



## Special DTP Colloquium

# Does Gravitational Lensing Affect The Cosmological Distance-Redshift Relation?

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A long standing question in cosmology is whether gravitational lensing changes the mean distance-redshift relation or the mean flux density of sources.

I will first review the rich history of this subject. The problem was first considered by Zel'dovich in the early '60s and reconsidered by many others since. Yet the situation remains confused. Weinberg, for example, argued in '76 that there is no effect on the grounds of flux conservation, yet that seems to conflict with other calculations. Interest in this has been rekindled by recent results from 2nd order relativistic perturbation theory which, if correct, would have profound implications for both supernova and CMB cosmology.

With John Peacock, I revisit this. First, we argue, drawing on Kibble and Lieu, that many of the apparent contradictions can be understood as arising from confusion between different types of averaging. Second, we carefully examine Weinberg's argument that there should be no effect and show that the fractional perturbation to the area of a surface of constant source redshift is one part in a million effect. This effectively validates the conventional approach to CMB analysis and provides a firm basis for SN1a cosmology.



Prof Nick Kaiser is renowned for his many seminal contributions to the field of Cosmology. After his Maths Tripos and PhD from the University of Cambridge, UK, he was Professor at CITA, Toronto, before moving to the University of Hawaii. He has been the recipient of many prizes, including the Helen Warner Prize of AAS, the Herzberg Medal, the NSERC Steacie fellowship, the Rutherford medal etc. He is the PI of the Pan-STARRS telescopes in Hawaii.

**Friday, 11th December, 2015, at 4pm**  
**Lecture Theatre AG 69, TIFR**