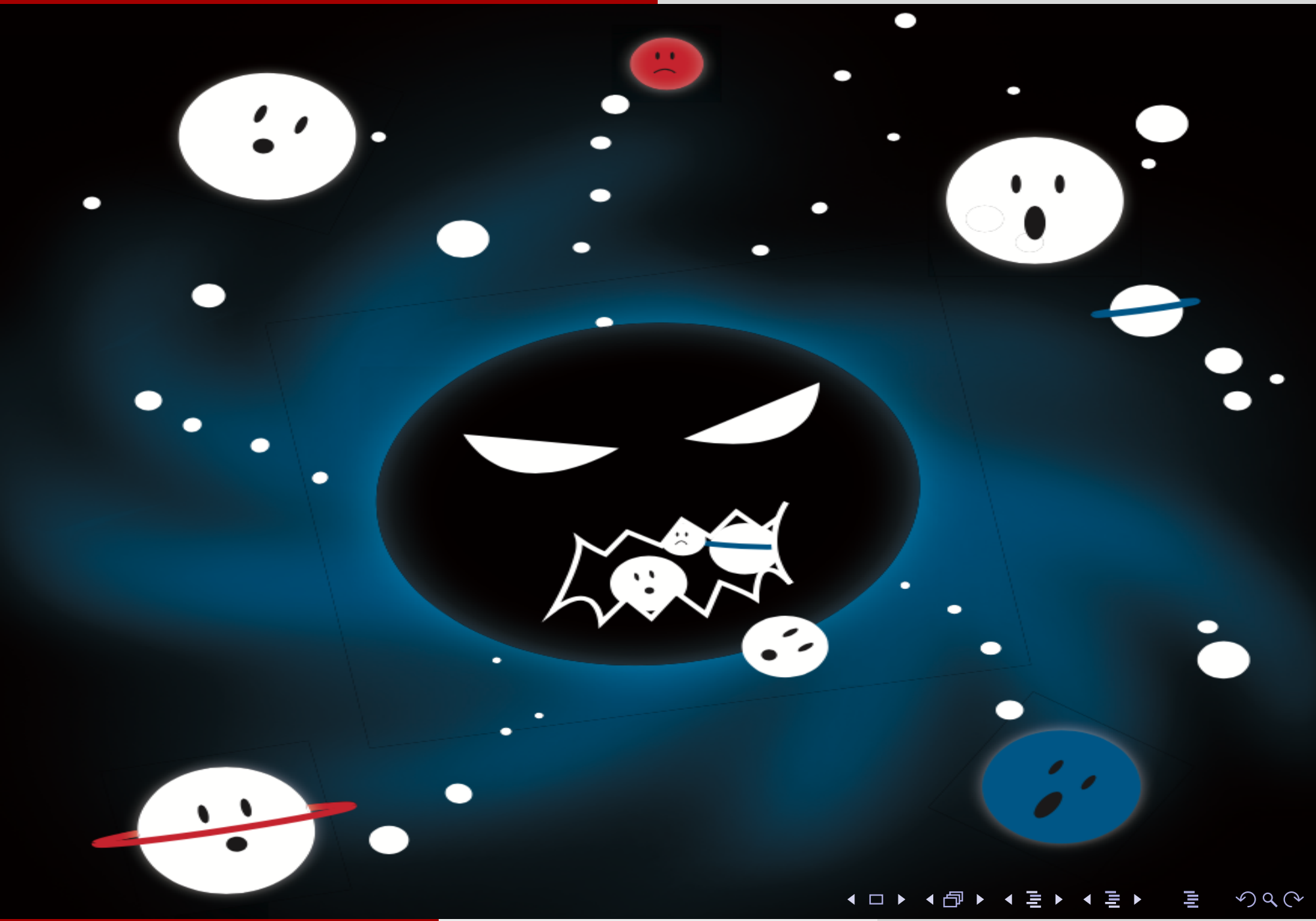
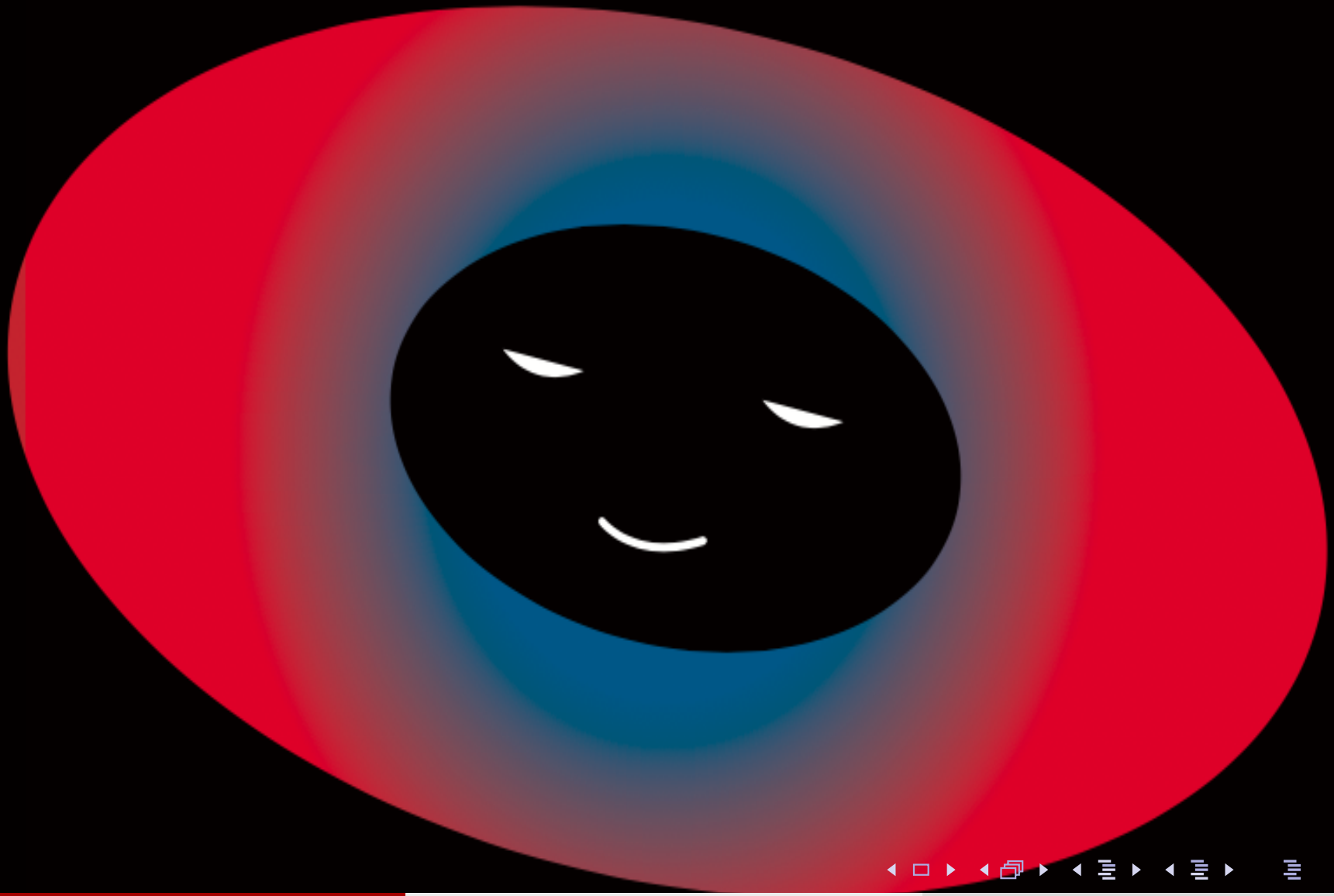
