POLARIZATION AND MICROLENSING IN THE QUADRUPLY IMAGED BROAD ABSORPTION LINE QUASAR H1413+117

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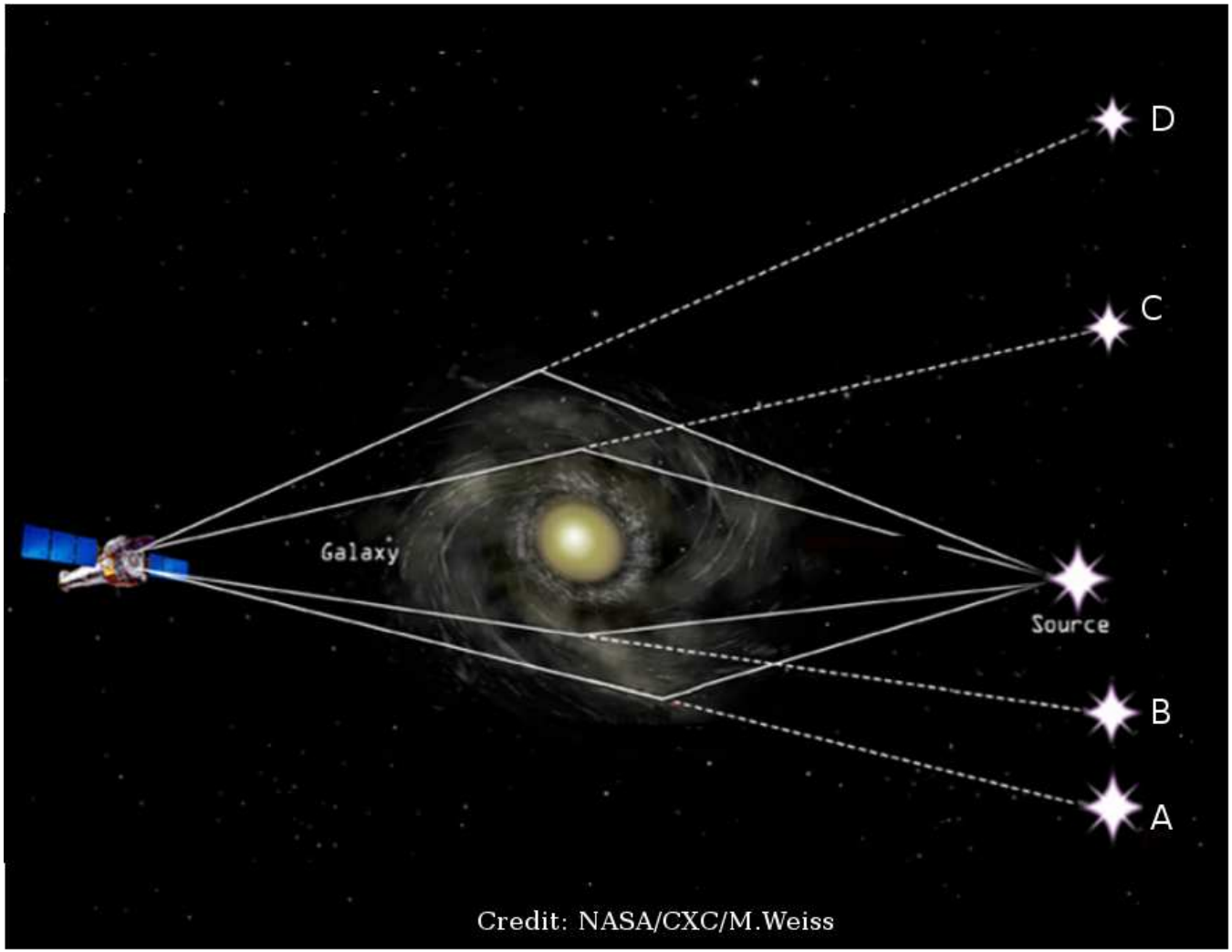
Gravitational lensing & microlensing



