MICROLENSING IN LENSED QUASARS

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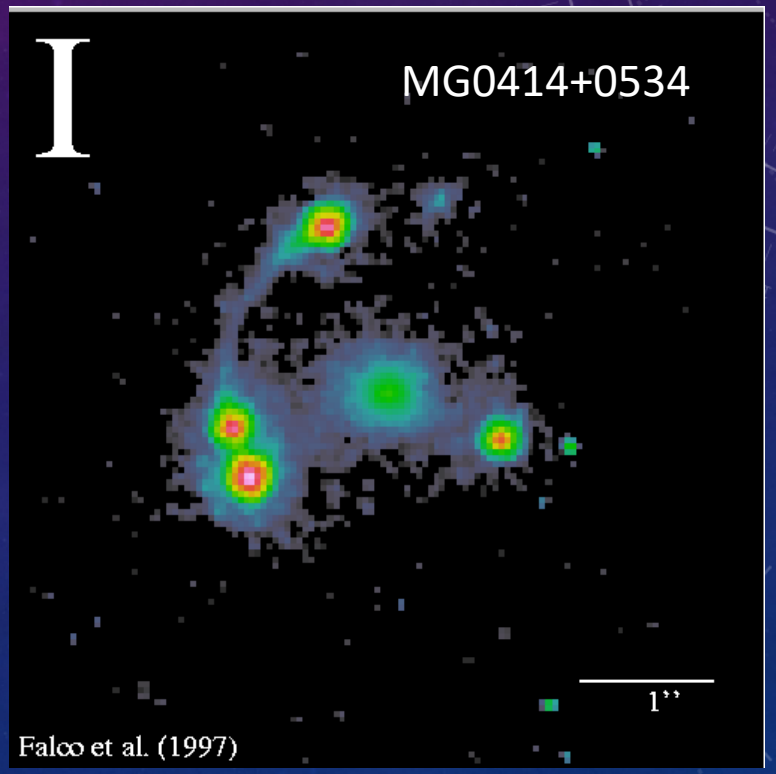
ARRIVAL

‘FLUX ANOMALIES’ IN LENSED QUASARS

- Complex mass distribution.
- Dust extinction by the lens galaxy.
- Microlensing by stars in the lens galaxy halo.



Falco et al 1997, ApJ 113, 550

‘FLUX ANOMALIES’ IN LENSED QUASARS

Simon Birrer’s talk
Liliya Williams’ talk

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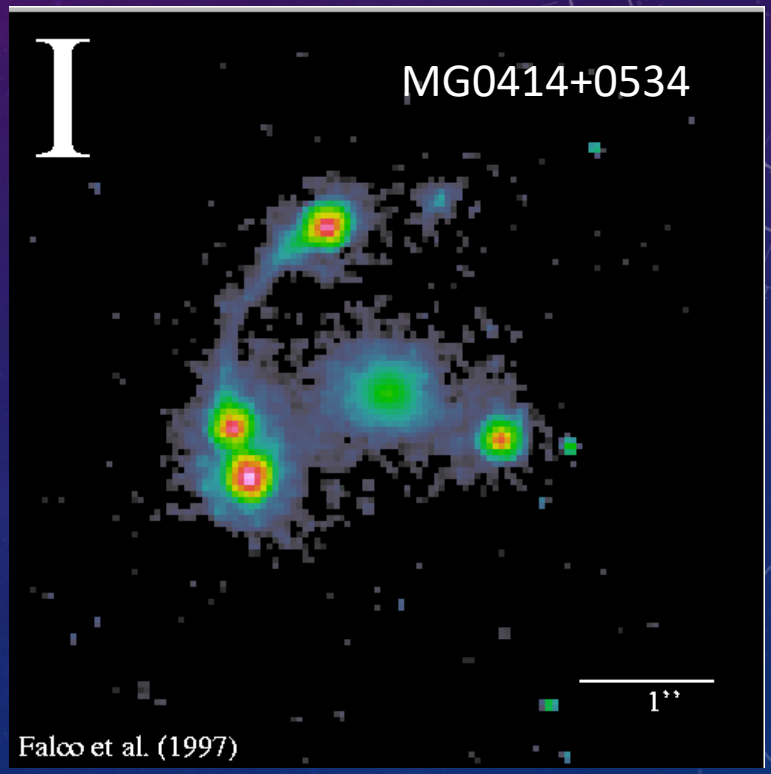

Falco et al 1997, ApJ 113, 550

MOTIVATION

$$m^{\lambda}_{\mathrm{obs},\,i}(t) = m^{\lambda}_{int}(t-\tau_i) - 2.5\log\left[\mu^{i}_{\lambda}(t)\right] + A^{i}_{\lambda}$$

Intrinsic magnitude of the QSO

Time delay of image *i*

Magnification of image *i* (including microlensing)