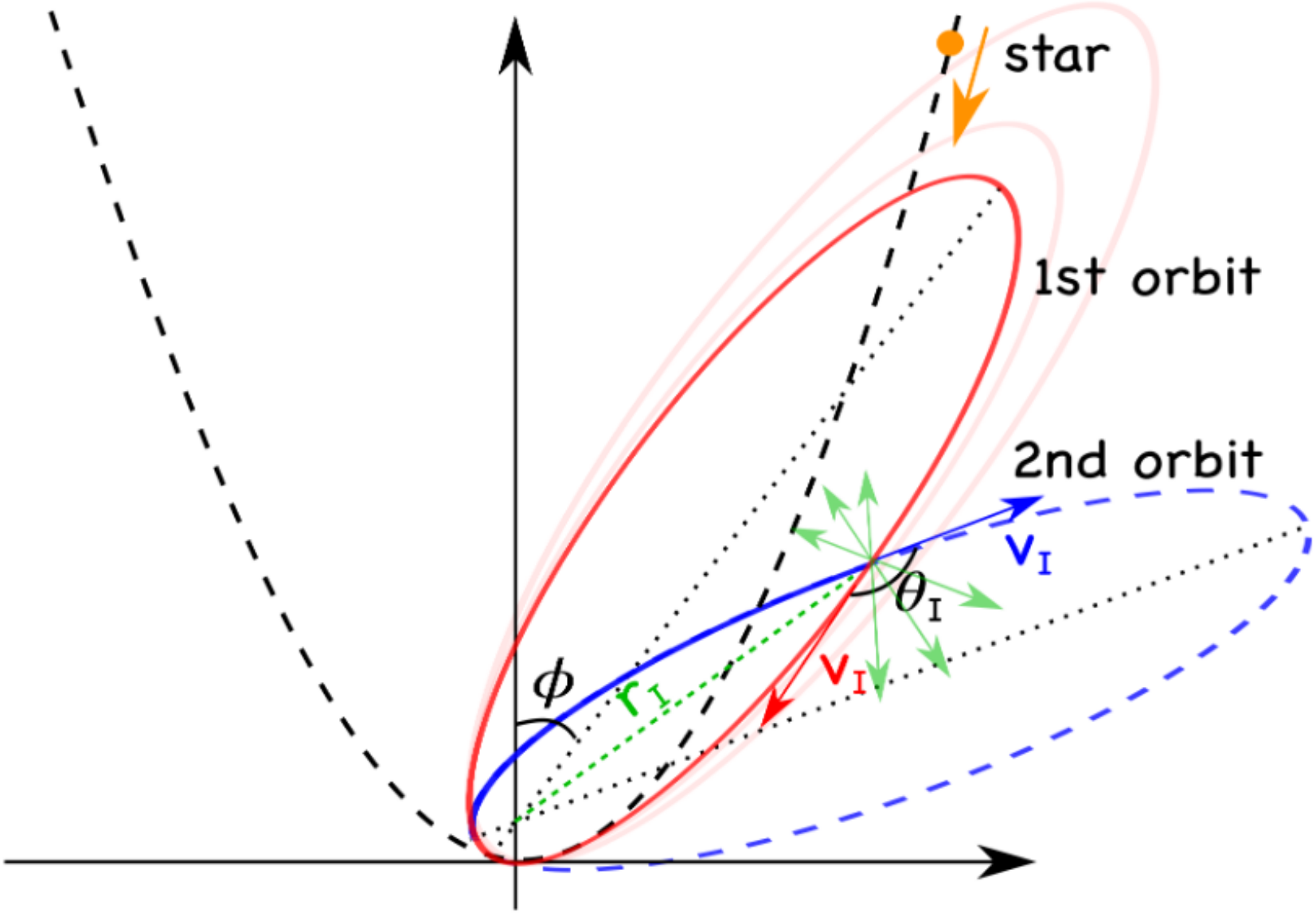
Disk formation and evolution in the TDE AT 2018fyk