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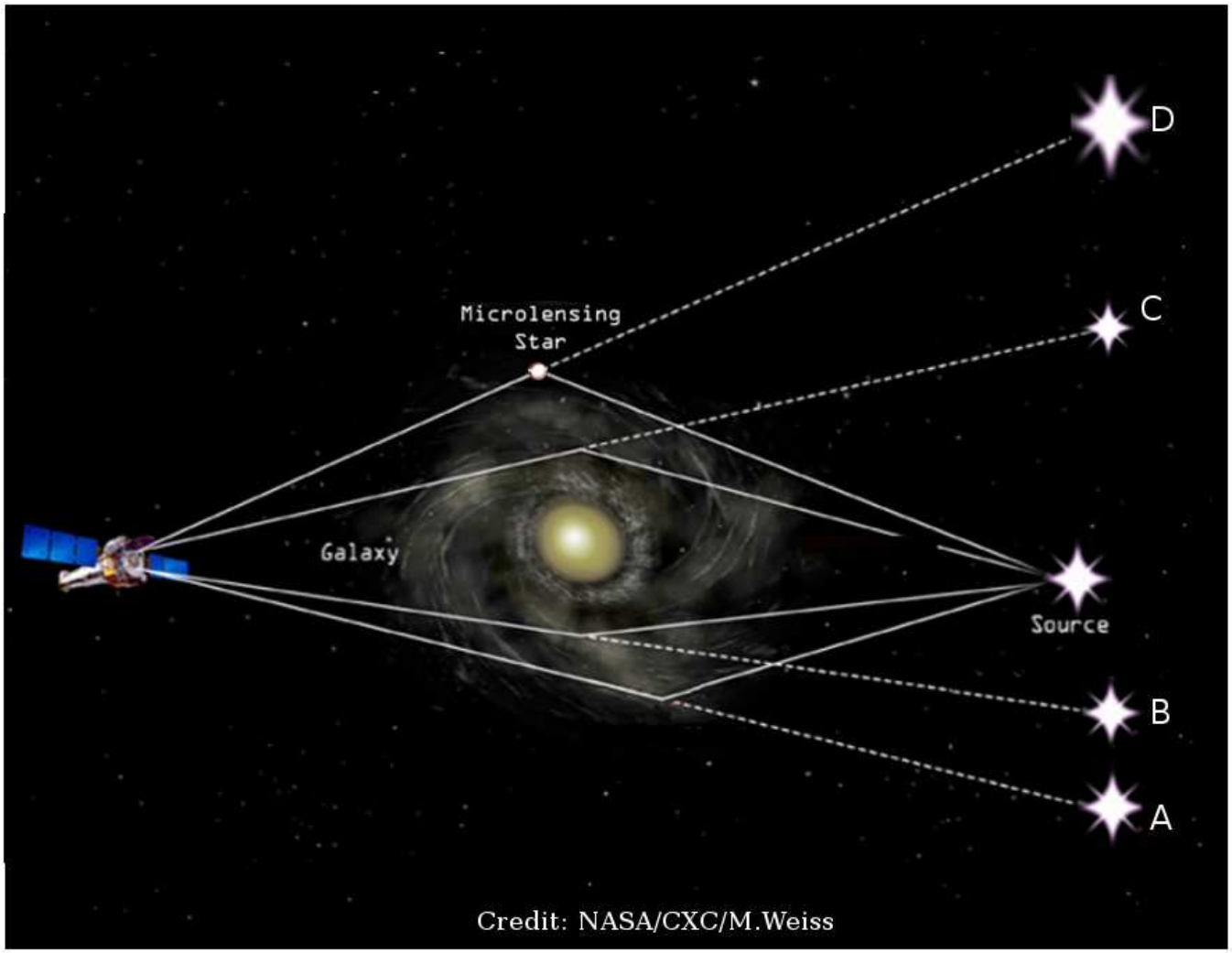
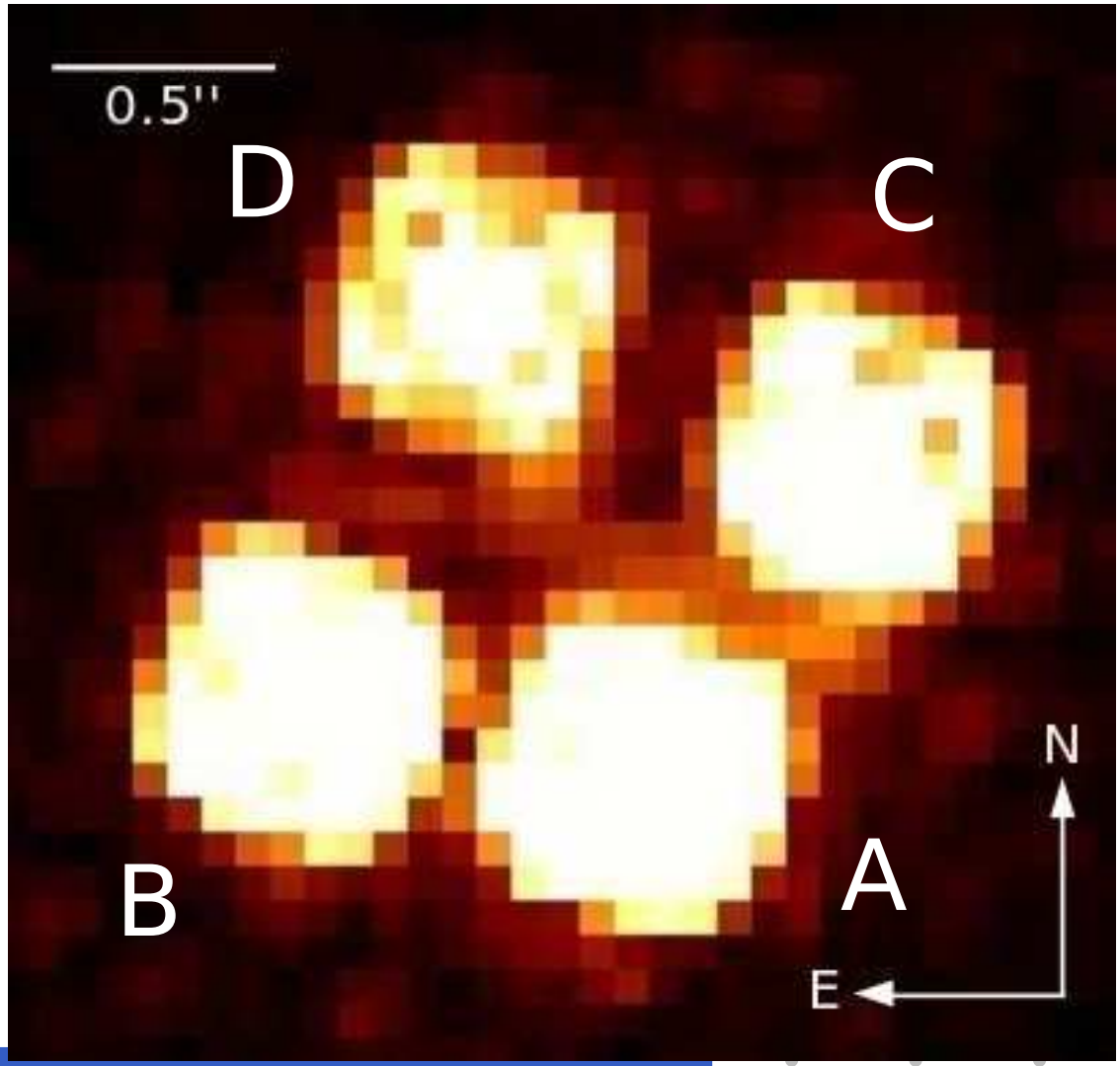


The Cloverleaf

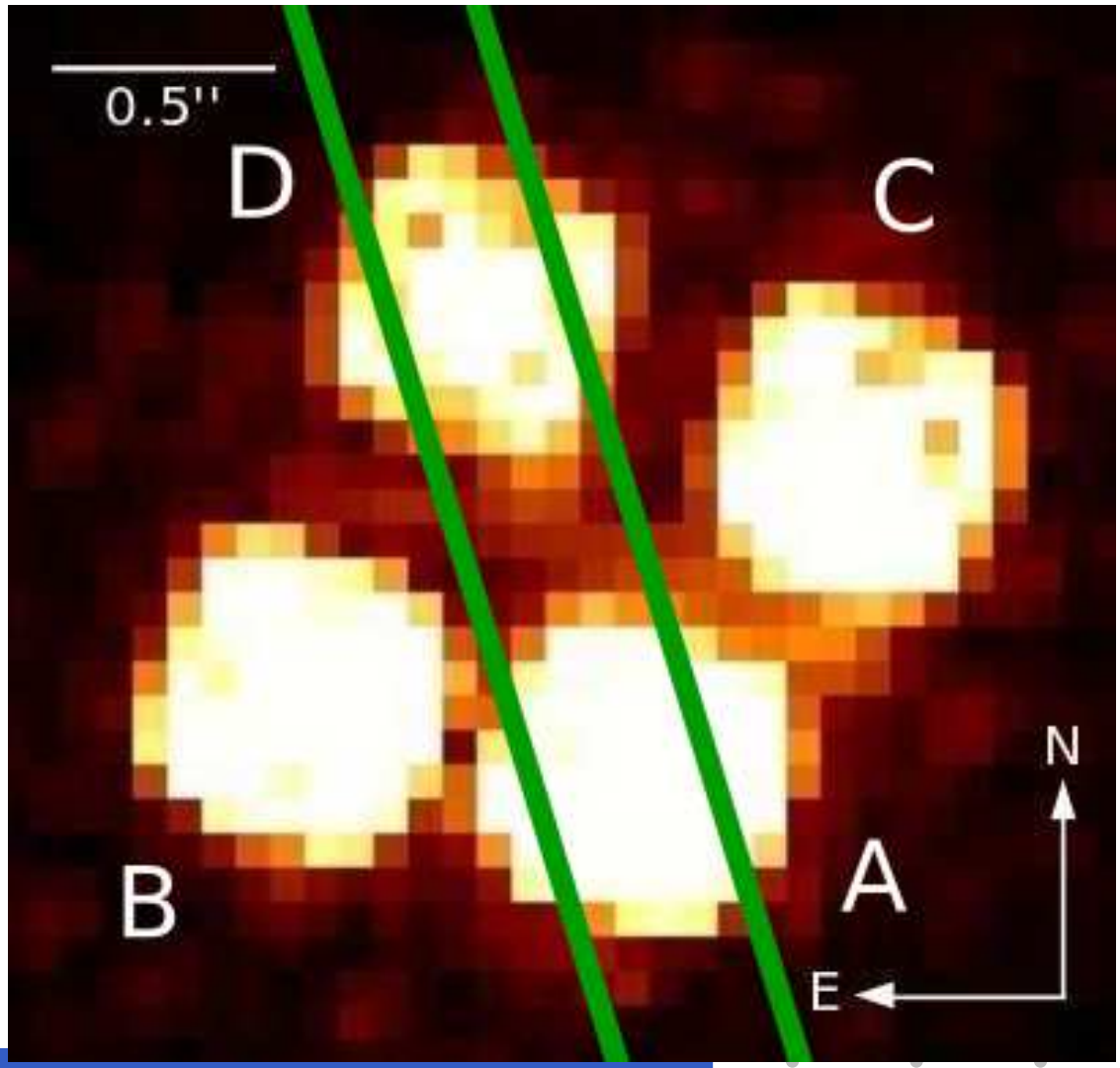


$$z_S = 2.55$$

Polarized $\sim 2\%$
(Goodrich & Miller 1995)

