

# Type Ia supernova standardisation: taboo systematics in the local Hubble constant measurement

*Monday 18 November 2024 10:20 (1 hour)*

My talk will focus on unresolved problems in the current models of type Ia supernova standardisation and how they bias the Hubble constant determination. I will show that the supernova standardisation model employed in the SH0ES measurement leaves unaccounted for residuals in the calibration data (supernovae observed in host galaxies of Cepheids). These residuals can be traced back to the model's assumption that intrinsic and extrinsic (extinction in supernova host galaxies) supernova properties are identical in the calibration galaxies and in the Hubble flow. This, however, cannot be reconciled with a naturally expected bias resulting from selecting highly star forming and dust-rich calibration galaxies for observations of Cepheids. I will show that the selection problem requires a more sophisticated modelling of type Ia supernovae in which we account for supernova subpopulations related to their host galaxy environments. I will discuss results from a newly developed hierarchical Bayesian modelling type Ia supernovae and its impact on the Hubble constant determination. I will demonstrate that the new approach lowers the best fit Hubble constant to 70 km/s/Mpc, reducing the Hubble tension by a factor of 2, primarily due to stronger extinction in the calibration galaxies than in the Hubble flow – the property which turns out to be the main cause of apparent residuals in the original modelling from SH0ES.

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