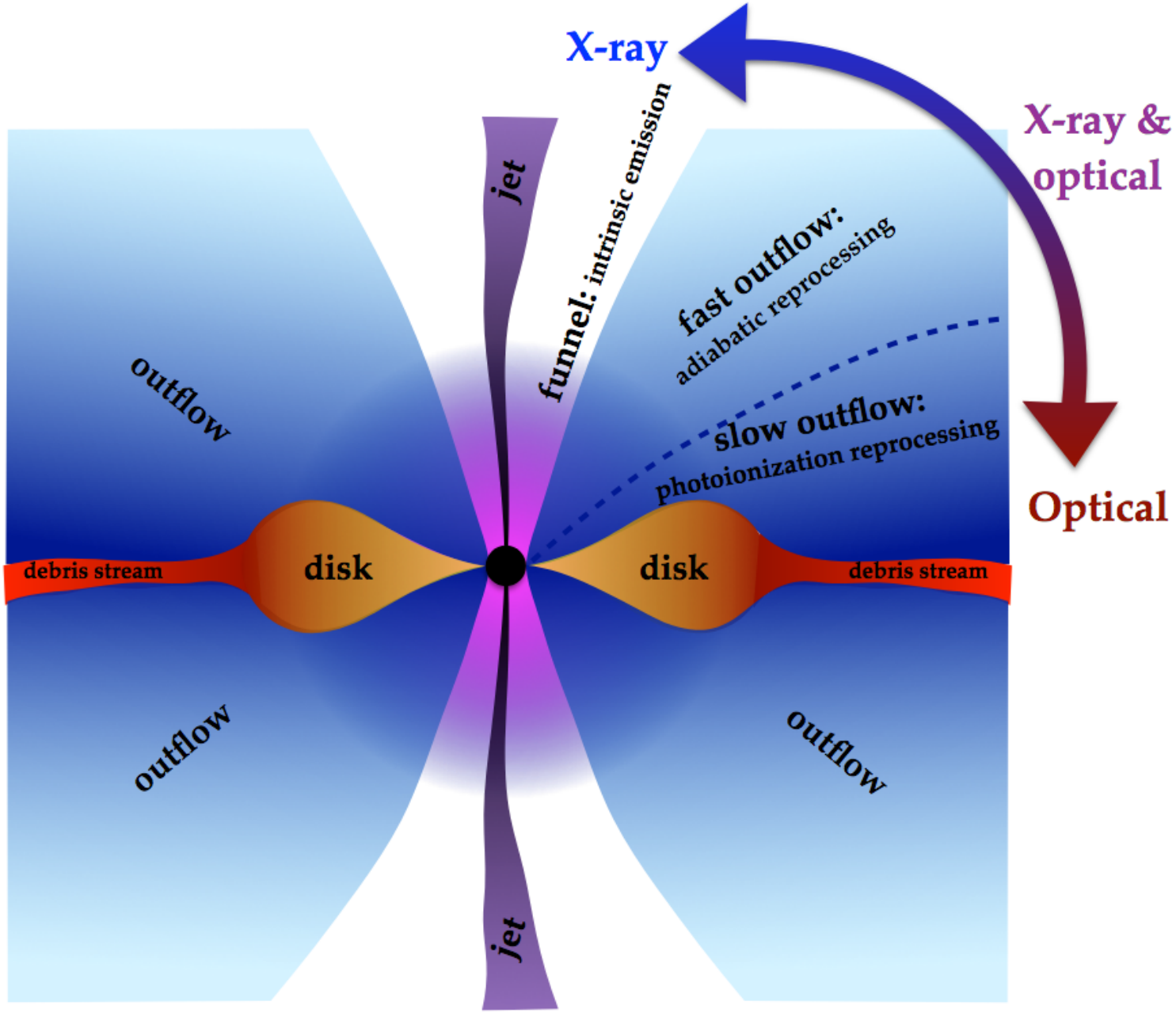
Thomas Wevers (IoA, Cambridge)

