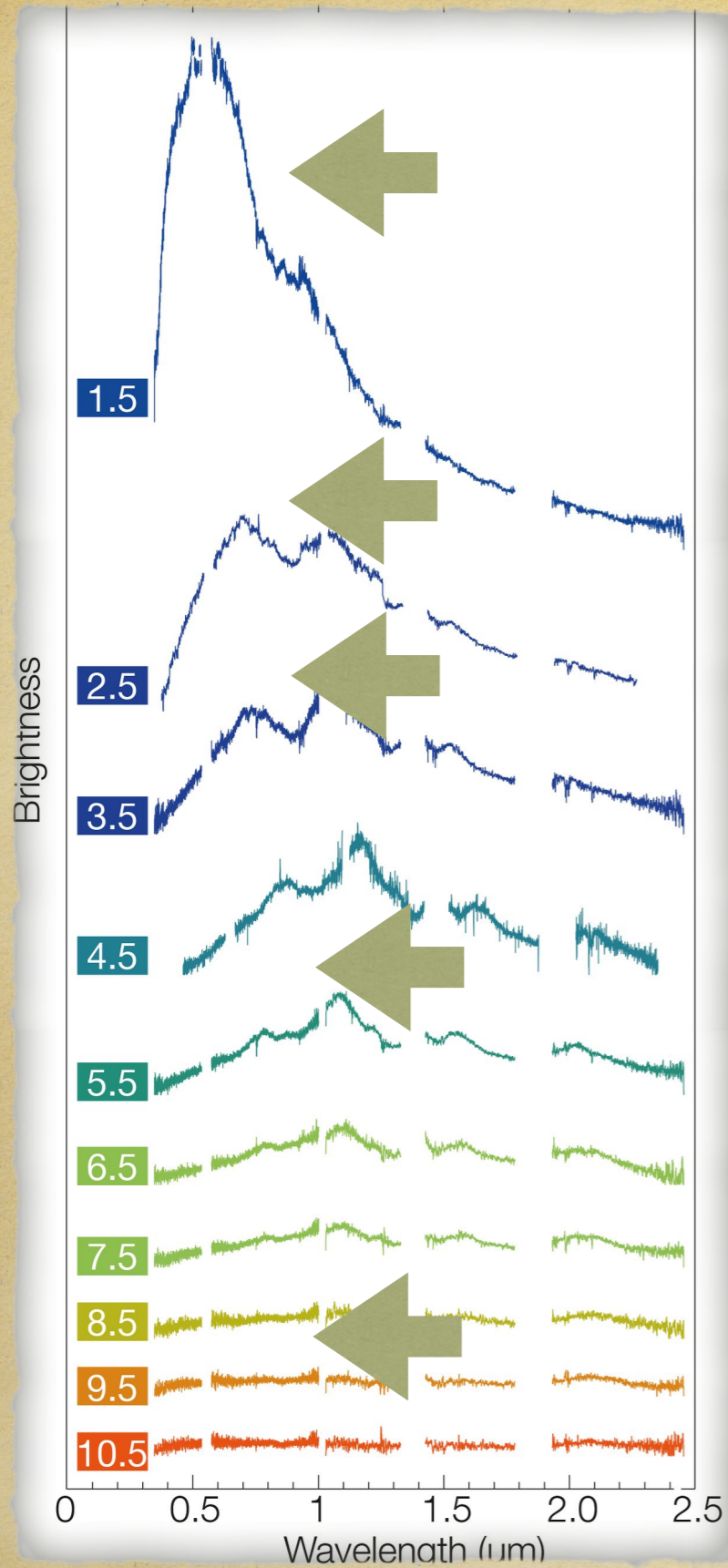




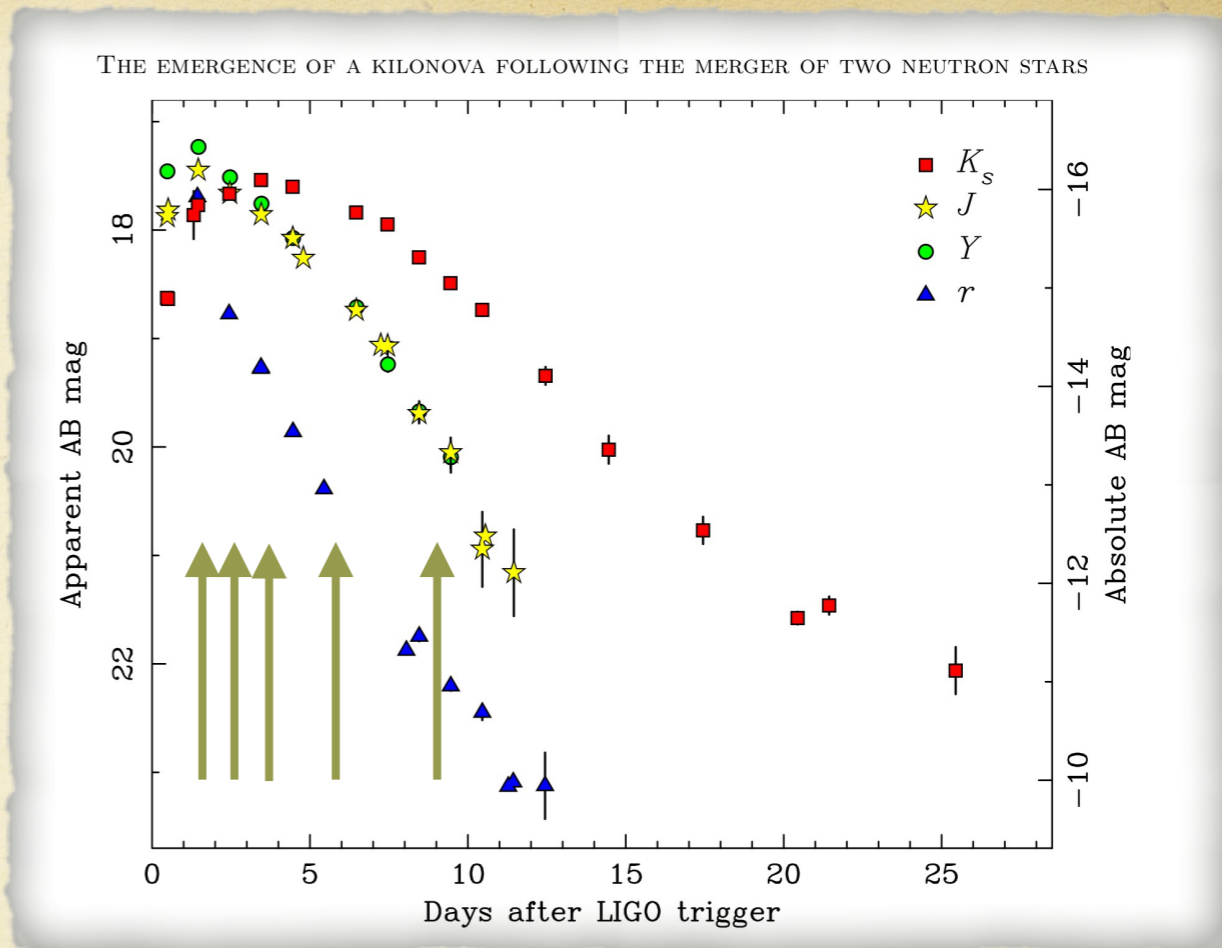
Polarization of macronovae



*Stefano Covino INAF / Brera Astronomical Observatory
Mattia Bulla, Klaas Wiersema, K. Toma, Y. Fan...*



Pian, D'Avanzo et al. (2017)



