Contribution ID: **54** Type: **not specified**

Timescape versus ΛCDM —supernovae evidence for foundational change

Tuesday, 10 February 2026 14:40 (20 minutes)

The timescape cosmology returns to first principles, with quasilocal gravitational energy replacing dark energy, to explain apparent cosmic acceleration. As inhomogeneities grow, they back react on average cosmic expansion, which differs from conventional FLRW models. Crucially, dynamical spatial curvature arises as time-varying gradients of the kinetic energy of expansion, and depends directly on the void volume fraction.

The timescape expansion history is close to ΛCDM, but with differences at a precision which we are now finally probing. Whereas ΛCDM is increasingly challenged, independent observational tests now favour timescape. I will present a recent analysis of the Pantheon+ type Ia supernovae data set by Bayesian methods. When considering the entire Pantheon+ sample, we find very strong evidence ($\ln B > 5$) in favour of timescape over ΛCDM. Furthermore, even restricting the sample to redshifts beyond any conventional scale of statistical homogeneity, $z > 0.075$, timescape is preferred over ΛCDM with $\ln B > 1$.

The relation of our results to those of other surveys (DES, DESI etc) that find increasing tensions for ΛCDM, will be discussed. In particular, the recent DESI evidence for "evolving dark energy" is consistent with timescape's non-FLRW evolution, as predicted in 2009.

References:
1 A. Seifert, Z.G. Lane, M. Galoppo, R. Ridden-Harper, D.L. Wiltshire, "Supernovae evidence for foundational change to cosmological models", MNRAS Letters **537** (2025) L55-L60;
2 Z.G. Lane, A. Seifert, M. Galoppo, R. Ridden-Harper, D.L. Wiltshire, "Cosmological foundations revisited with Pantheon+", MNRAS **536** (2025) 1752-1777.

Authors: SEIFERT, Antonia (Perimeter Institute & University of Waterloo); Prof. WILTSHIRE, David (University of Canterbury); GALOPPO, Marco (University of Canterbury); RIDDEN, Ryan (University of Canterbury); LANE, Zachary (University of Canterbury)

Presenter: Prof. WILTSHIRE, David (University of Canterbury)

Session Classification: Theory