D. R. Pasham, S. van Velzen, ePESSTO+: arXiv:1903.12203 (MNRAS, in press)



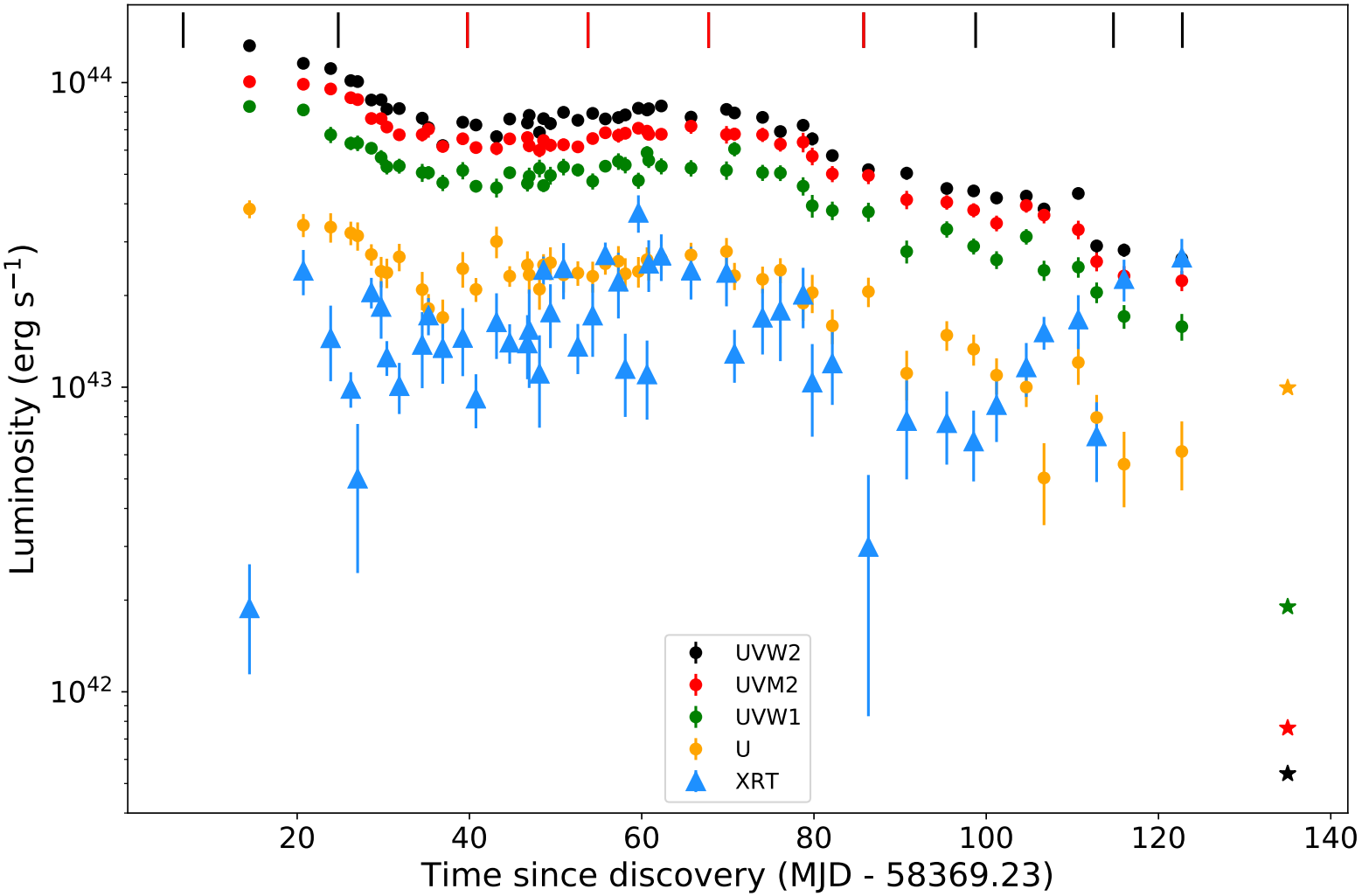



star
1st orbit
2nd orbit
v_I
θ_I
v_I
ϕ
r_I

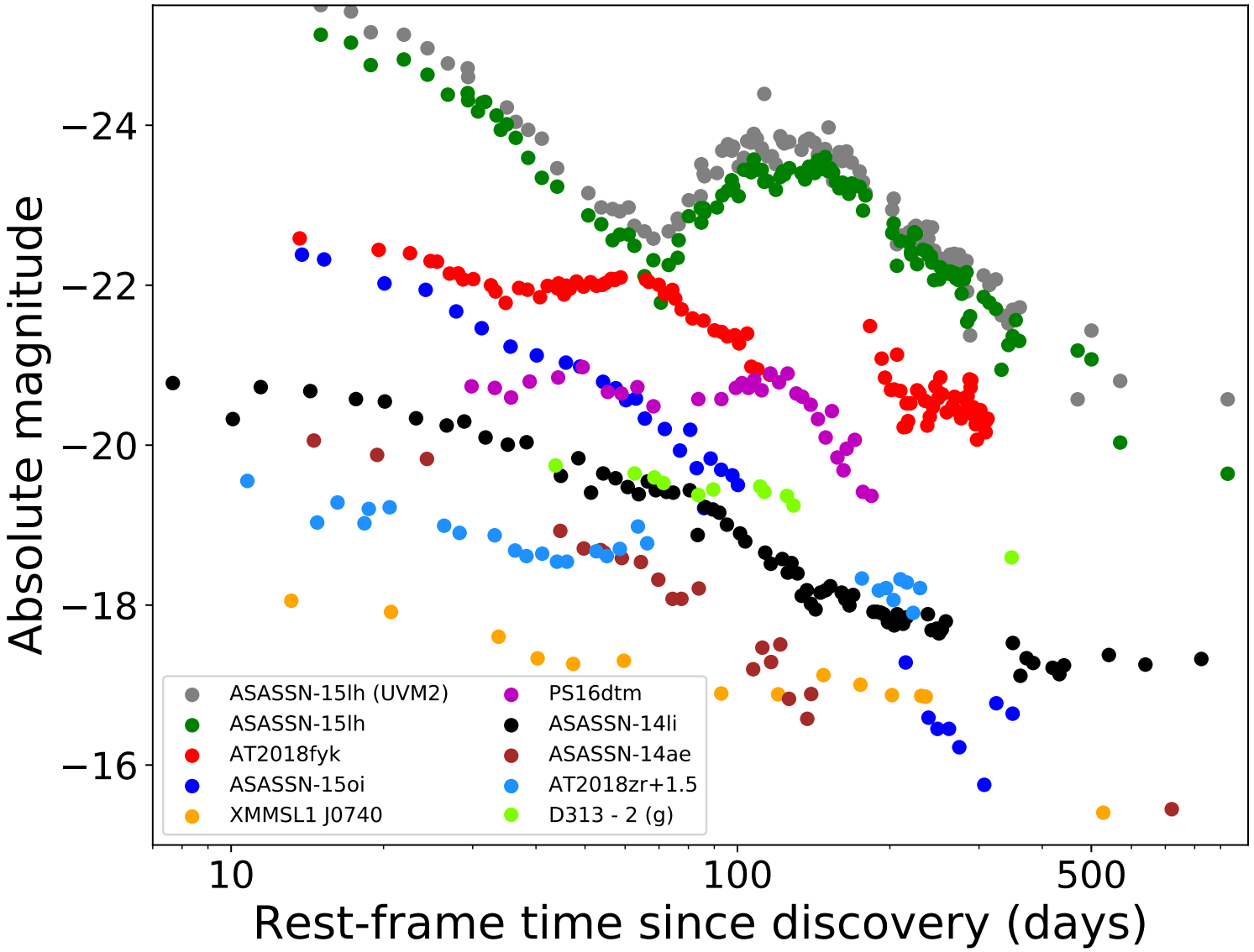


Dai et al. 2018

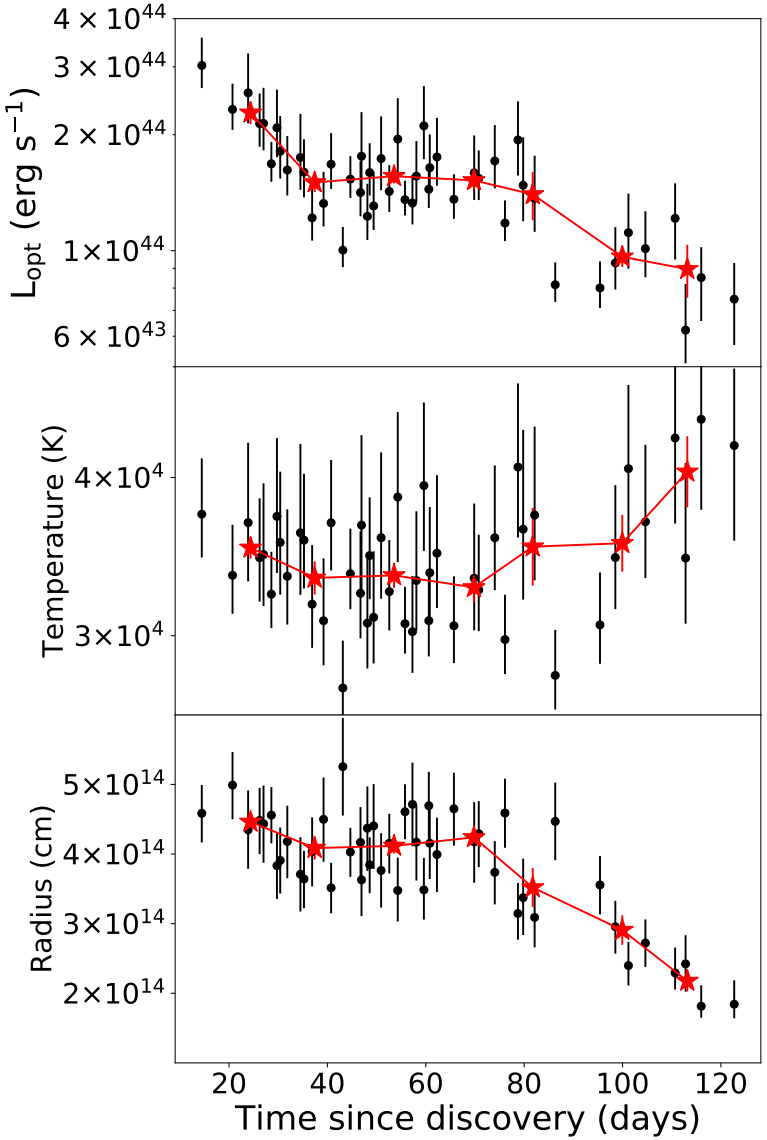
Swift lightcurve - no ordinary $t^{-5/3}$



