current H_0 and σ_8 tensions.

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