Dust extinction at image *i*

months/years of broad-band monitoring

MOTIVATION

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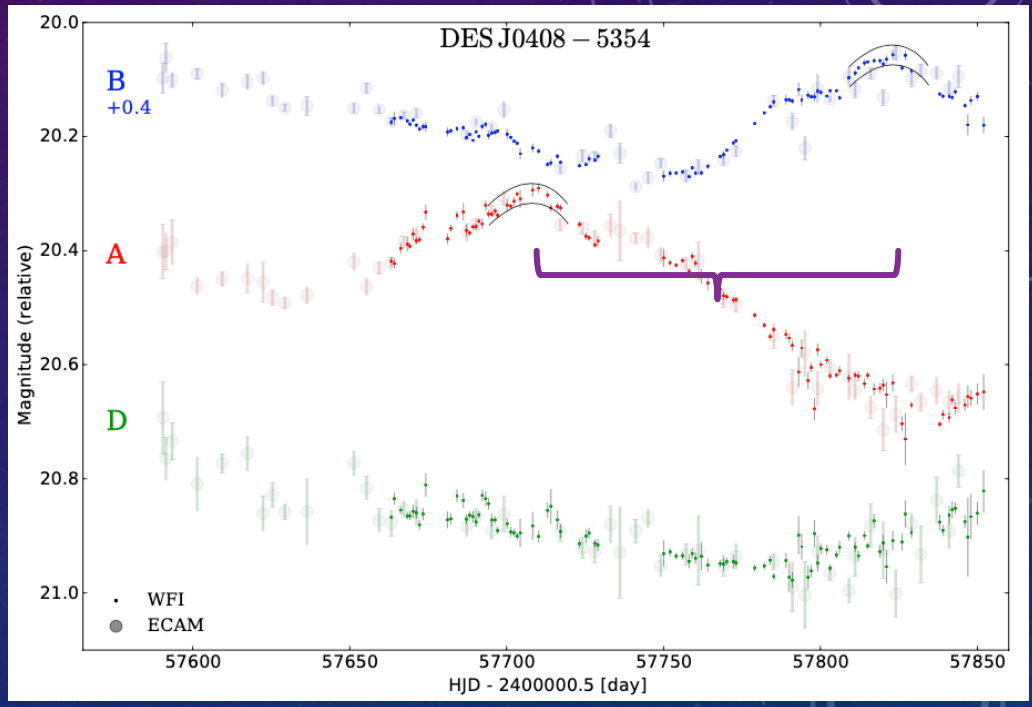
Intrinsic magnitude of the QSO

Time delay of image *i*

Magnification of image *i* (including microlensing)

Dust extinction at image *i*

increase cadence



Courbin et al 2018, A&A 609, A71

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Intrinsic magnitude of the QSO

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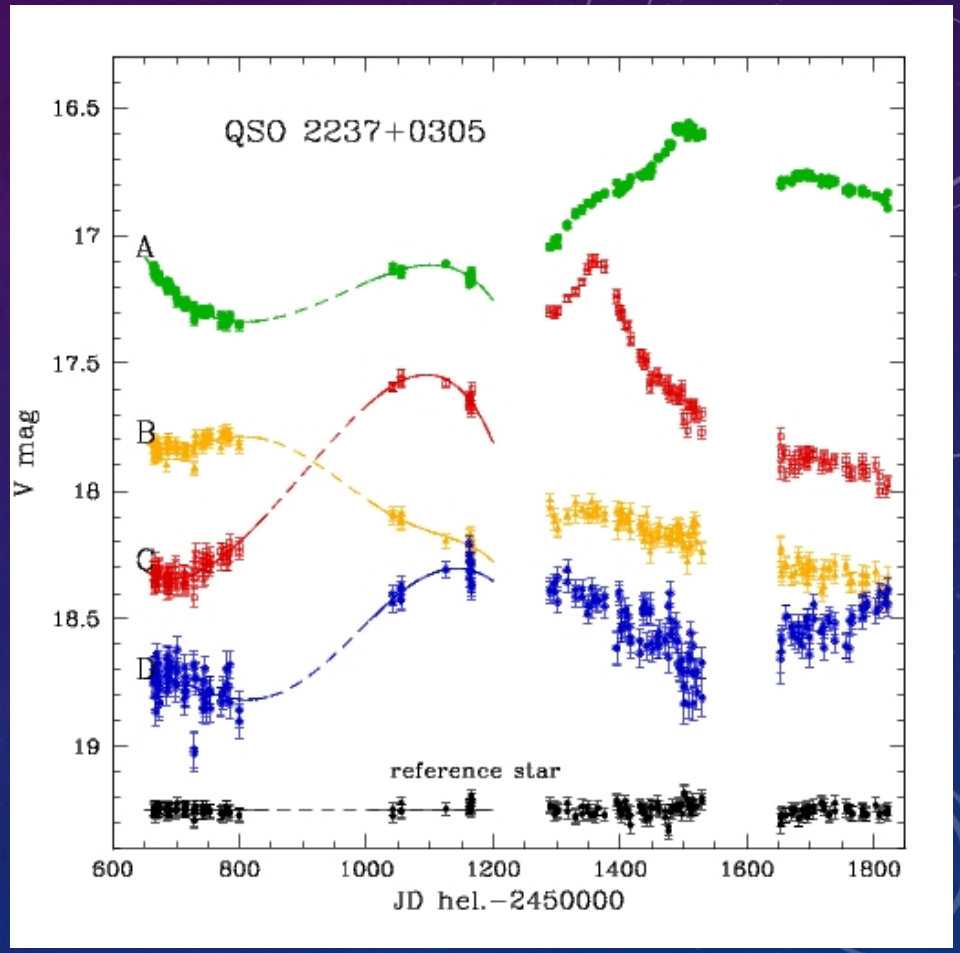
Magnification of image *i* (including microlensing)