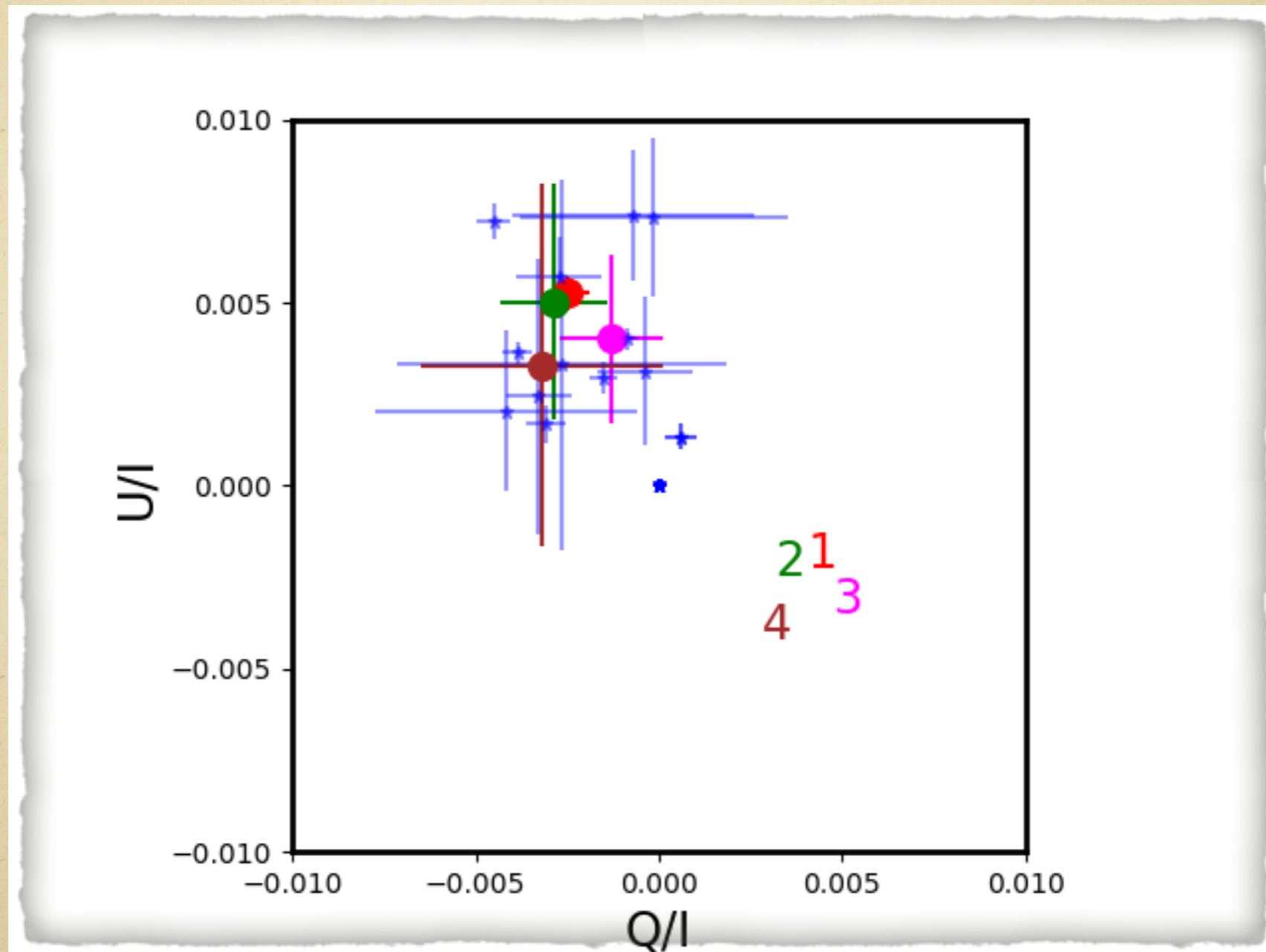
Tanvir et al. (2017)



Courtesy by Bo Milvang-Jensen and the VINROUGE collaboration

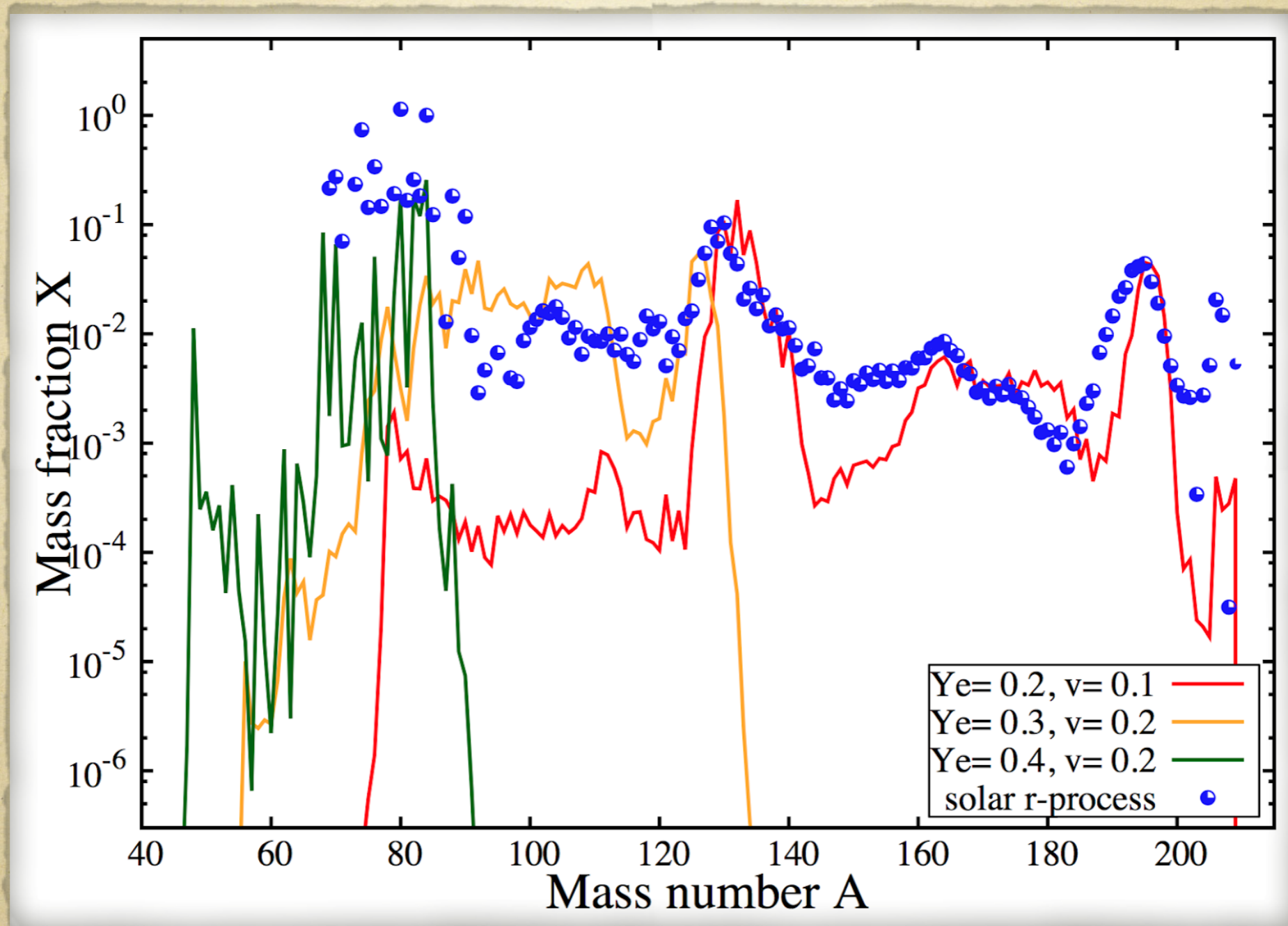
Polarisation always consistent with that induced by Galactic dust

- 1: $P \sim 0.5\%$
- 2: $P < 0.6\%$
- 3: $P < 0.5\%$
- 4: $P < 0.9\%$
- 5: $P < 4\%$