Microlensed
(e.g. Angonin et al. 1990, Hutsemékers et al. 2010)

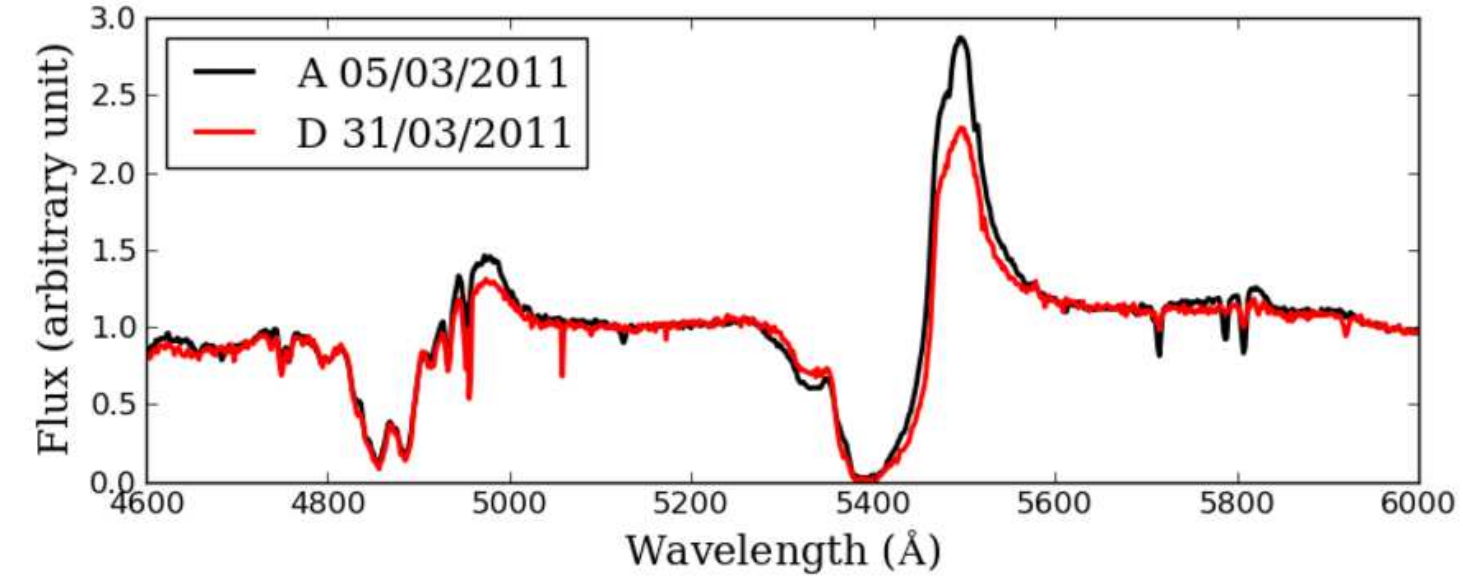
The Cloverleaf

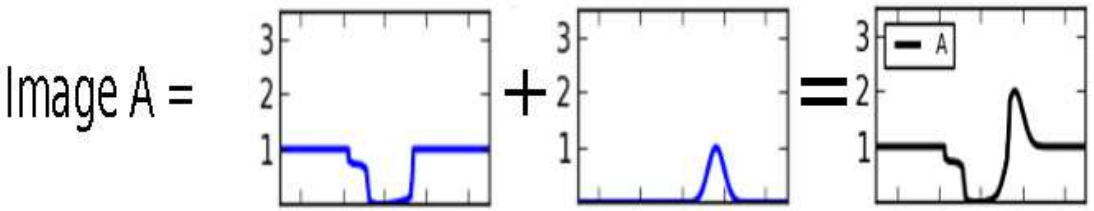


Slit	Date
(A,D)	March 5th, 2011
(A,D)	March 31st, 2011

VLT-FORS2 MOS

Microlensing in the Cloverleaf





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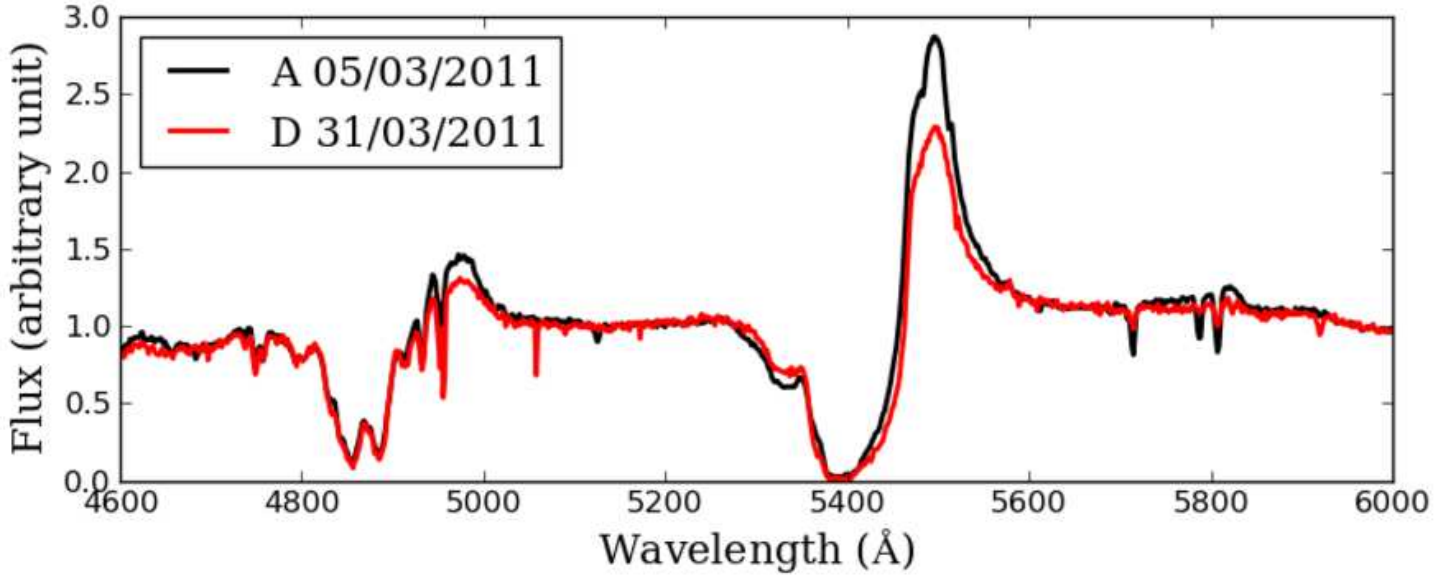