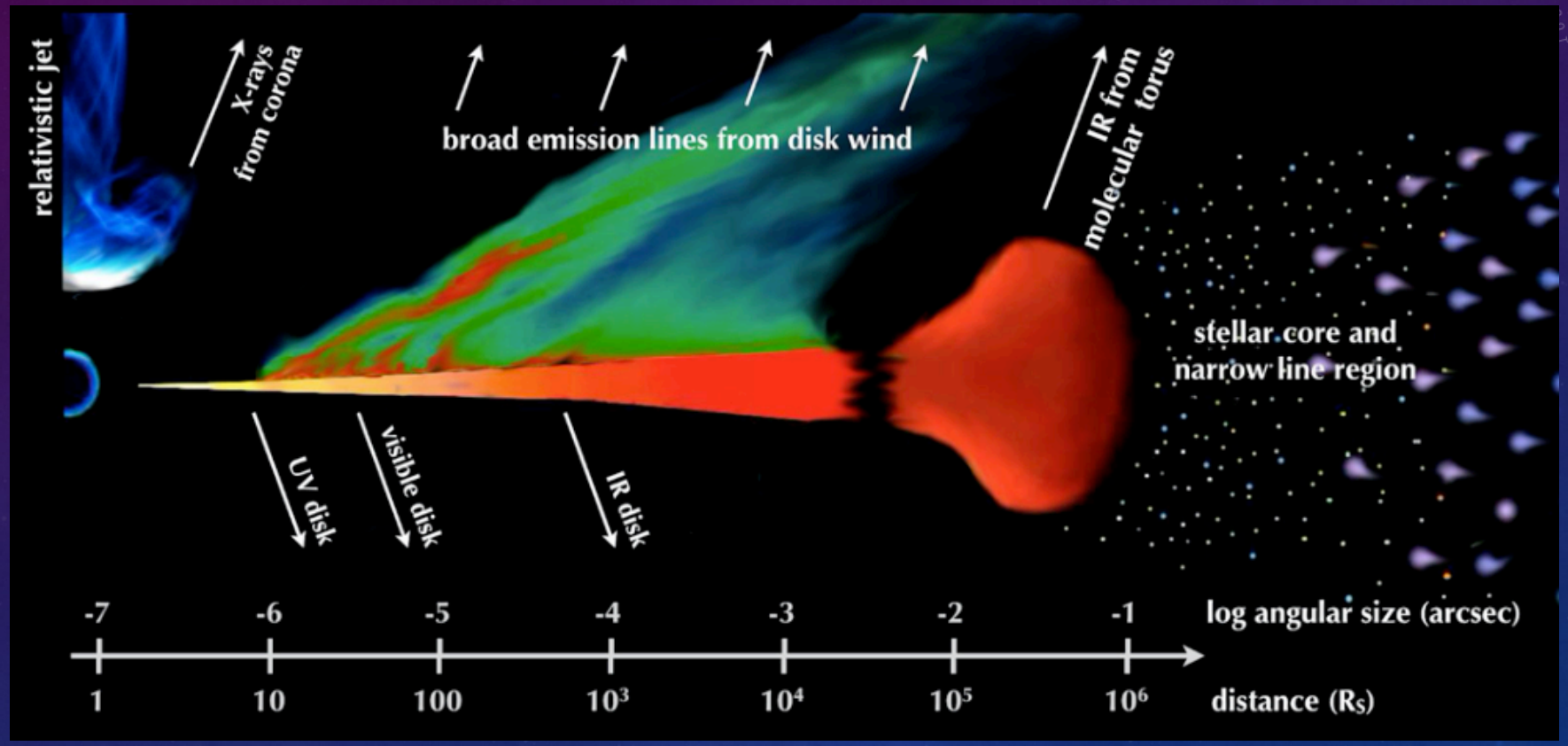
Dust extinction at image *i*

- **'Noise'** for the light curves (time delay measurements).