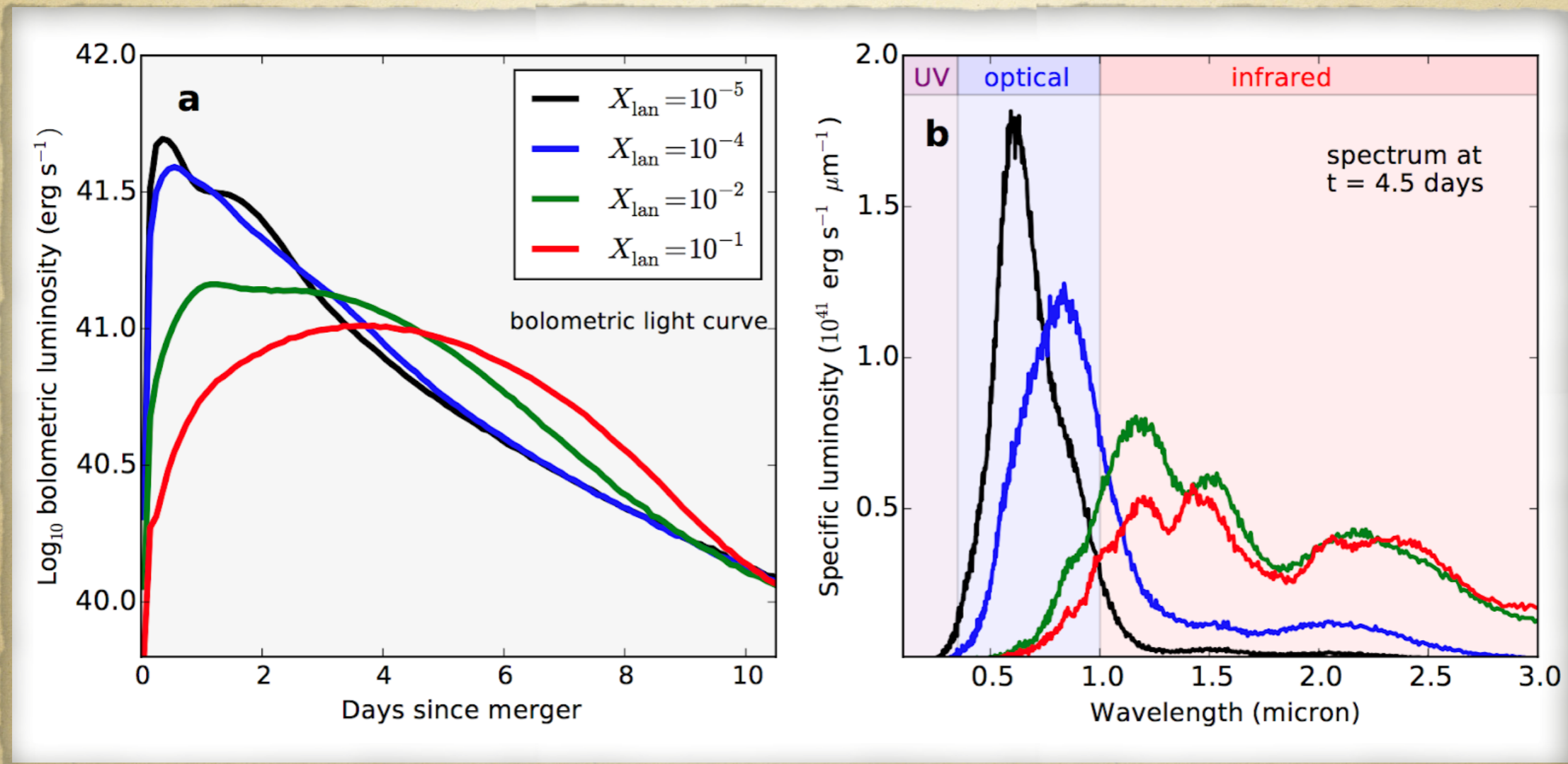
Covino et al. (2017)

The lower Y_e - The higher neutrons - The higher mass number A



Rosswog et al. (2017)

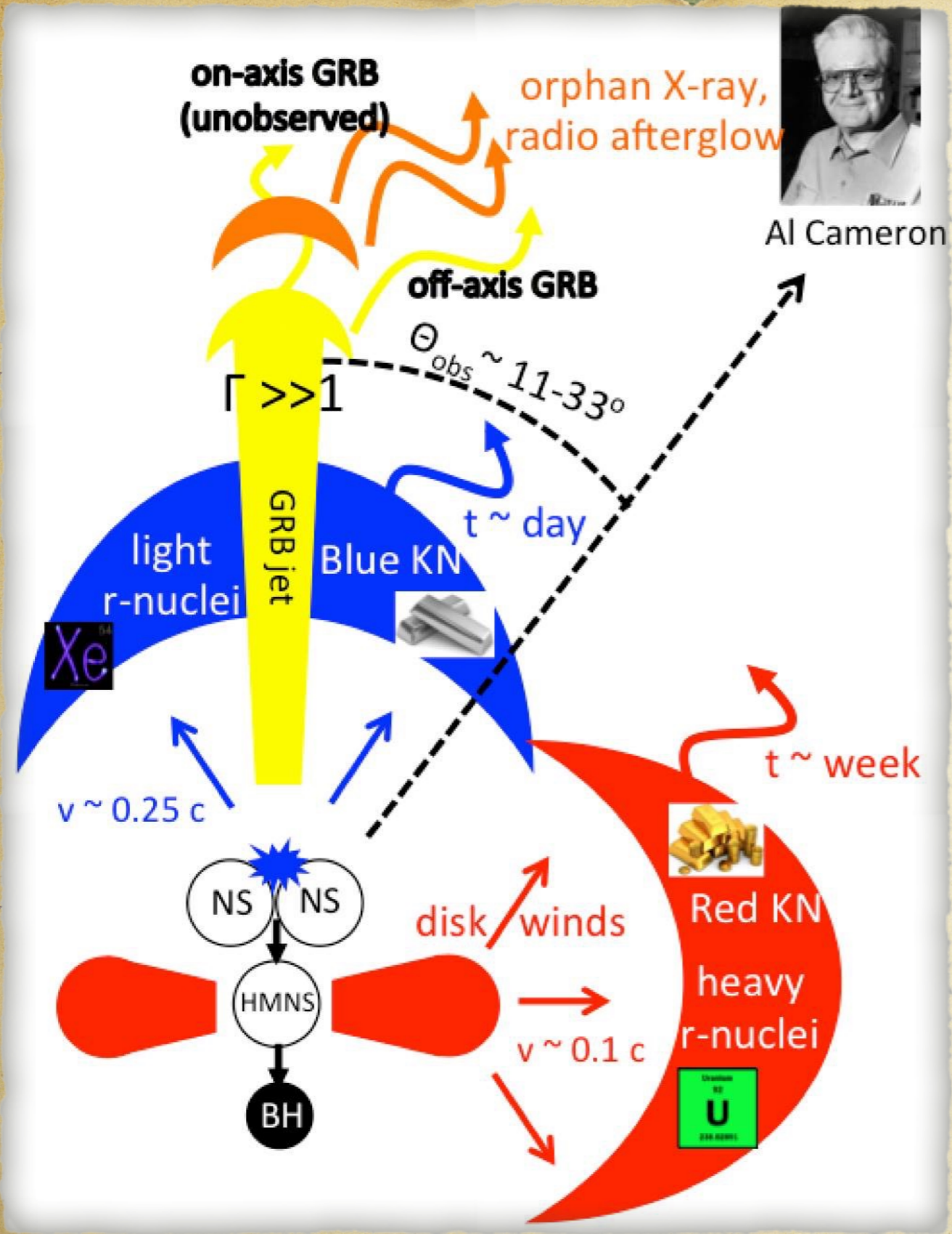
Different light curves and spectra for different compositions...