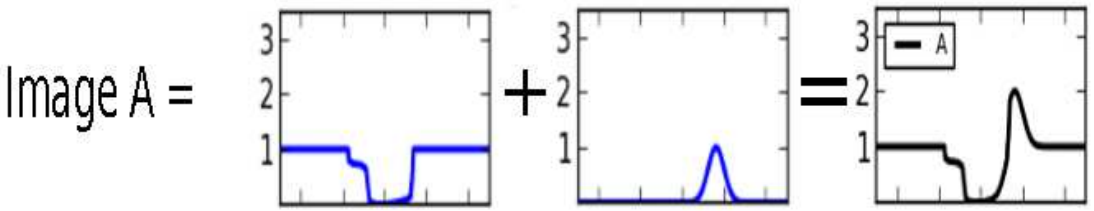

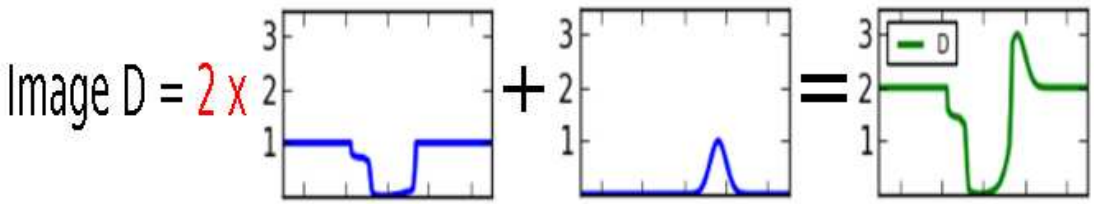

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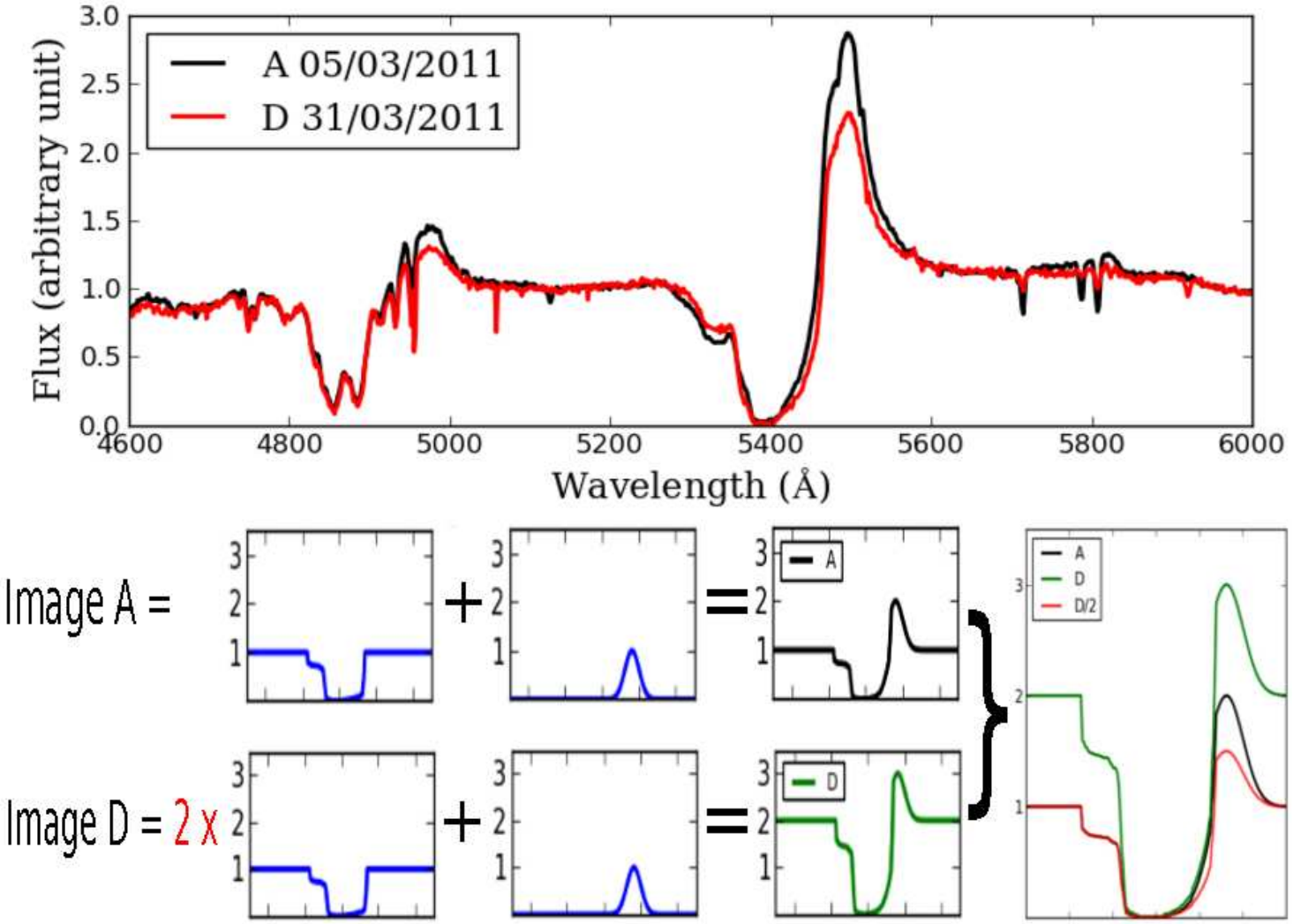
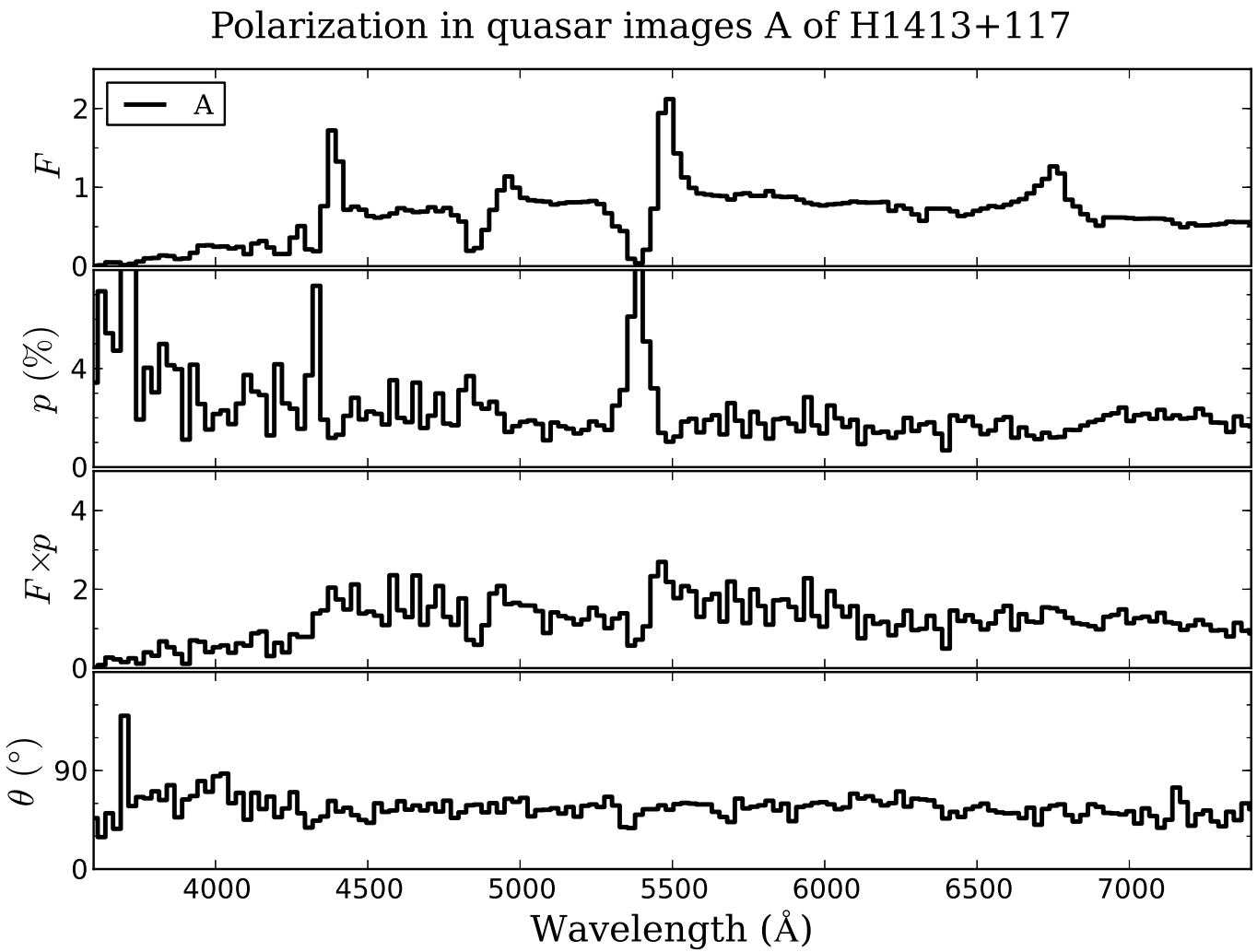