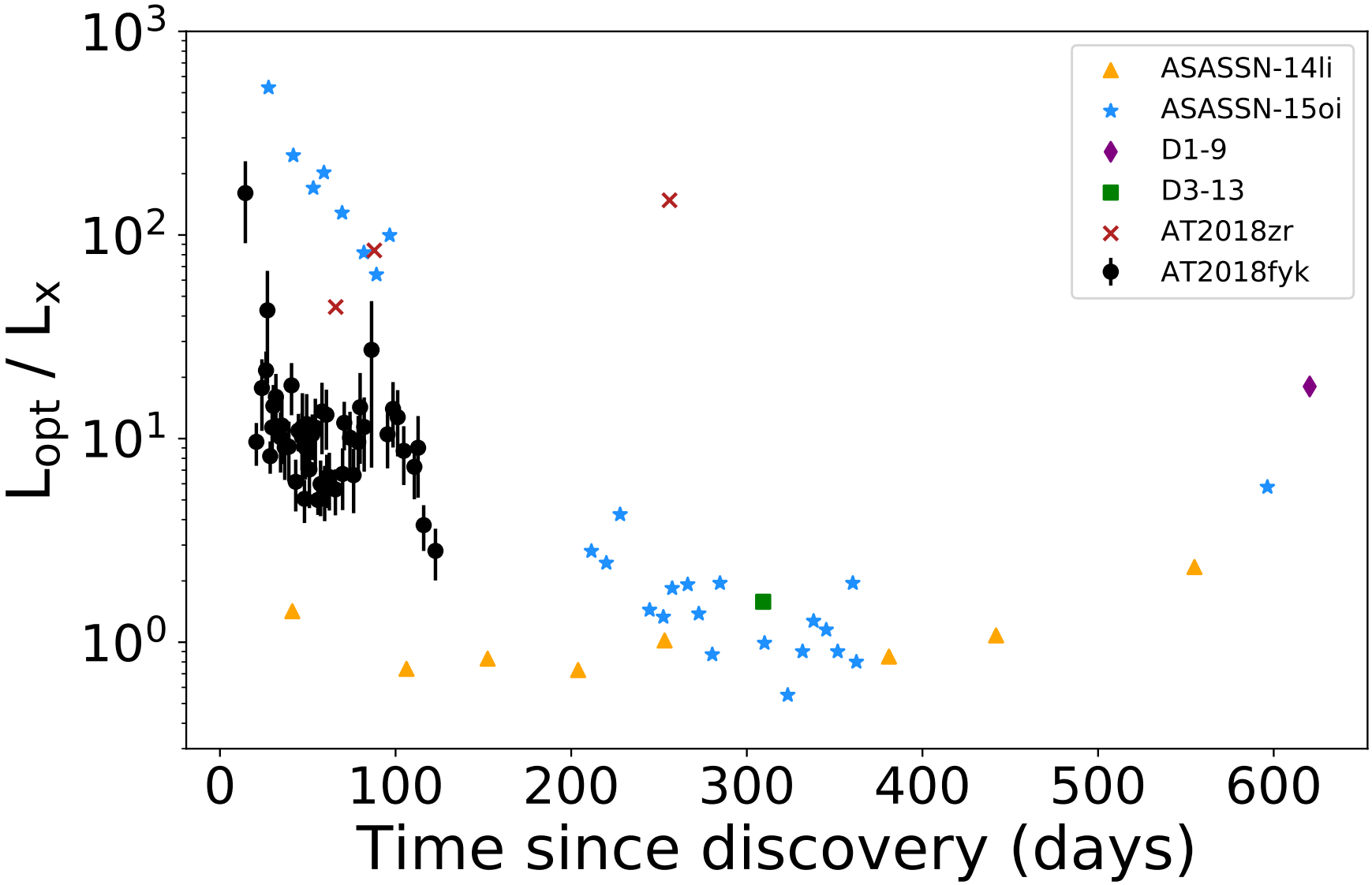
Lightcurve comparison



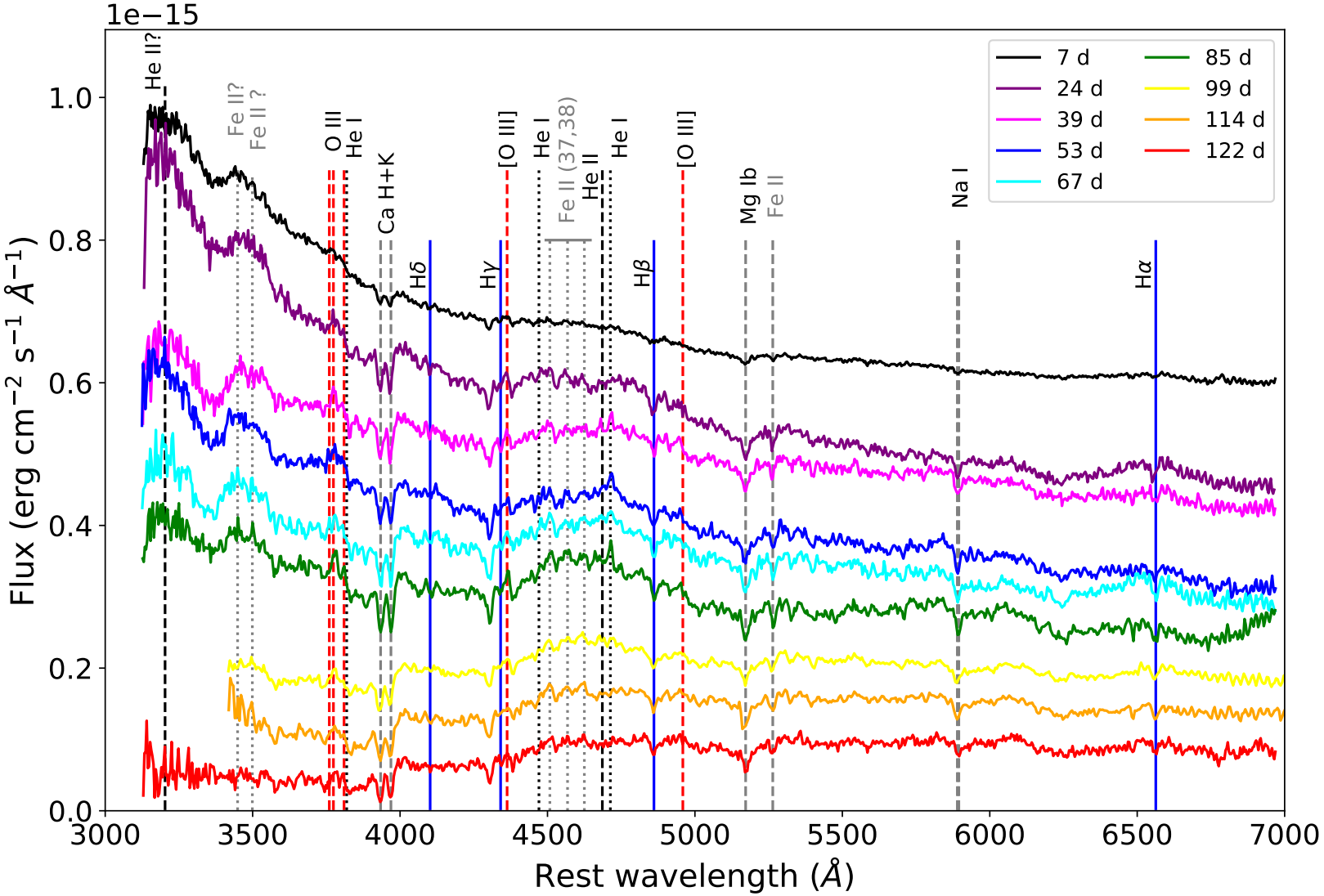
Hot (& getting hotter?)