Kasen et al. (2017); Barnes & Kasen (2013); Tanaka & Hotokezaka (2013)

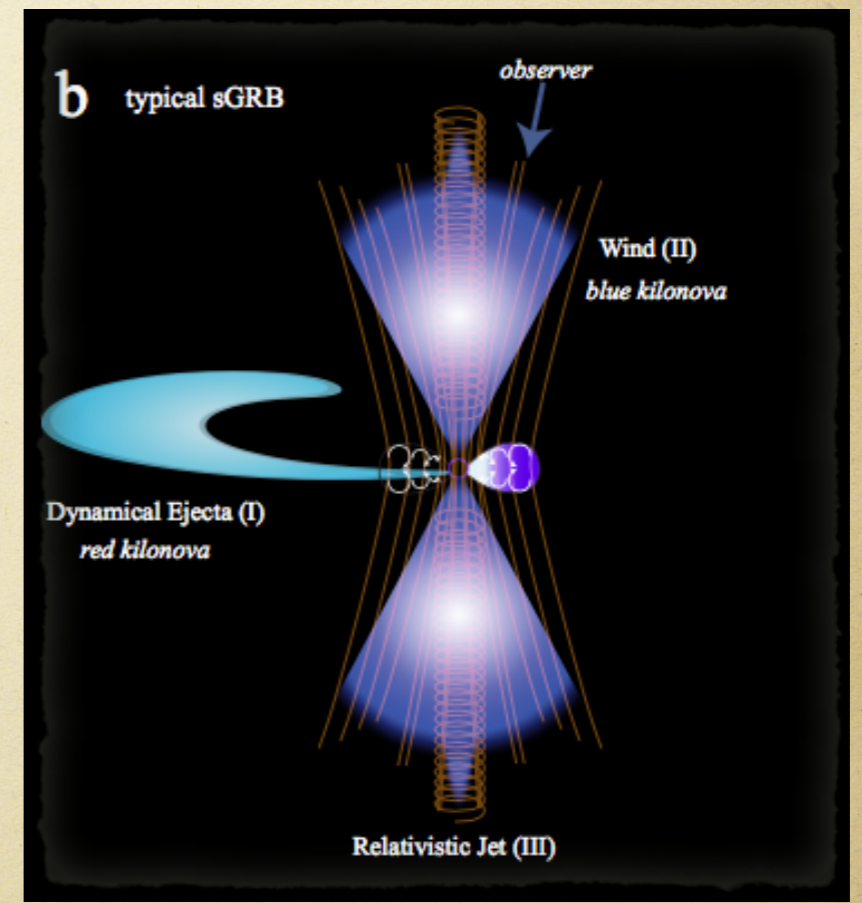


Al Cameron



Metzger (2017)

Different components with different composition, ionisation degree, free electron density, etc.

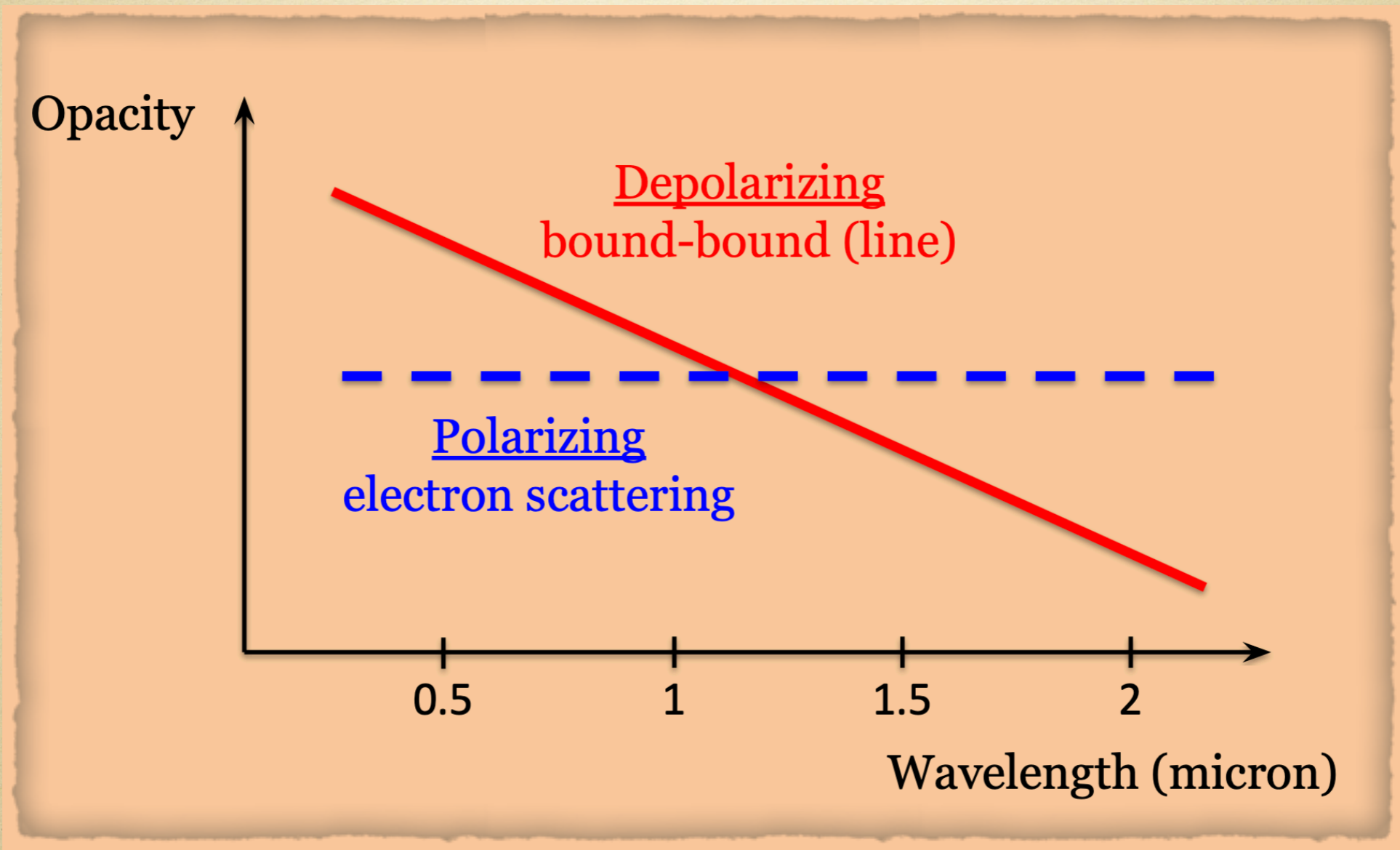


Murguia-Berthier et al. (2017)