Microlensing effect on polarization



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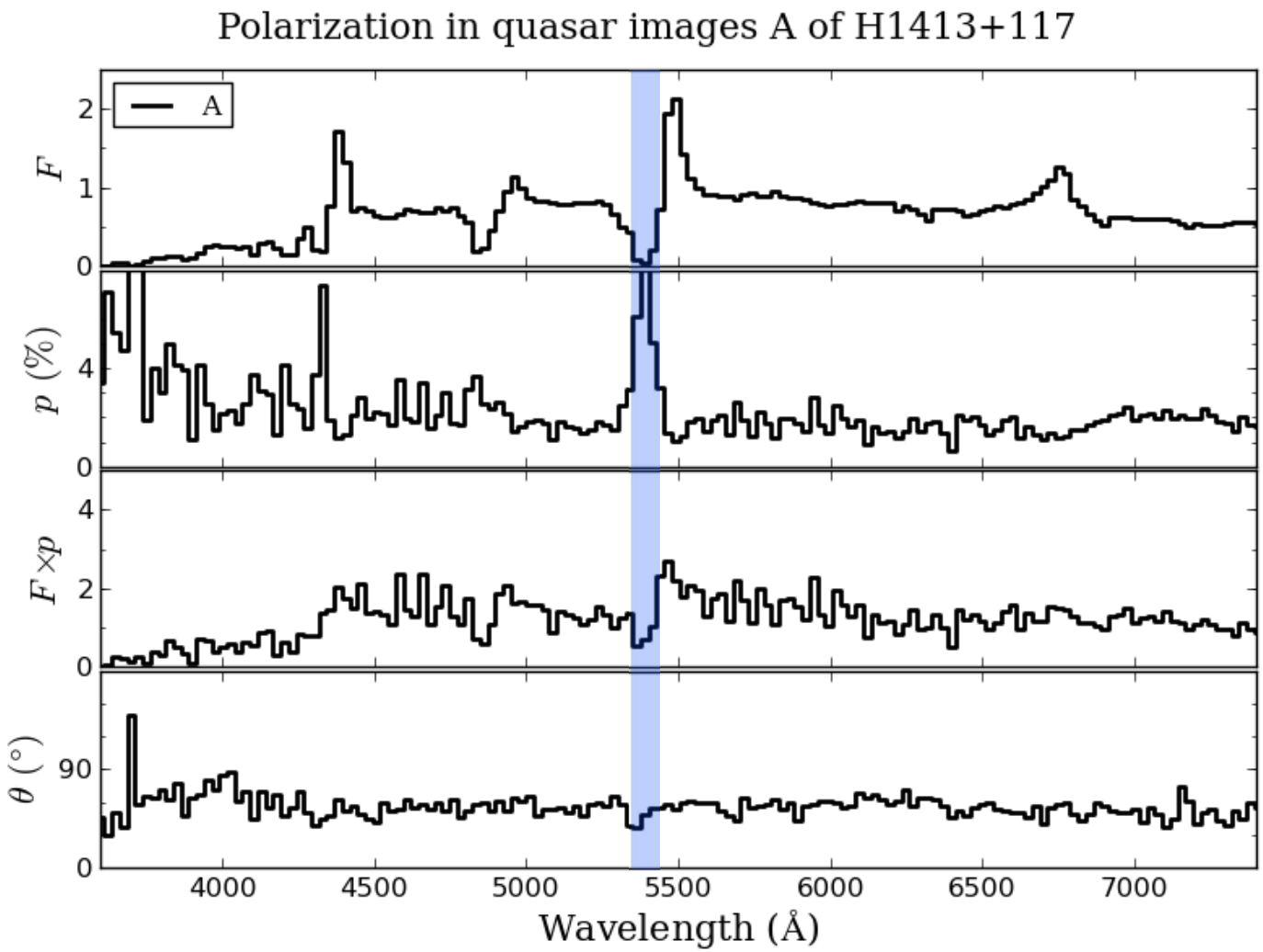

