Data and Time Delay Analysis

All data has been reduced in a homogeneous way as described in Tewes et al. (2013b). Photometry of the sources is obtained through simultaneous deconvolution using the MCS algorithm (Magain et al. 1998). Three of the time delay estimation methods are described in Tewes et al. (2013a). They include a dispersion-like technique, a regression difference technique, and a free knot spline technique. The fourth method is the Numerical Model Fit as explained and applied in Eulaers & Magain (2011).

On the right, you see the result of the simultaneous deconvolution of 1109 R-band Mercator images of SDSS J1206+4332. We clearly identify the lensed images A and B separated by 2.98 arcseconds, the main lensing galaxy G1 and two more galaxies G2 and G3. From the light curves we derive a final time delay of $\Delta t = 111.3 \pm 3$ days.

The Numerical Model Fit... – revisited

This method, as it was presented in Eulaers & Magain (2011) constructs a numerical model for the quasar variability, together with a linear microlensing trend, for a given time delay. The optimal time delay is the one that minimizes the difference between the data and this numerical model. To determine the error on the time delay, we first check that our residuals (data minus model) are compatible with a normalized Gaussian distribution. Then we add normally distributed random errors with the appropriate standard deviation to the numerical model light curve and redetermine the time delay. The mean value of the time delay distribution that we obtain after 1000 executions is considered to be the final time delay, and its dispersion represents the 1σ error bar.

SDSS J0903+5028

The time delay determination of this doubly lensed quasar is not straightforward in spite of clear photometric variability in the more than 4 years of Maidanak and Mercator data. The poor sampling during some of the seasons can partially be blamed for this difficulty, but microlensing probably complicates the case. The choice of a non-linear slow microlensing model in the NMF makes the time delay shift for 11 days. On top of that, the other three time delay estimation methods each yield a different result in a range from $\Delta t = 90 - 130$ days. => needs further investigation

References

Eulaers, E. 2012, Ph.D. Thesis