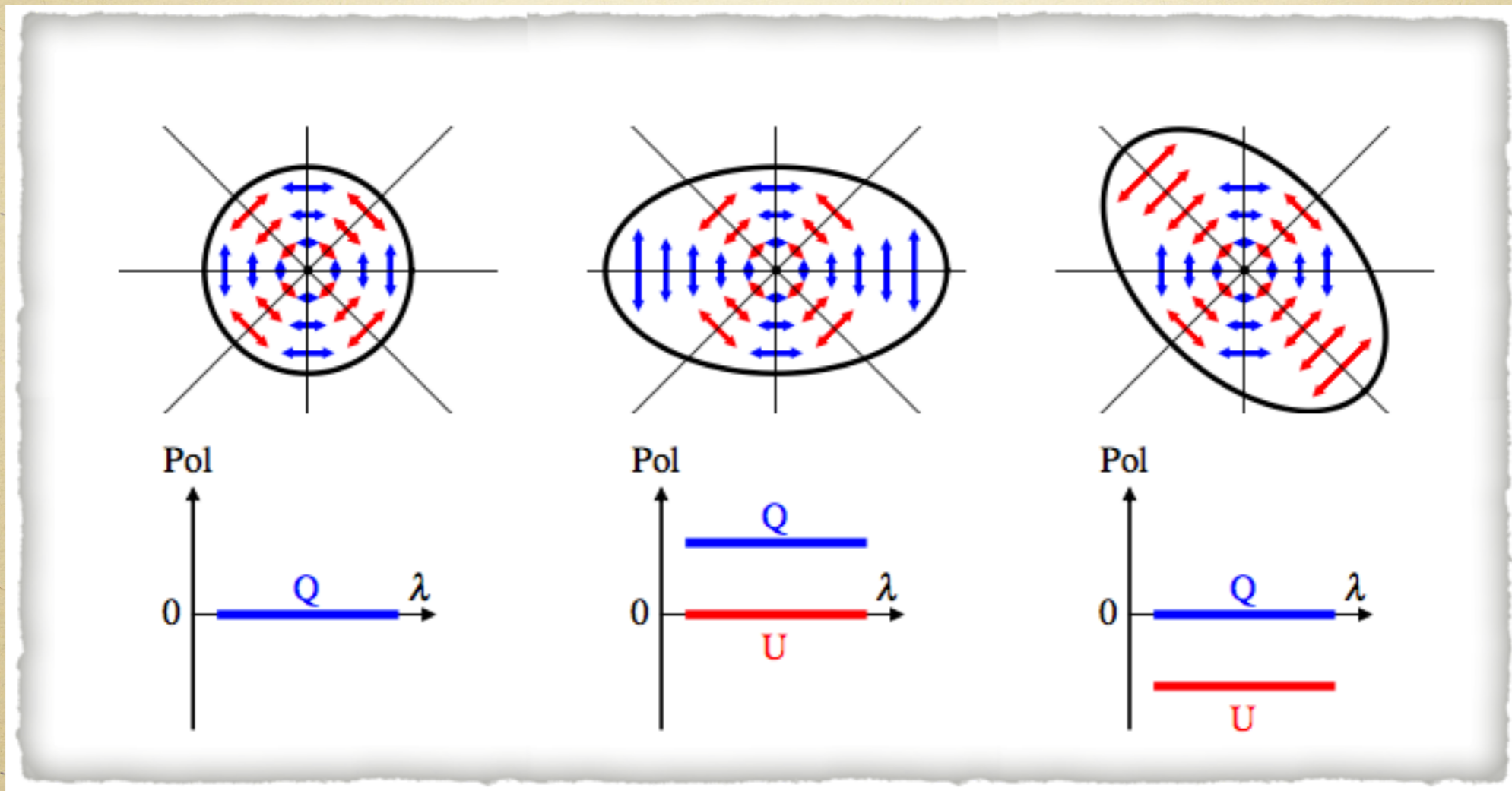
Lanthanide-free component *Lanthanide-rich component*

- *Polar regions*
 - *Electron fraction $Y_e \sim 0.3$*
 - *Mass numbers $90 < A < 140$*
 - *Opacities @1d @7000Å...: $5 \times 10^{-3} \text{ cm}^2 \text{ g}^{-1}$*
 - *“Bright-and-blue” macronova*
- *Equatorial regions*
 - *$0.1 < Y_e < 0.4$*
 - *Includes $A > 140$ (lanthanides)*
 - *Opacities @1d @7000Å...: $10 \text{ cm}^2 \text{ g}^{-1}$*
 - *“Faint-and-red” macronova*

Polarization signal dependent on (wavelength- and time-dependent) opacities

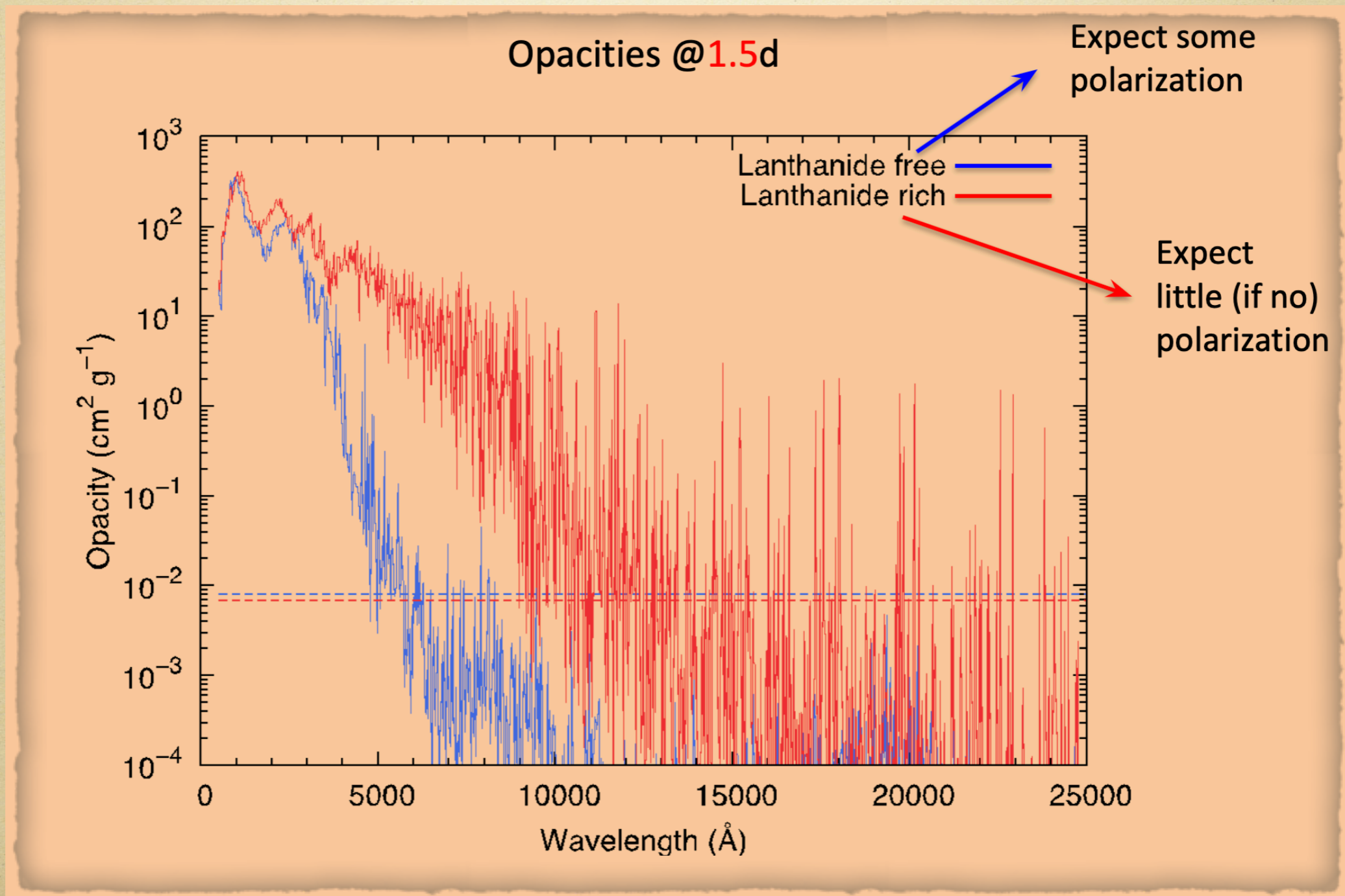


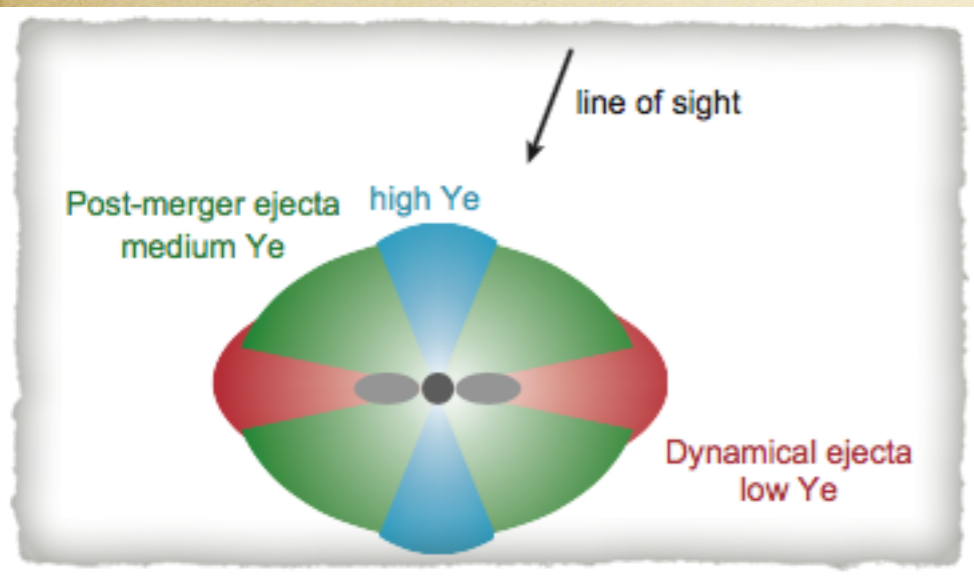
Polarimetry for SNaE is a well known and widely applied diagnostic tool