OGLE light curve (1997-2000)
http://ogle.astrouw.edu.pl/

QUASAR STRUCTURE SCHEME



Moustakas et al. 2019, 1904.12967

LENSED QUASAR SPECTROSCOPY

$$m_1(\lambda) - m_2(\lambda) = -2.5 \log\left(\frac{M_1}{M_2}\right) + (E_1 - E_2) R_V \left(\frac{\lambda}{1 + z_L}\right)$$

magnitude difference in the emission line for images 1 and 2

magnification ratio

extinction curve (lens galaxy restframe)

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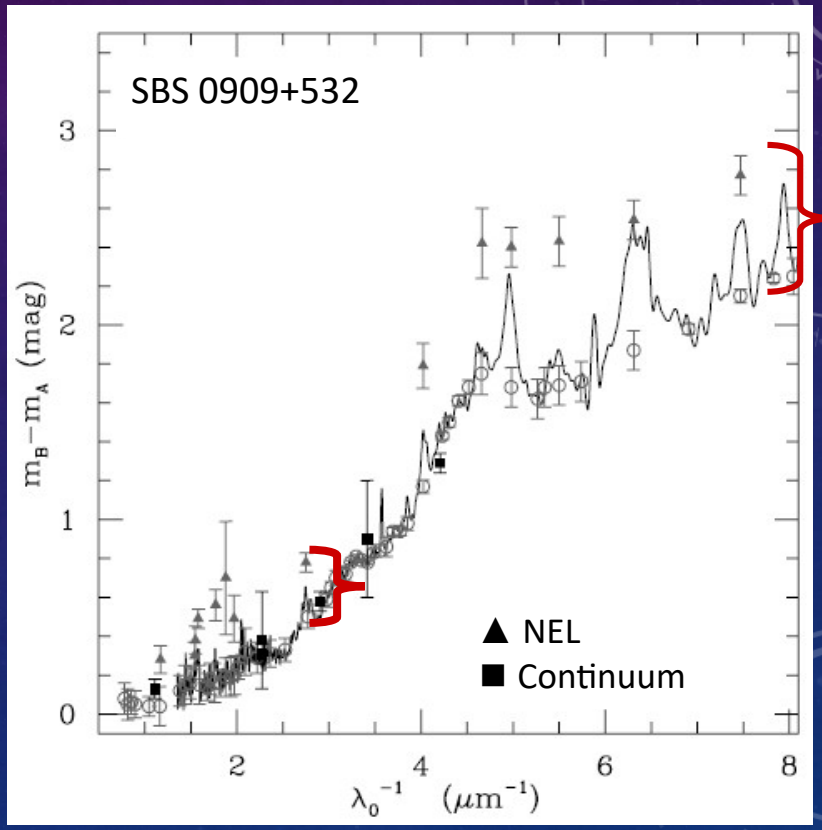

Mediavilla et al. 2011, ApJ 730, 16

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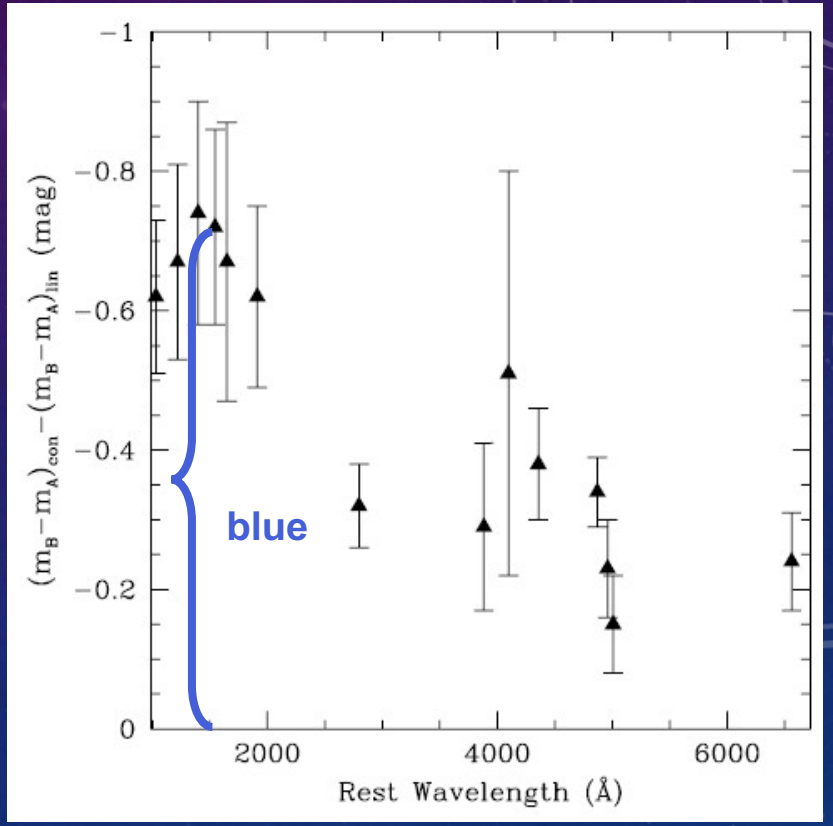