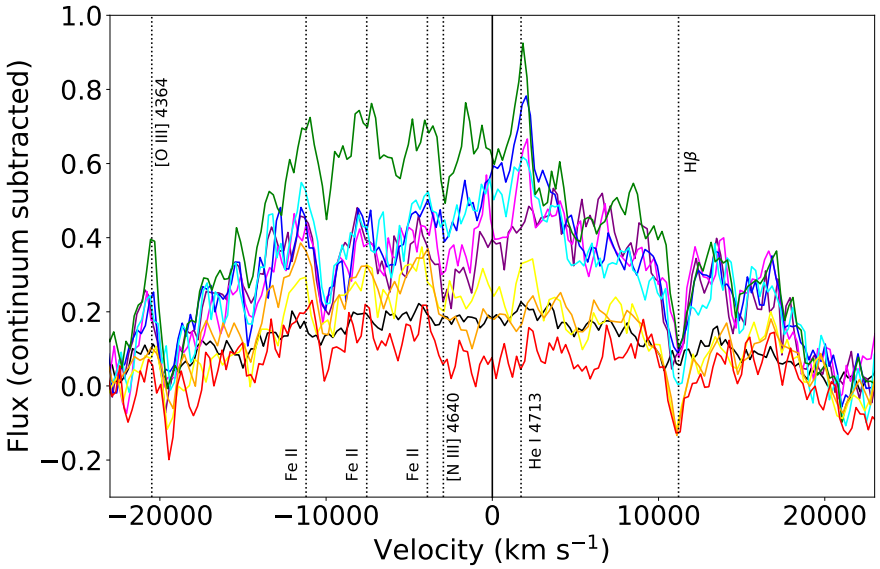
Early time L_{opt}/L_X evolution

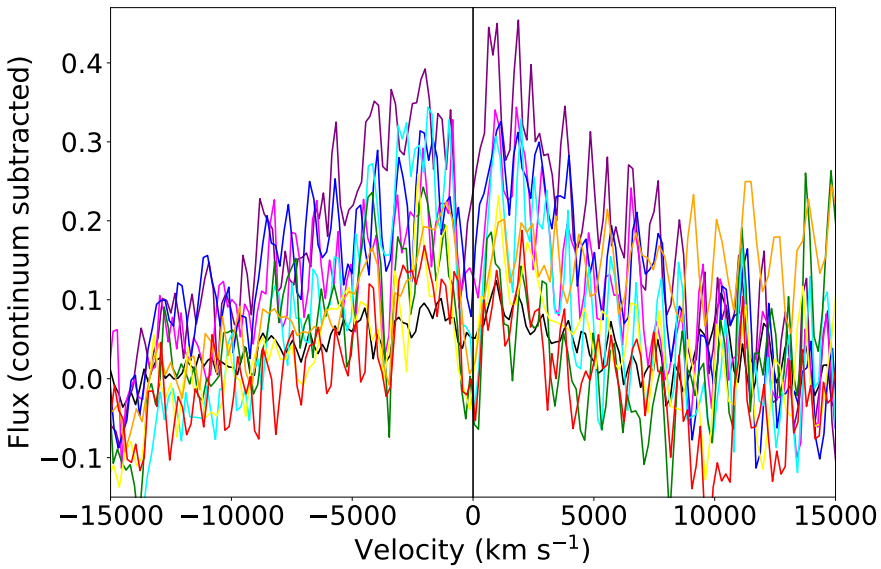


Spectral evolution



Different line profiles for Hα and "He II"