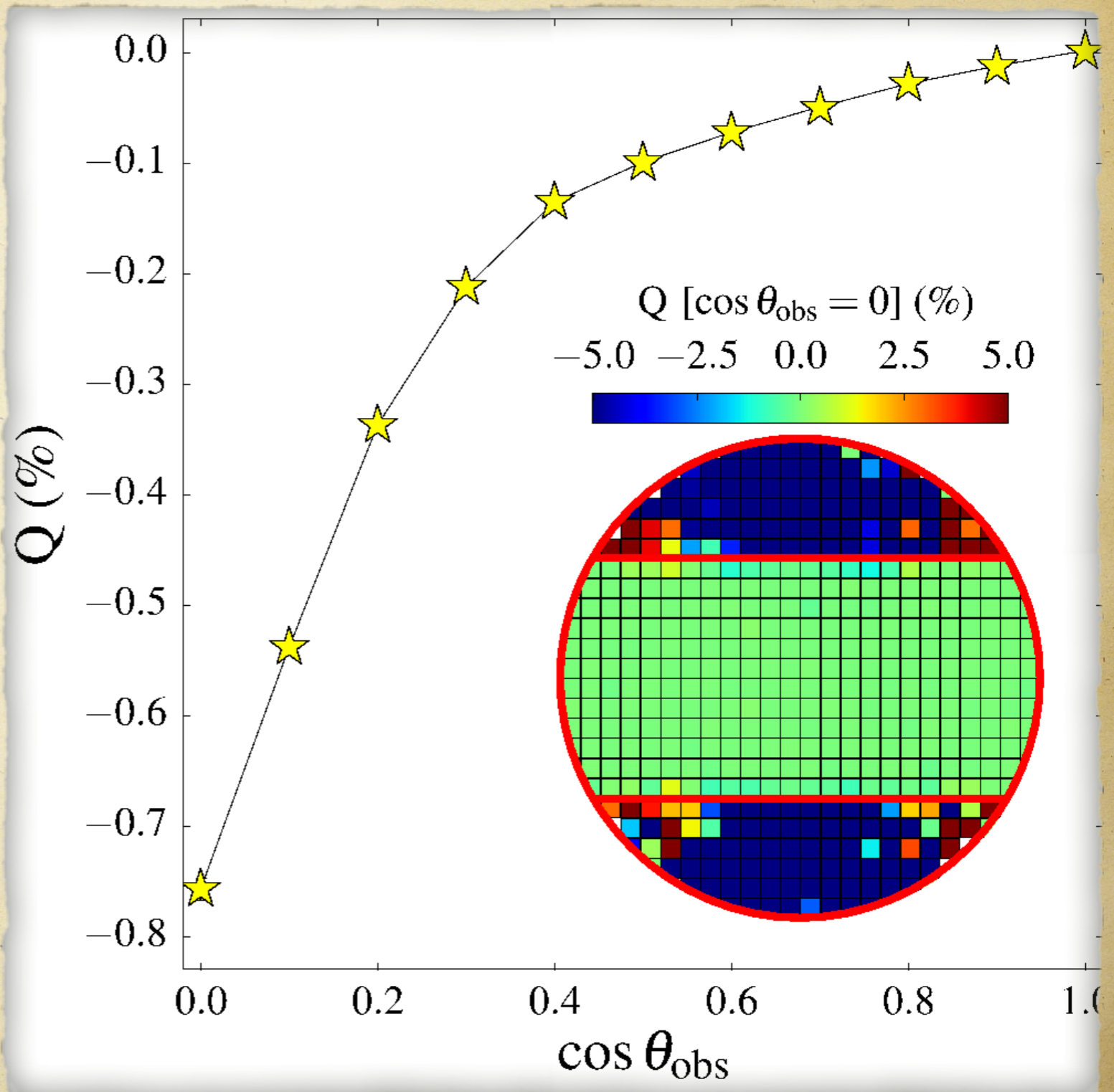
Geometry affects more polarisation than the total flux

Opacity for Lanthanide-free and rich material at ~1.5 day
(*M. Tanaka*)



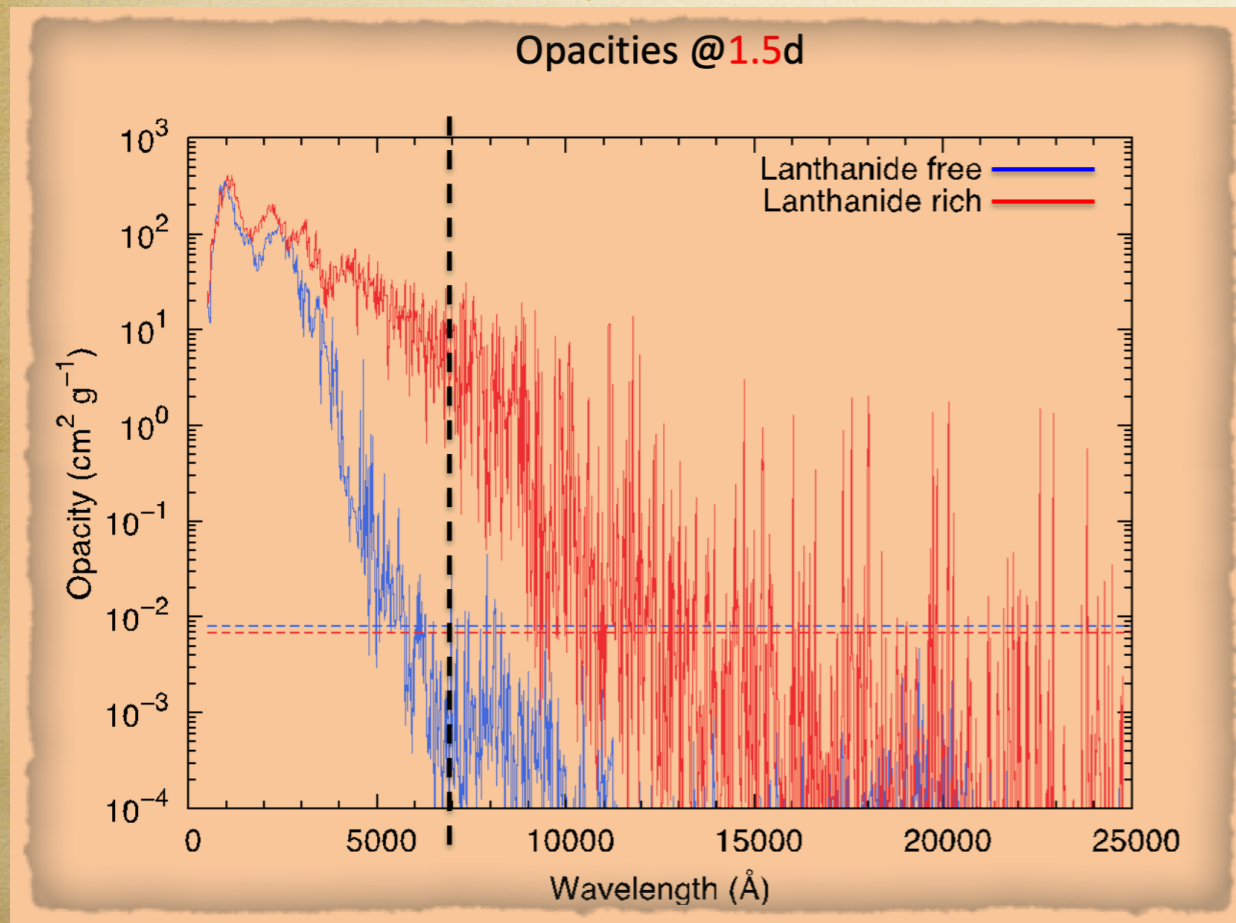


Tanaka et al. (2017)