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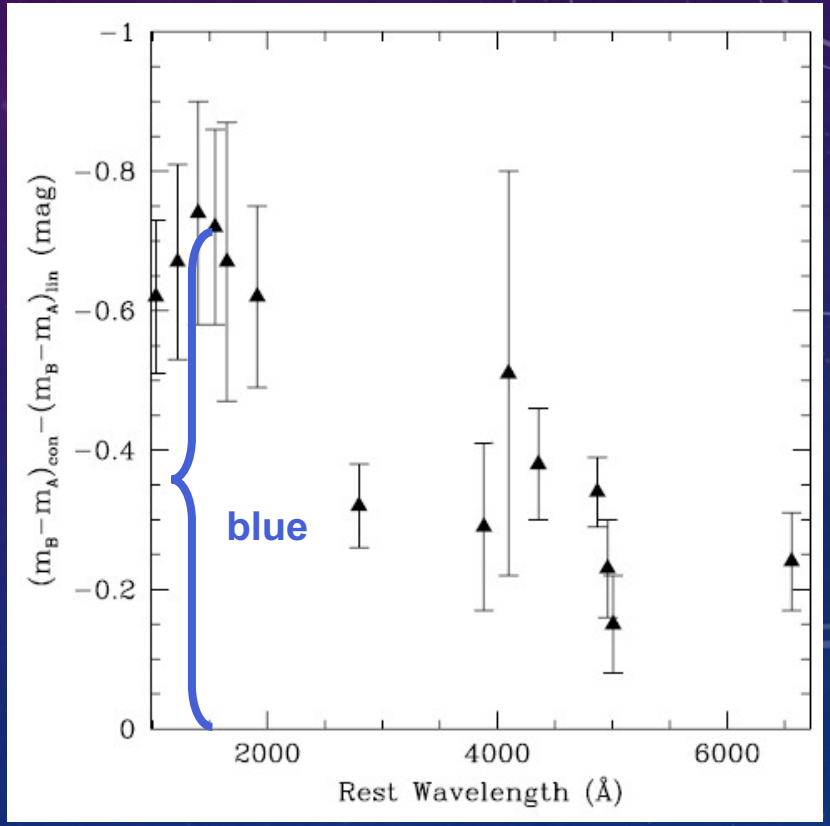
Eric Paic's talk



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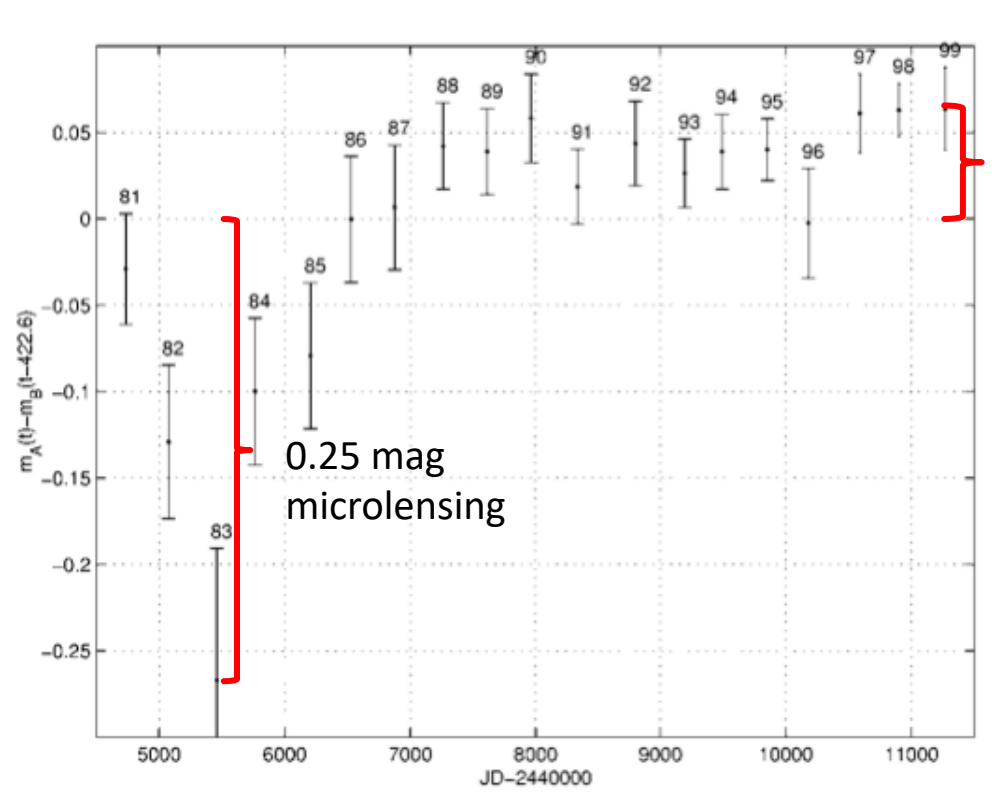
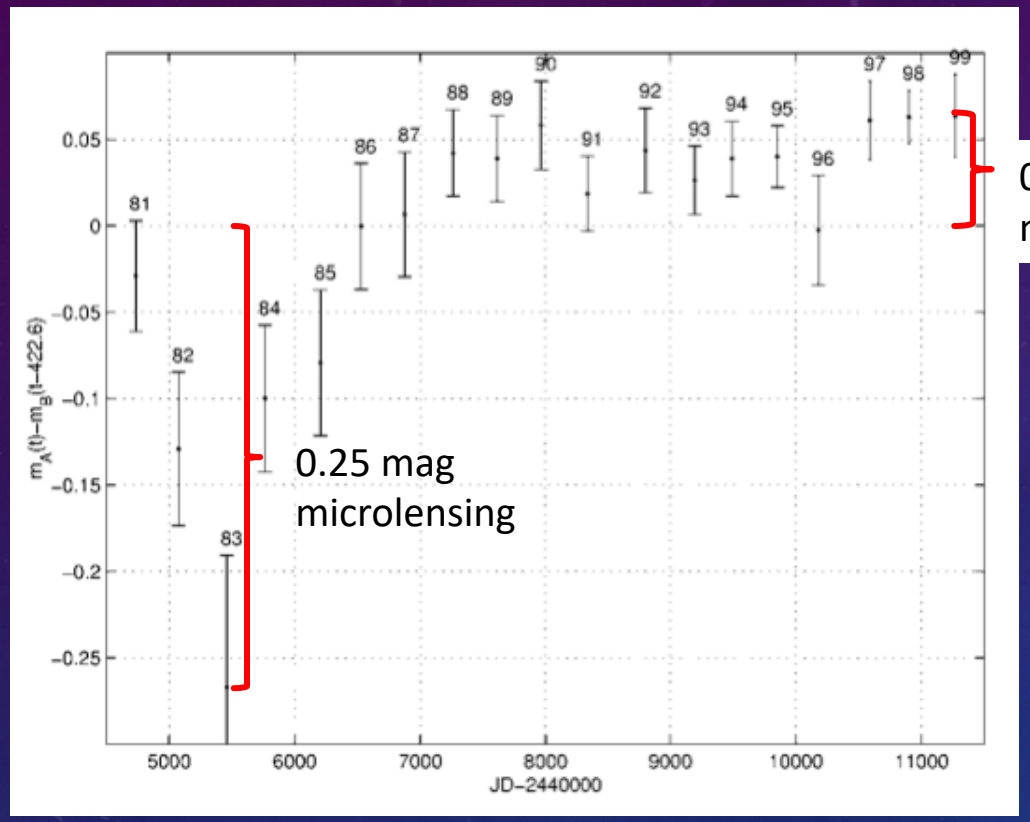
A COMPLICATION: Q0957+561