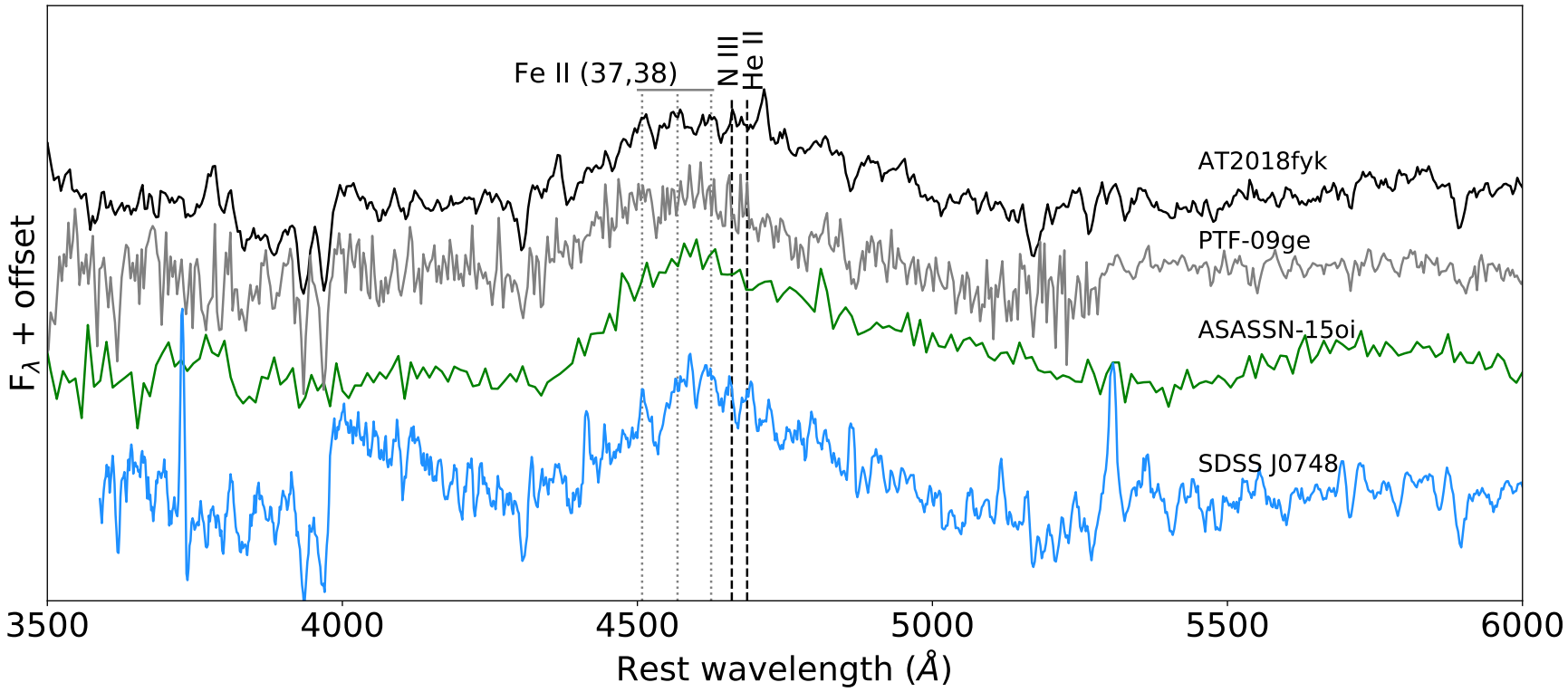




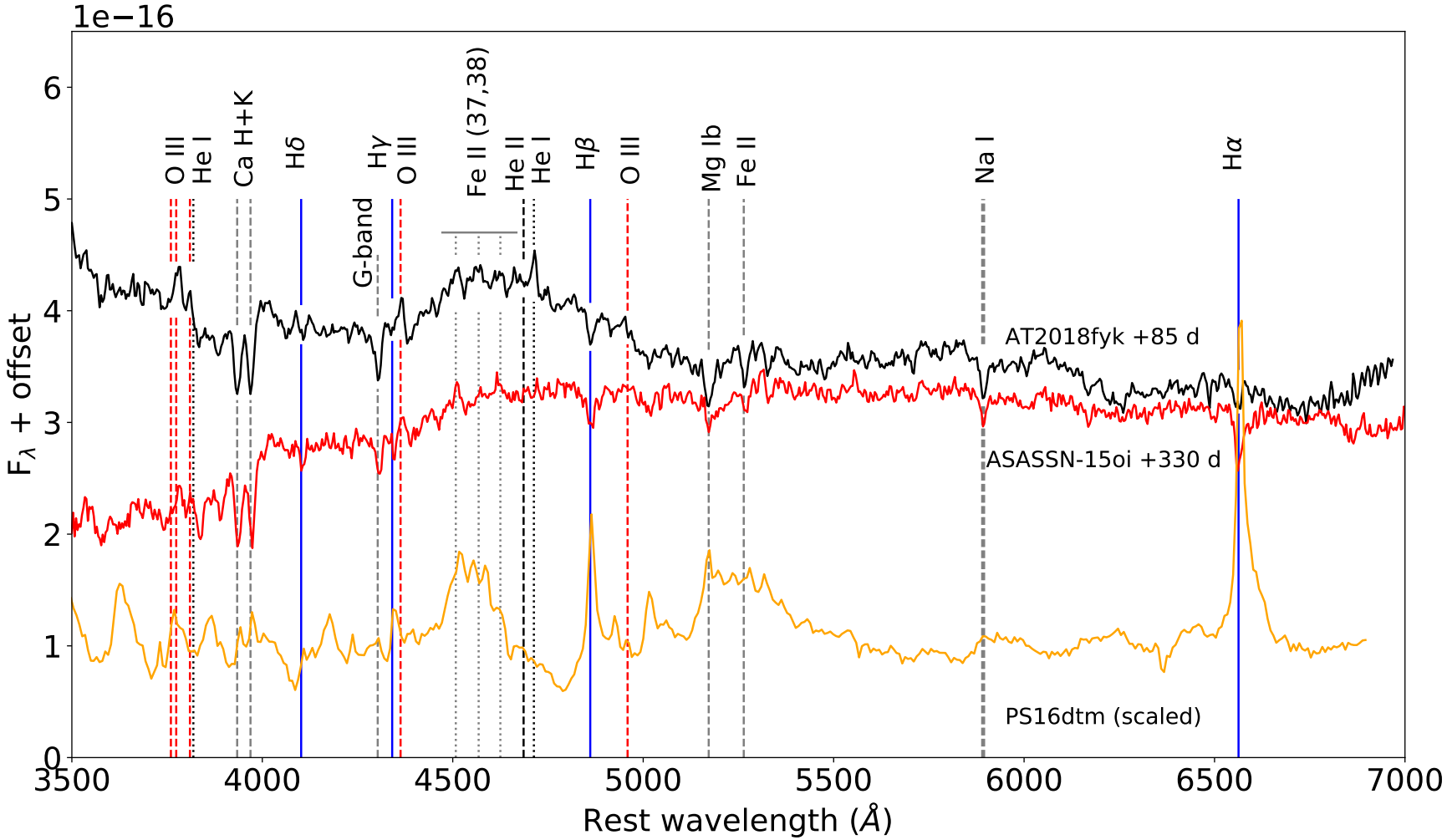
Hα looks symmetric / good fit with single Gaussian