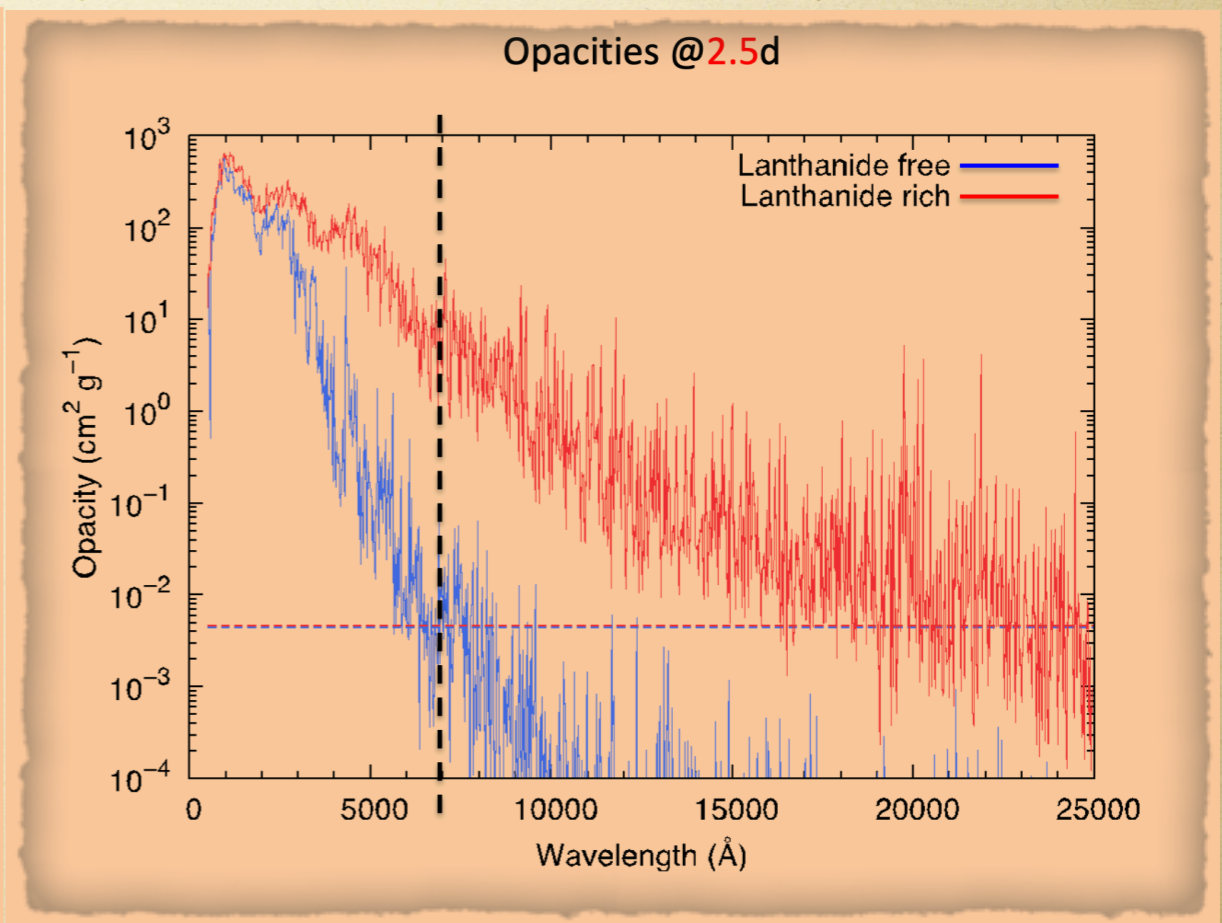


Bulla et al. (2018)

