

Time delay lens cosmography

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Received: date / Accepted: date

Abstract Here goes the abstract.

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1 Introduction

1.1 A brief history of time delay cosmography

Once upon a time, there was an important article written by ?.

Early attempts. Systematic errors evident.

B1608: HST data on Einstein Ring, fully modeled, precision cosmology.

1.2 Current context

Towards accurate cosmology with multiple probes.

Time delays lie between local Hubble constant measurement and other kinematic probes at intermediate redshift (BAO, SNe).

Requirements of each probe: sufficient precision to test systematics of the others.

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2 Theoretical background

Gravitational lensing. Time delay surface. Distance.

Notes on lens mass distribution.

Notes on weak lensing effects.

3 Time delay distance measurement

Outline key analysis steps.

Next three sections will each describe current state of the art, current limitations, and principal sources of systematic error of the three key parts of the problem.

4 Measuring time delays

Preamble.

4.1 Monitoring Observations

State of the art: COSMOGRAIL optical monitoring.

Limitations: scheduling.

Systematic errors: uniform calibration and photometry.

4.2 Lightcurve Analysis

State of the art: TDC results.

Systematic errors: microlensing, correlated noise.

5 Modeling the lens mass distribution

Preamble.

5.1 High Resolution Imaging Observations

State of the art: HST, Keck AO.

Limitations: resolution, bright quasar images.

5.2 Lens Modeling

State of the art: pixelated source reconstruction, simply-parameterised lens mass distributions, MCMC.

Limitations: skilled labor.

Systematic errors: source pixelation/regularisation, lens model assumptions.

6 Lens environments and line of sight effects

State of the art: ray-traced cosmological simulations, matched via number counts.

Limitations/systematics: incomplete model: local vs line of sight mass, ignoring multi-plane lensing, external convergence only.

7 From time delay distances to cosmography

Approach: combining CMB and time delay distances. Blinding.

Results. Internal consistency. Consistency with other probes.

8 Outlook

Preamble.

8.1 Precision

Sample size. Stage 3, stage 4 surveys. Monitoring solutions.

Extrapolations to N lenses assuming X% precision per time delay distance, forecasts.

8.2 Accuracy

Addressing systematics associated with time delay measurement, lens modeling, environment characterisation.

Accuracy in joint analysis: hierarchical inference.

9 Summary

Acknowledgements Thank people who give comments/input. Thank funding agencies.