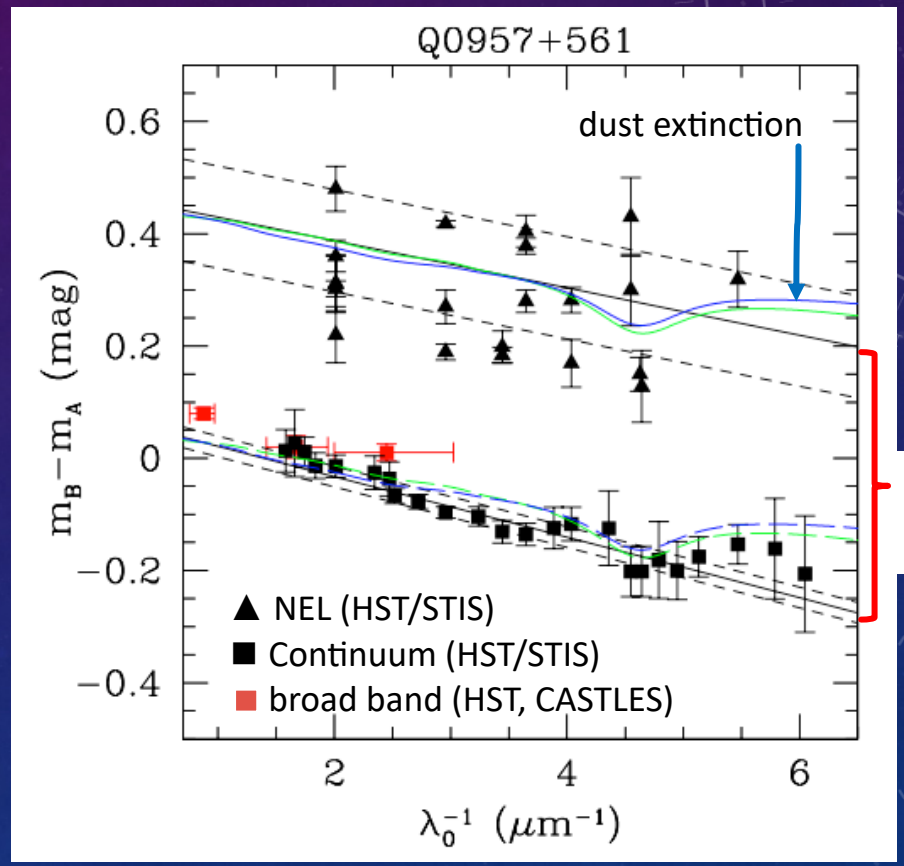
Oscoz et al. 2002, ApJ 573, L1

- Broad band light-curve over ~2 decades.
- Averaged difference per year (corrected by time delay).

