

# Towards precision tests of the cosmological principle: Inhomogeneous backreaction versus $\Lambda$ CDM

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**Abstract.** Upcoming missions such as the Euclid satellite will have the power to test the Friedmann equation via the Clarkson-Bassett-Lu test and similar tests, potentially falsifying a core assumption of the standard cosmology. However, to achieve the necessary precision also requires dealing with the fact that the standard cosmology is very often implicitly assumed in the data reduction process. We consider both type Ia supernovae data and baryon acoustic data, by new methods which are as model-independent as possible. We compare the  $\Lambda$ CDM to the timescape cosmology (a model with backreaction). Both models fit well with current data. However, in the case of supernovae we uncover systematic errors related to the emergence of a scale of statistical homogeneity, irrespective of the cosmological model. Regardless of which model is correct, such issues need to be confronted to achieve per cent level precision.

## References

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