



# Harnessing the Unresolved Lenses: Detecting Strong Lenses and Measuring Time-Delays from Unresolved Light Curves

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## ABSTRACT

Strong gravitational lensed systems with variable sources, like supernovae (SNe) and quasars (QSO), can be the next frontier in cosmic probes. One can obtain crucial constraints on cosmological parameters, such as the value of Hubble constant, evolution of dark energy etc, independent of other probes by measuring the time delays between the images. Lensed SNe and QSOs have their own advantages, e.g. lensed SNe are extremely rare as compared to lensed QSOs but the former have much better understood light curves with the time scale of a few months only. The upcoming time-domain surveys such as LSST and Roman will observe many lensed systems with both kinds of sources. However, many will have the images spatially unresolved due to the limited angular resolution of the wide-field surveys. In such cases, the observed lightcurves would be superposition of the time-delayed image fluxes. We investigate whether the unresolved sources can be recognized as lensed given only the lightcurve information and whether time delays can be extracted robustly.

In this talk, I will discuss a few such interesting techniques that can identify the unresolved lensed systems of both source kinds (SN and QSO). Most importantly, these techniques are very much generic and, hence, do not assume any particular property of the sub-classes of the sources, such as the type of SNe, the flux variability of QSOs etc. These techniques can be very useful in detecting the lensed systems in wide-field surveys and in measuring the time delays simultaneously to improve our understanding of the cosmos.

## DATE & TIME

15th February, 2024  
04:00 PM

## VENUE

PAMU Seminar Hall  
A.N. Kolmogorov Building,  
ISI, Kolkata



*Everyone is invited to  
attend*