A COMPLICATION: Q0957+561



Oscoz et al. 2002, ApJ 573, L1



Motta et al. 2012, ApJ 755, 82

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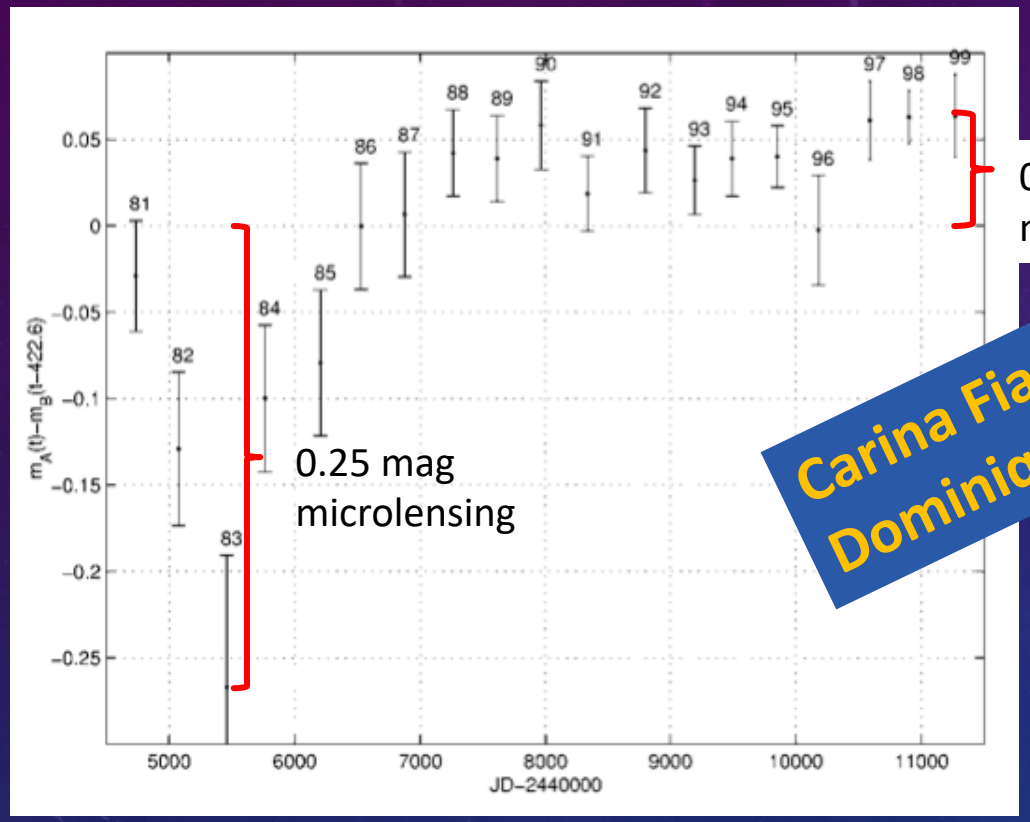

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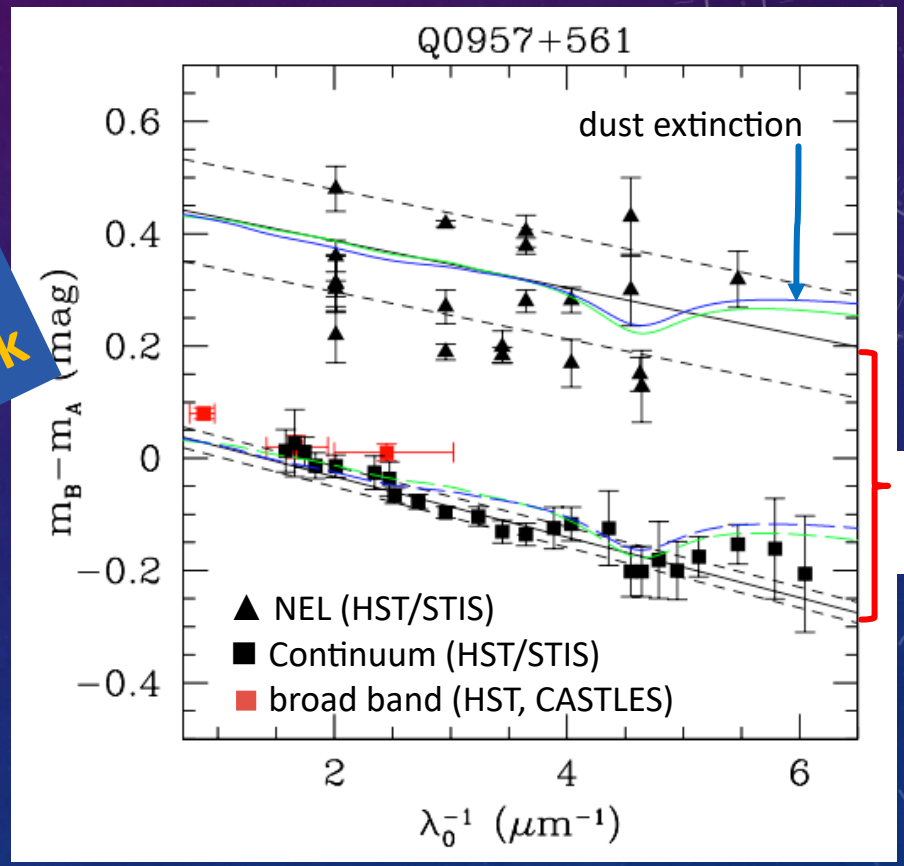
Carina Fian's talk
Dominique Sluse's talk



