Playing dice with the universe: Bayesian statistical analyses of cosmological models and new observables

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Stellingen

Behorend bij het proefschrift "Playing dice with the Universe: Bayesian Statistical analyses of cosmological models and new observables"

1. It is unfeasible to make a full model-independent study of features in the primordial power spectrum and higher correlation functions: the results will depend on assumptions about the physical origin of the features and the ansatz used to parametrize them.
   Chapter 2 of this thesis

2. In general, the usual approach in Cosmology is to sample the inflationary parameters (power-tilt and amplitude of the primordial power spectrum) without assuming any specific inflationary model a priori. This approach, however, does not allow for a complete sampling study of the parameter space in a specific model.
   Chapter 3 of this thesis

3. In addition to gravitational wave resolved events, one can expect the presence of a gravitational wave background produced by the superposition of unresolved compact binaries that are either too far away or too faint to be detected individually.
   Chapter 4 of this thesis

4. Gravitational waves alone are not particularly useful for Cosmology because the data provides only a sky position and a measure of the luminosity distance to the source. Additional independent observations are needed to address cosmological problems, like redshift measurements.
   Chapter 5 of this thesis

5. The construction of a software that allows us to perform a full Bayesian statistical analysis is crucial for the *Euclid* mission.
   Chapter 6 of this thesis

6. The impact of cross-correlations in redshift among photometric galaxy clustering and weak lensing is particularly relevant in models beyond ΛCDM.
   Euclid Collaboration. A&A, ***642*** *, A191 (2020).*

7. *Euclid* will be able to answer the most important key questions about the dark side of the Universe.
   Laureijs, R. et al. ESA Euclid Definition Study Report (2011).

8. Oscillatory features that require adding extra fitting parameters in the model are not favored compared to the baseline ΛCDM model although they provide up to 10 times improvement in fit to the data.
   Hazra, D. K. et al. JCAP, ***12****, 038 (2021).*

9. A cross-correlation signal between intensity mapping of the neutral hydrogen (HI) and gravitational waves (GW) is expected because both HI and GW trace the cosmic density field.
   Scelfo, G. et al. JCAP ***01****, 004, (2022).*

10. Physicists should stop encouraging a romantic view of the scientific career.

Guadalupe Cañas Herrera,
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