Opacity time evolution



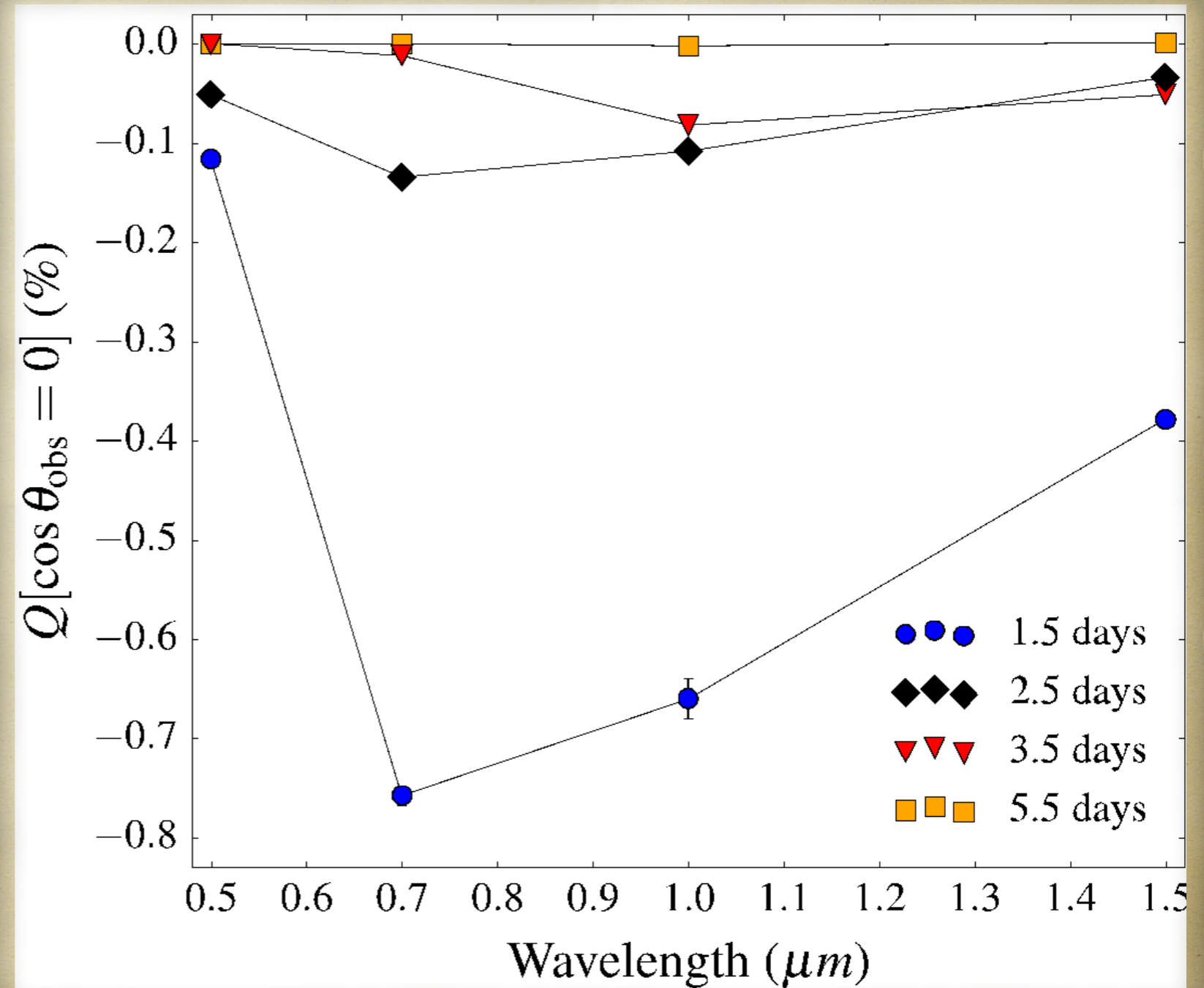
1.5 days

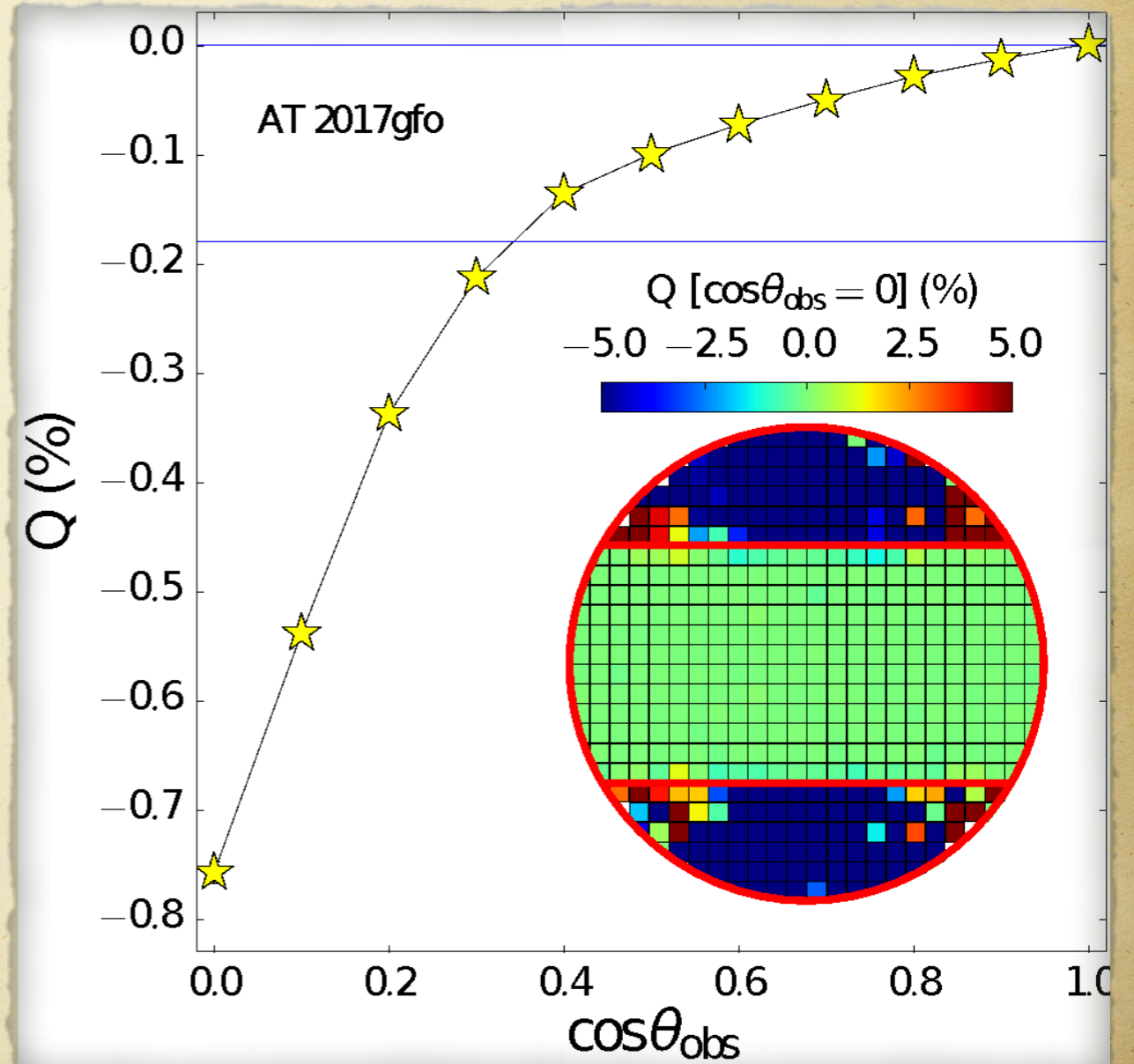
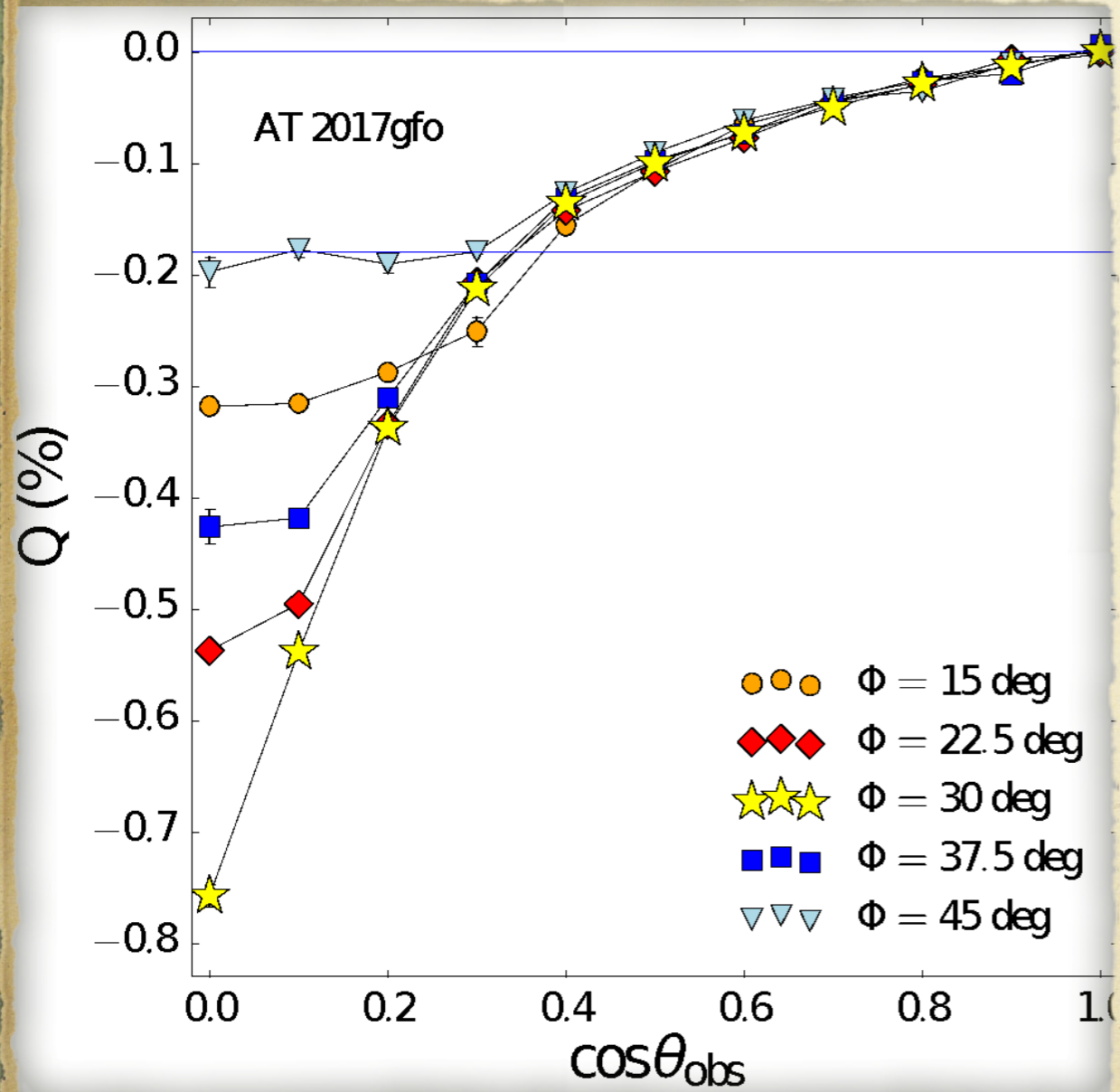


2.5 days

Only at early-time some polarisation can be expected

*At later times
polarisation
should likely due
to interstellar dust*





Bulla et al. (2018)

Thanks!



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