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SUMMARY

- Spectroscopic monitoring is a cheap way to disentangle microlensing and dust extinction.
- Narrow emission lines could confirm whether a long-lasting microlensing event is taking place in broad-band light curves.

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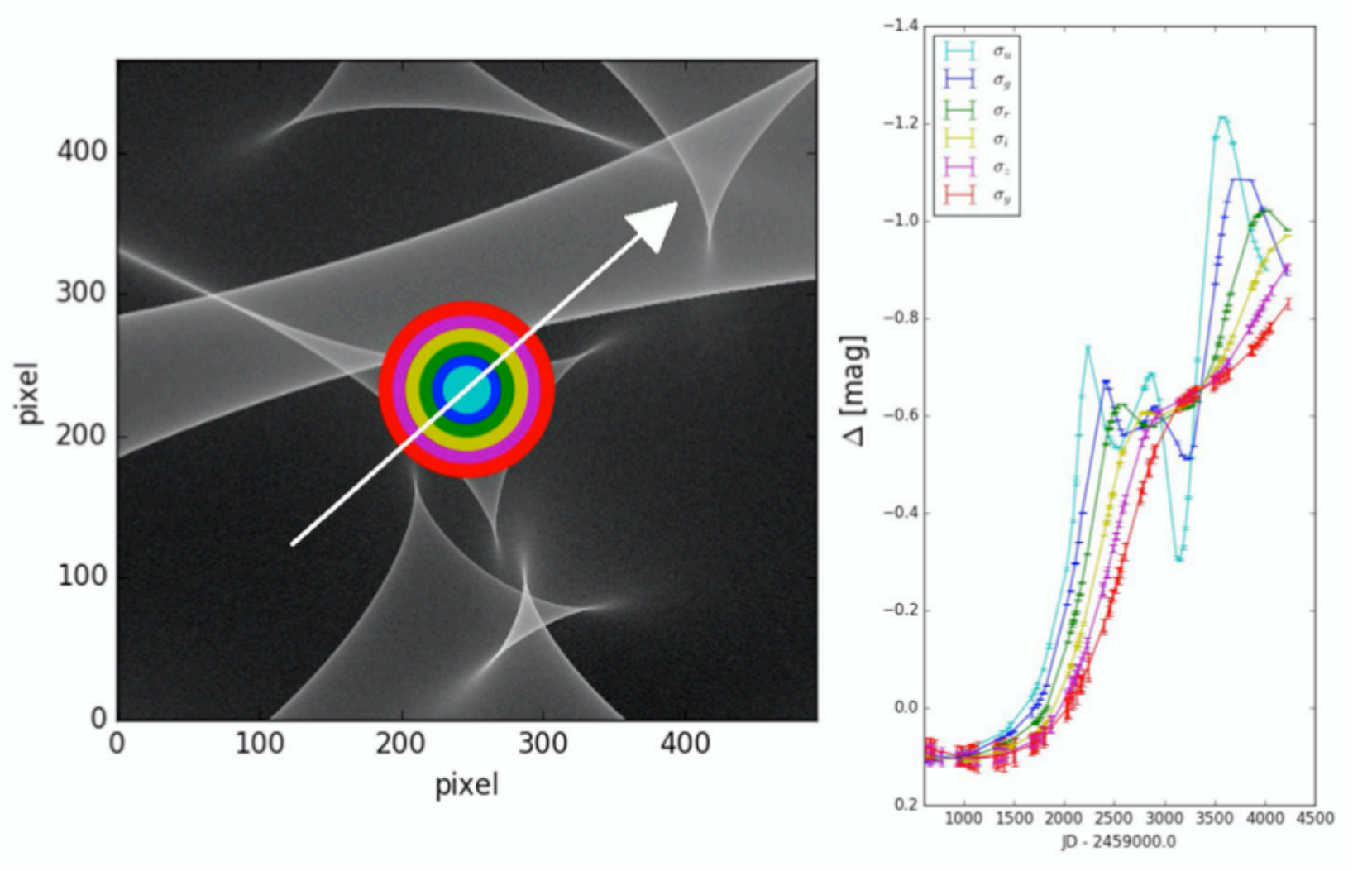

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