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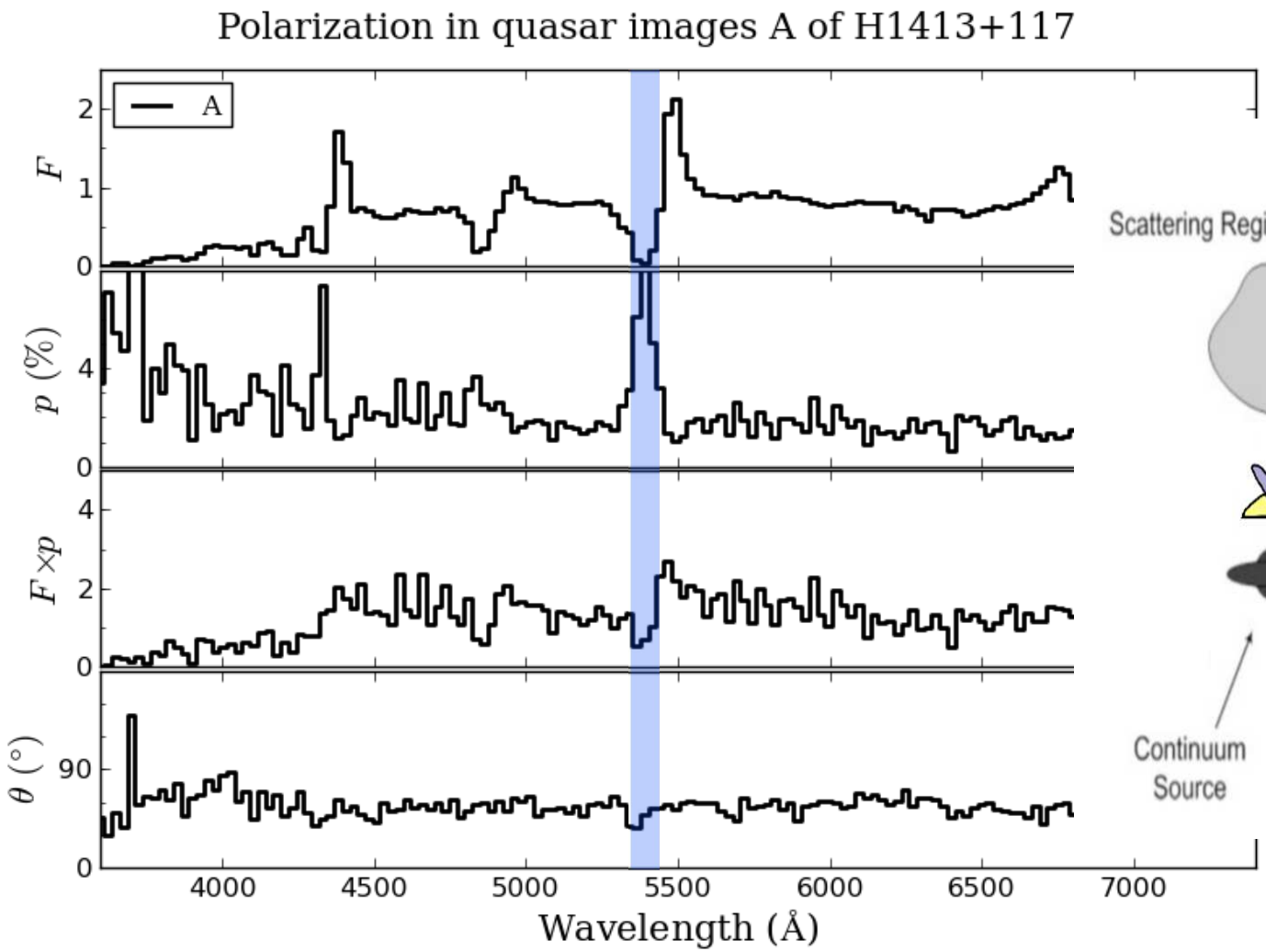

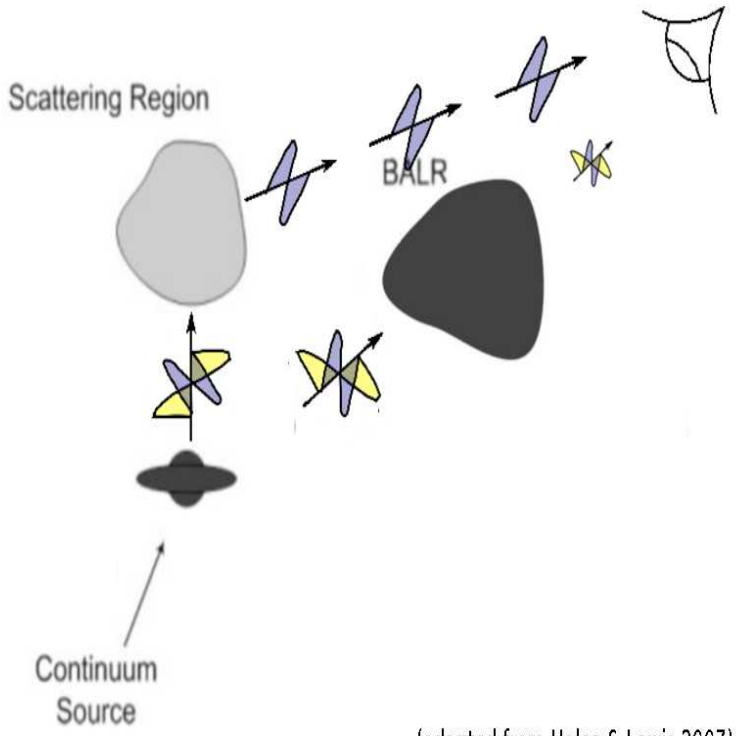

(adapted from Hales & Lewis 2007)

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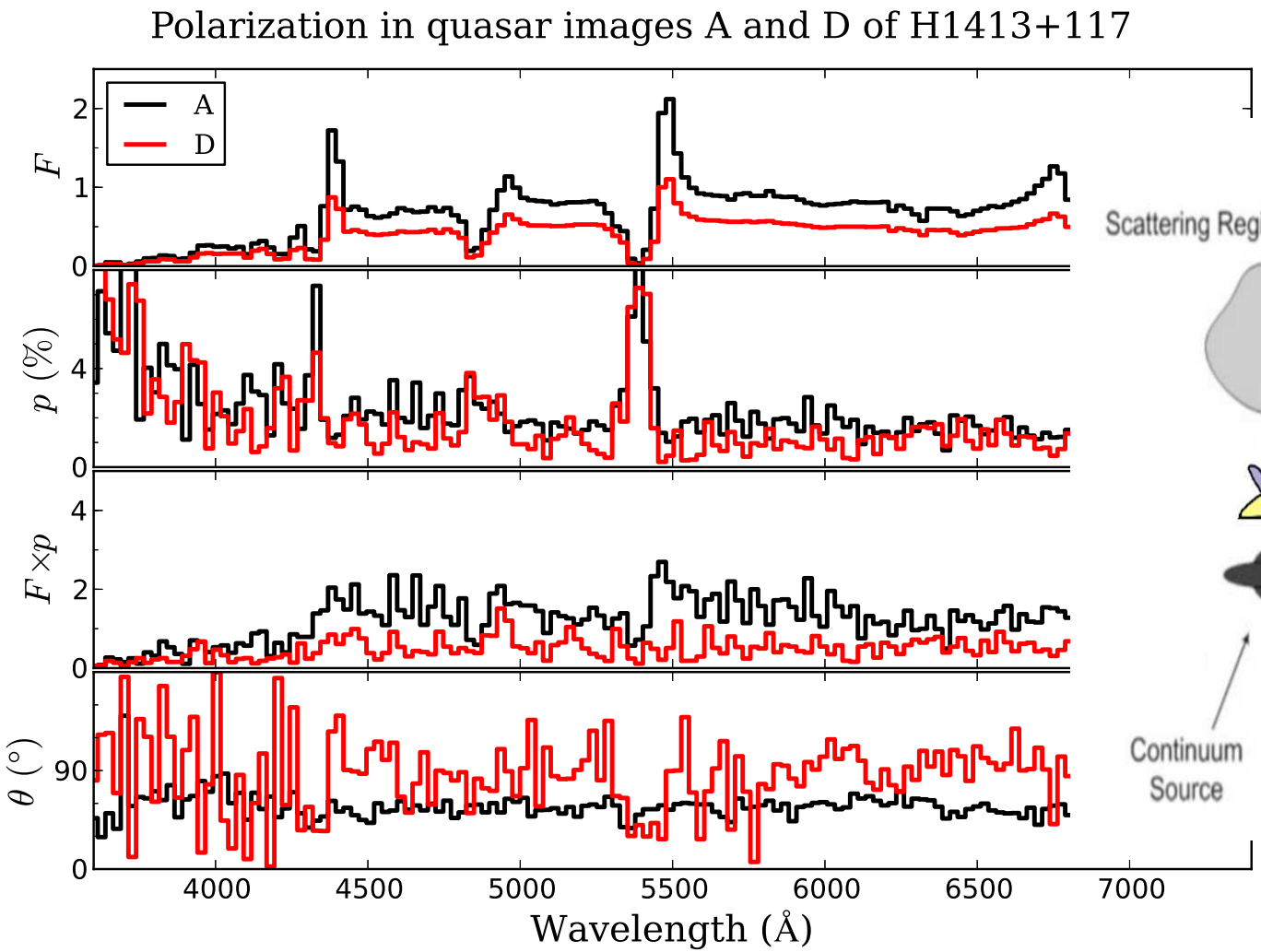

