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Time delay cosmography

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Abstract Here goes the abstract. mention blindness

Keywords First keyword · Second keyword · More

1 Introduction [TT]

What is time delay cosmography? Why is it cool? What is it good for? What are the challenges?

Blindness: with high precision comes greater responsibility. Extraordinary claims etc.

FIGURE: CARTOON OF LENSING, FROM SPACE WARPS WEBSITE? [PJM]

FIGURE: H0 AS A FUNCTION OF TIME (A CAUTIONARY TALE) [TT]

2 A brief history of time delay cosmography [TT]

Refsdal [60s]

First lensed quasars [70s]

First monitoring [80s]

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Controversy about time-delays [90s]

Controversy about models (too simple) [00']

The universe is not exactly homogenous and isotropic [00]

Modern time delay cosmography [¿00]

SN Refsdal [14-15]

FIGURE: HISTORIC TIME DELAY AND IMAGE OF A LENS VS MODERN DATA [TT]

3 Theoretical background [PJM]

Lensing, Fermat's principle and potential.

FIGURE: SCHEMATIC WAVEFRONT DIAGRAM FROM T&E15.

Time delay distance.

Importance of mass distribution in lens.

Model (mass-sheet) degeneracy and its generalizations

Importance of mass along the line sight - the universe is not Friedmann Lemaitre Robertson Walker.

POSSIBLE FIGURE: ILLUSTRATION OF LINE OF SIGHT EFFECTS? CARTOON COMPARING IDEALIZED UNIVERSE TO OVER/UNDER DENSE LINE OF SIGHT [PJM]

4 Modern Time delay distance measurement 2010+ [PJM]

4.1 Measuring time delays [PJM]

Mention importance of blindness in all measurements.

4.1.1 Monitoring Observations

Fassnacht for B1608 COSMOGRAIL. Others?

4.1.2 Lightcurve Analysis

COSMOGRAIL TDC

FIGURE: Forecasts for 10,50,100,1000 lenses for various cosmological models (w, wa+w0, curvature etc etc). CosmoSIS forecasts (ackn. Dave & Elise, ask them).

Check Jee et al.

6.2 Accuracy [PJM]

Discussion of systematic uncertainties

Time delay measurement. Light curve quality.

Lens mass modeling. Percent-level systematics due to model assumptions (ie MSD). IFU observations, resolved stellar kinematics. Ensembles.

Environment and line of sight

Time delay perturbations (someone's noise is somebody else's signal..)

The importance of blinding.

6.3 Cosmic complementarity [TT]

What's the point? Arent' other probes already doing it? Our place in the cosmology ecosystem. Discuss place relative to other distance indicators like Cepheids, BAO, Sne. Then complementarity with growth of structure probes like weak lensing, clusters etc etc. How important is H0?

Importance of multiple INDEPENDENT measurements for discovery of new physics.

7 Summary [TT]

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References