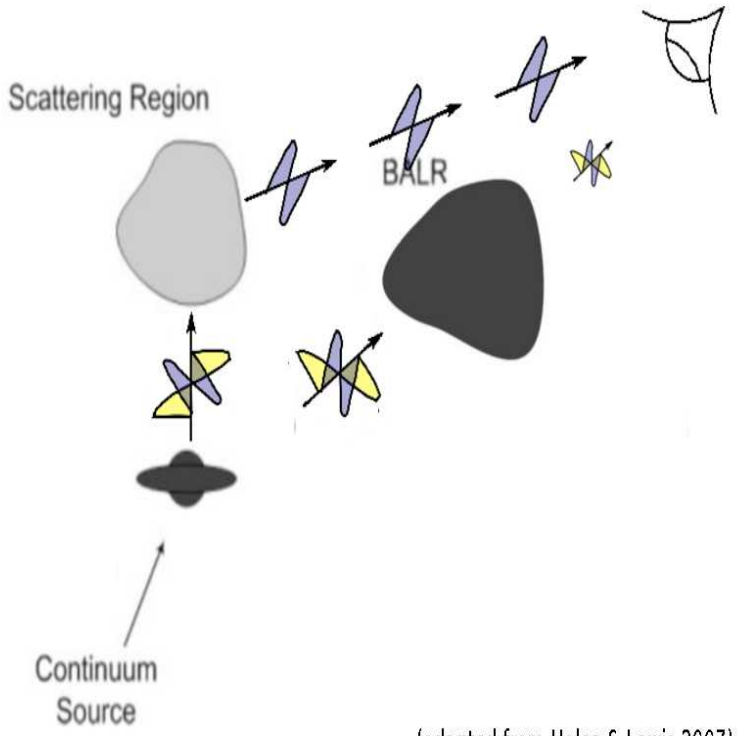

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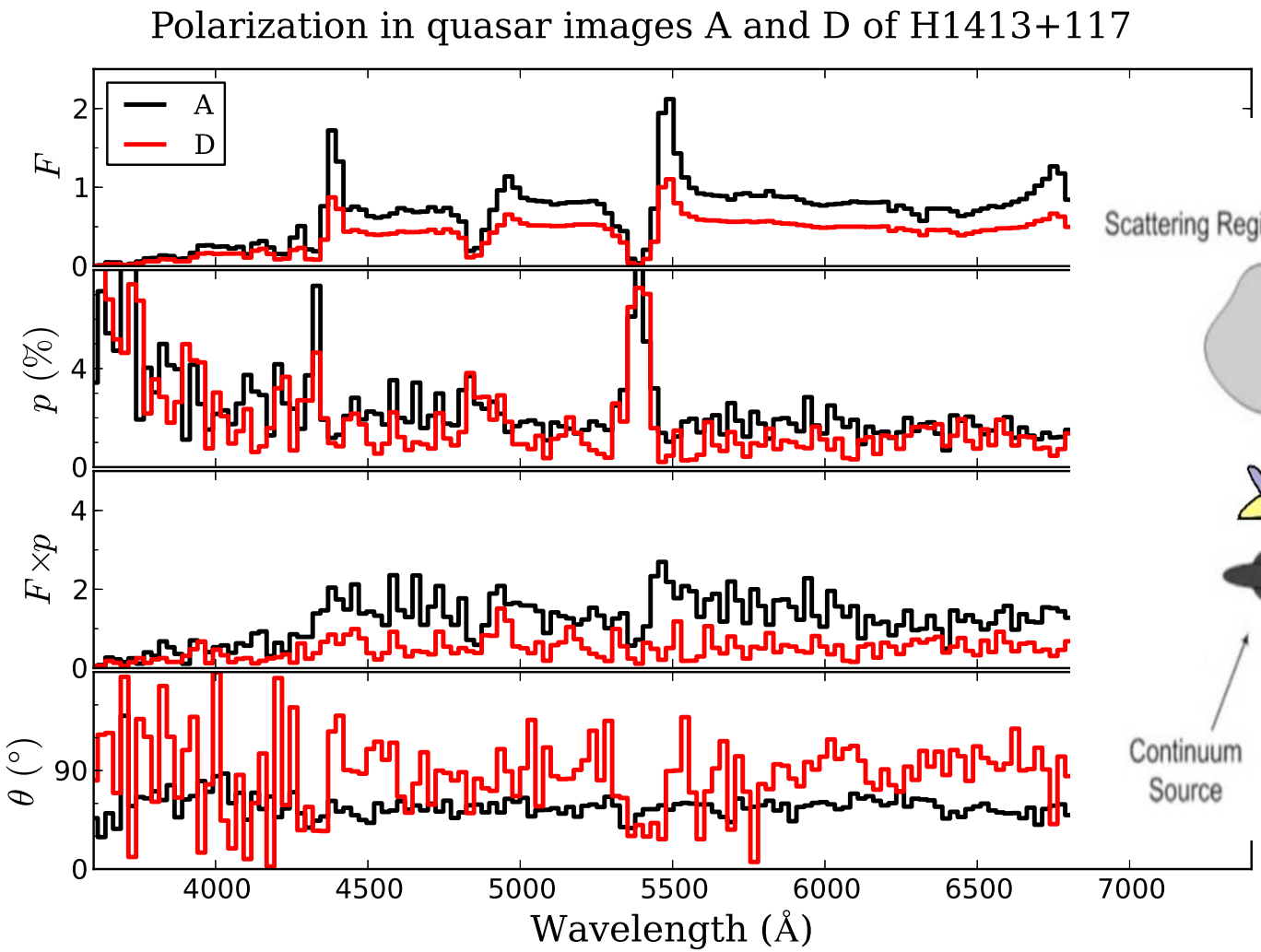

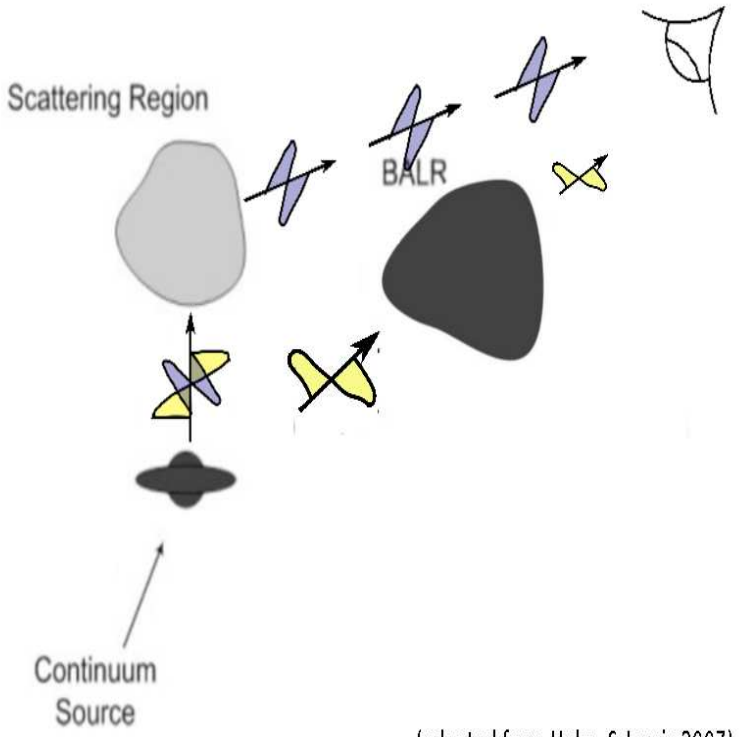

Two scattering regions?

Under the hypothesis that the observed continuum polarization is the sum of the polarization from a microlensed compact source and a non-microlensed extended one, we can extract the intrinsic polarization of the two sources:

$$s_D = \frac{\mu s_c + \beta s_e}{\mu + \beta} \quad , \quad s_A = \frac{s_c + \beta s_e}{1 + \beta} \quad .$$

s =normalized stokes parameter, namely q or u.
c denotes the compact microlensed source and e the extended one. $\beta = F_e/F_c$.
μ quantifies the additional amplification due to microlensing.

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With $\mu \sim 2$, we obtained:

p_c ~3%, $\theta_c \sim 115°$ and p_e ~10%, $\theta_e \sim 35°$

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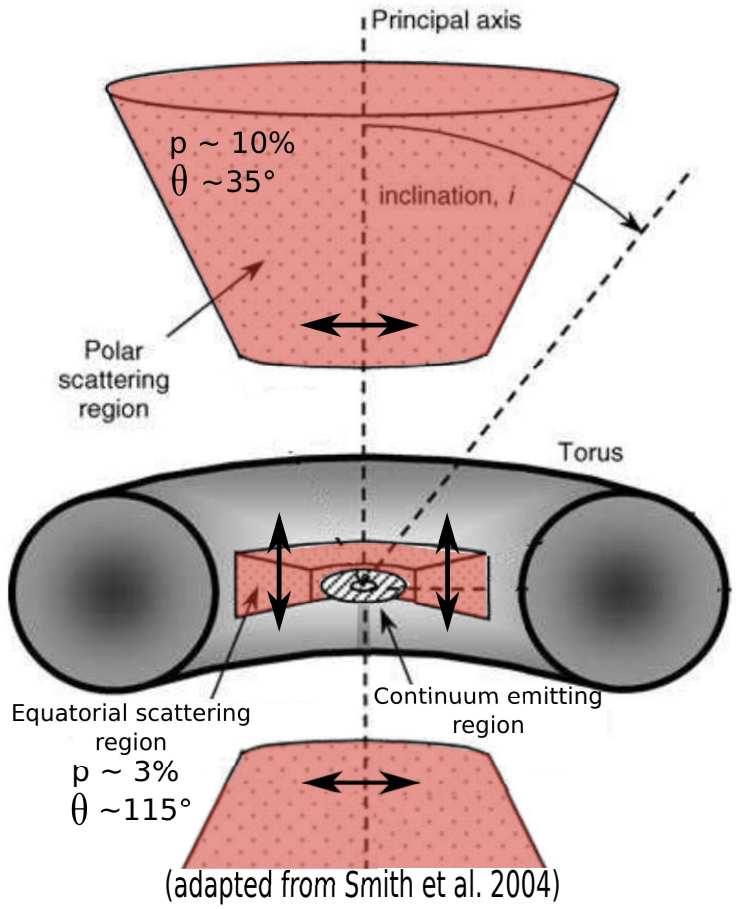
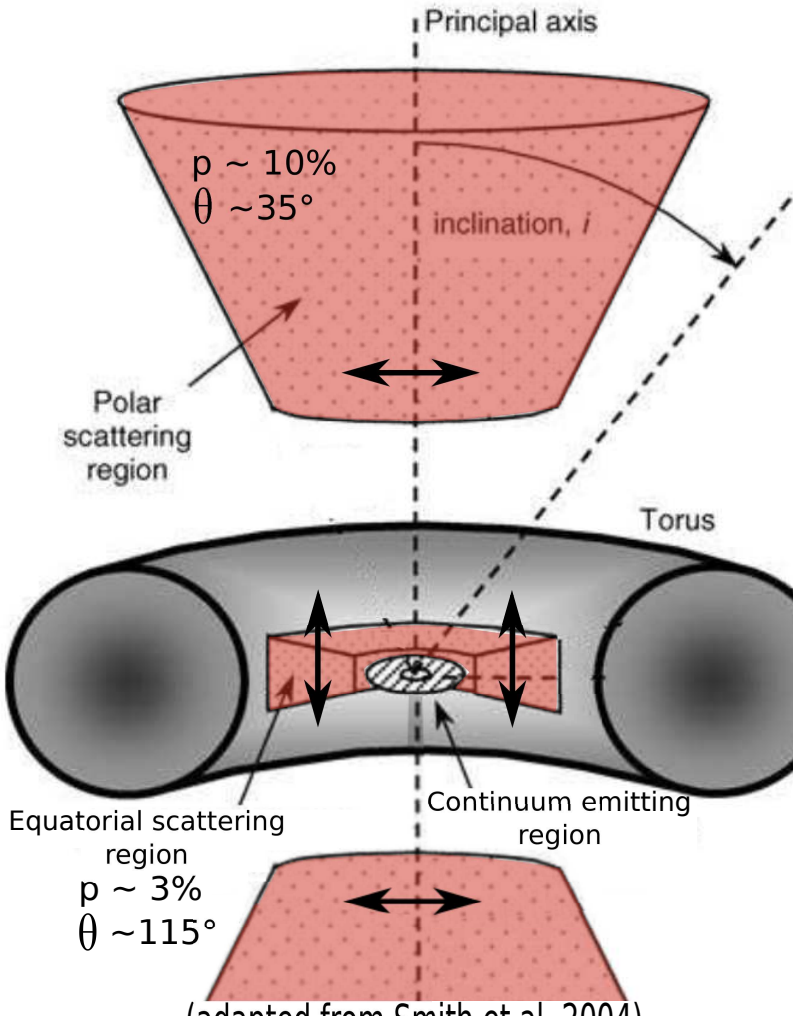


(adapted from Smith et al. 2004)

To conclude

The effect of microlensing on the polarization unveils the presence of two continuum sources polarized roughly perpendicularly.



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Université de Liège

Thank you for your attention.