λ4686 feature profile looks 'flat-topped' and evolves with time

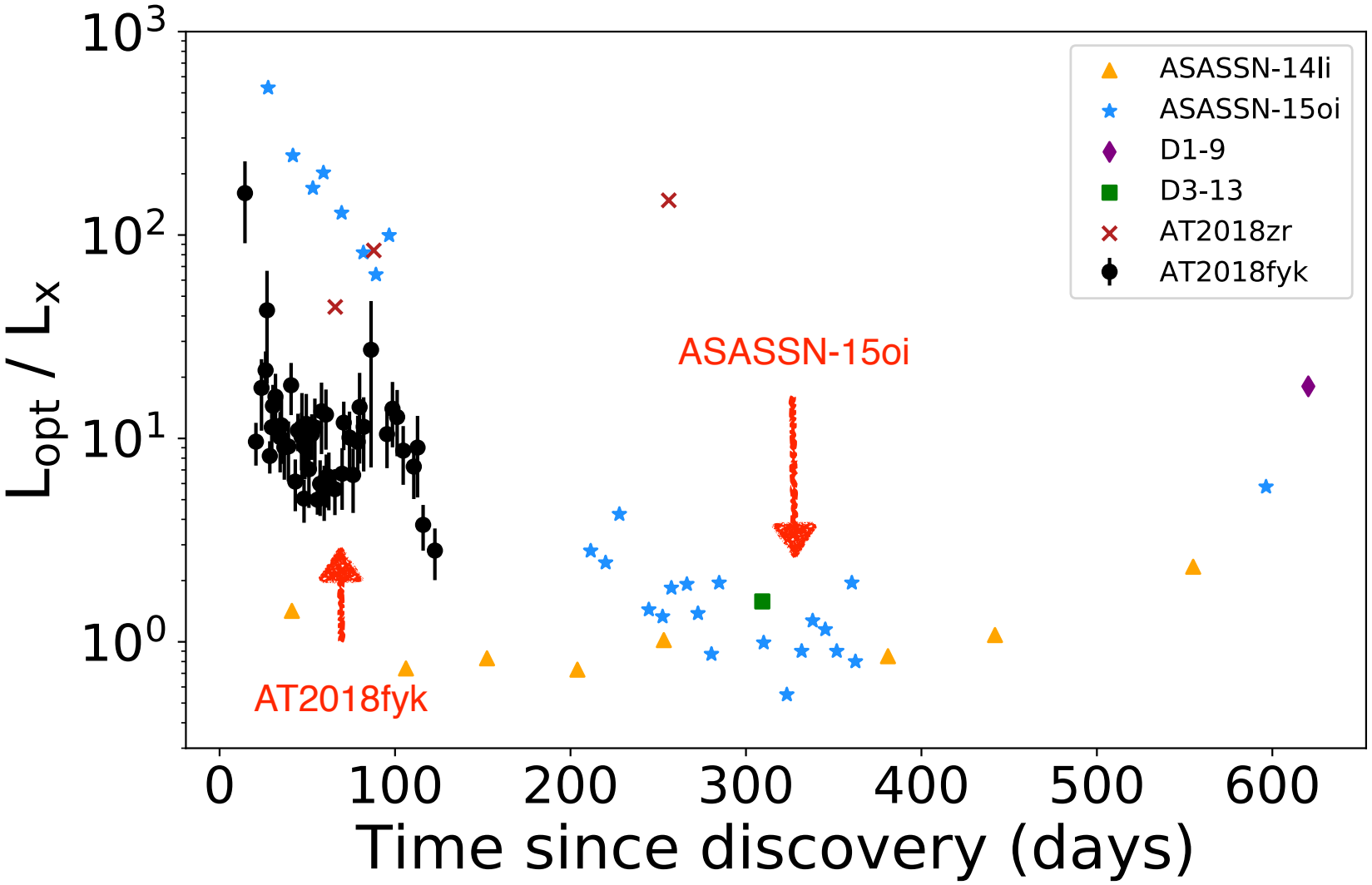
Fe II lines in other TDEs?



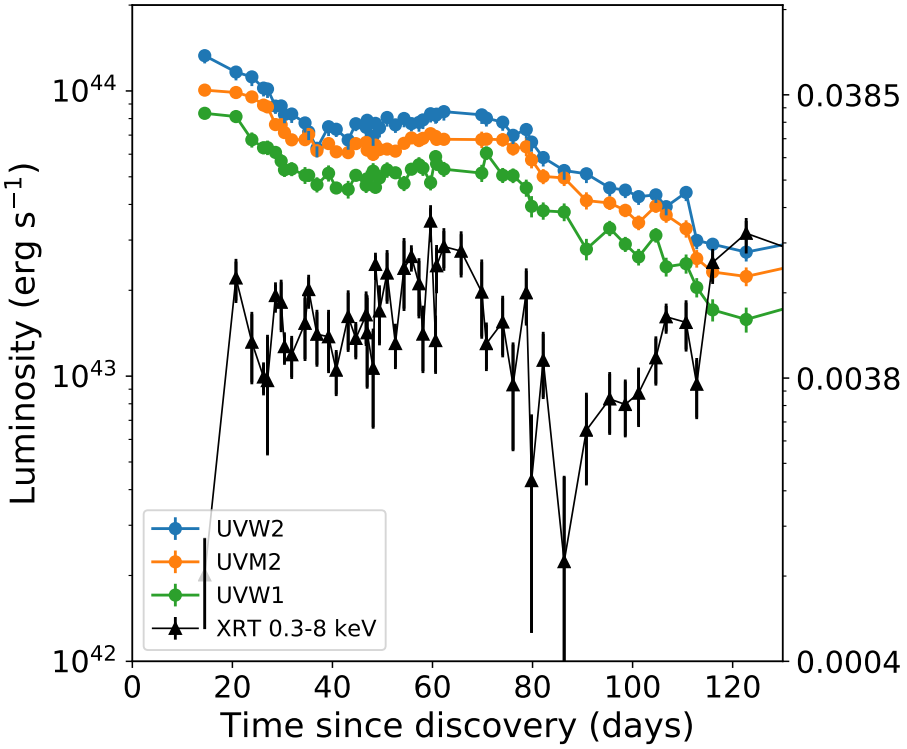
Fe II lines in other TDEs!

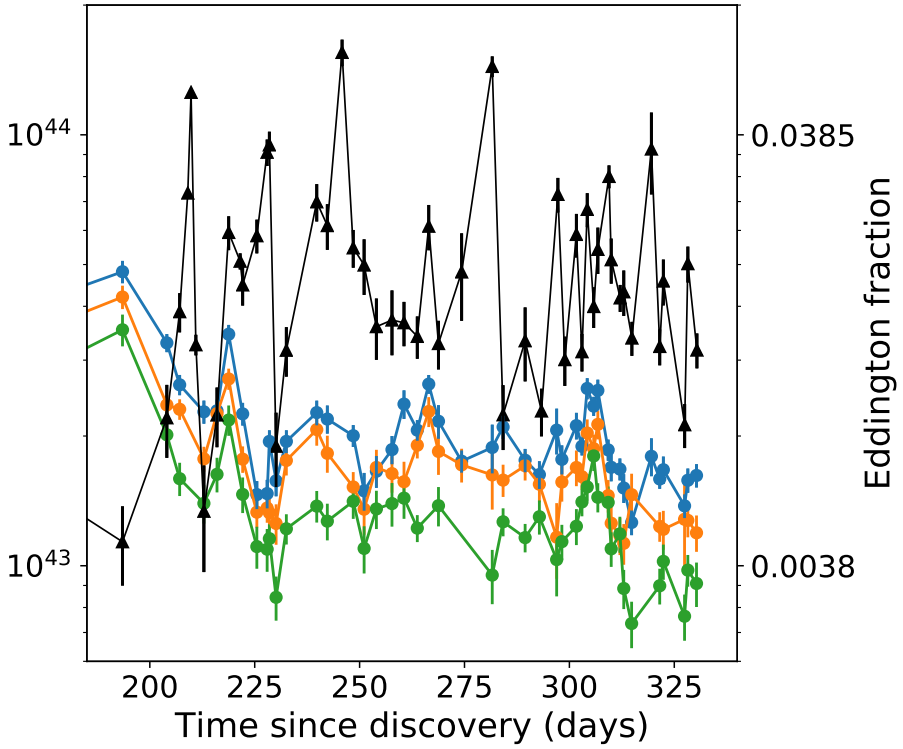


Narrow emission lines & L_{opt}/L_X evolution

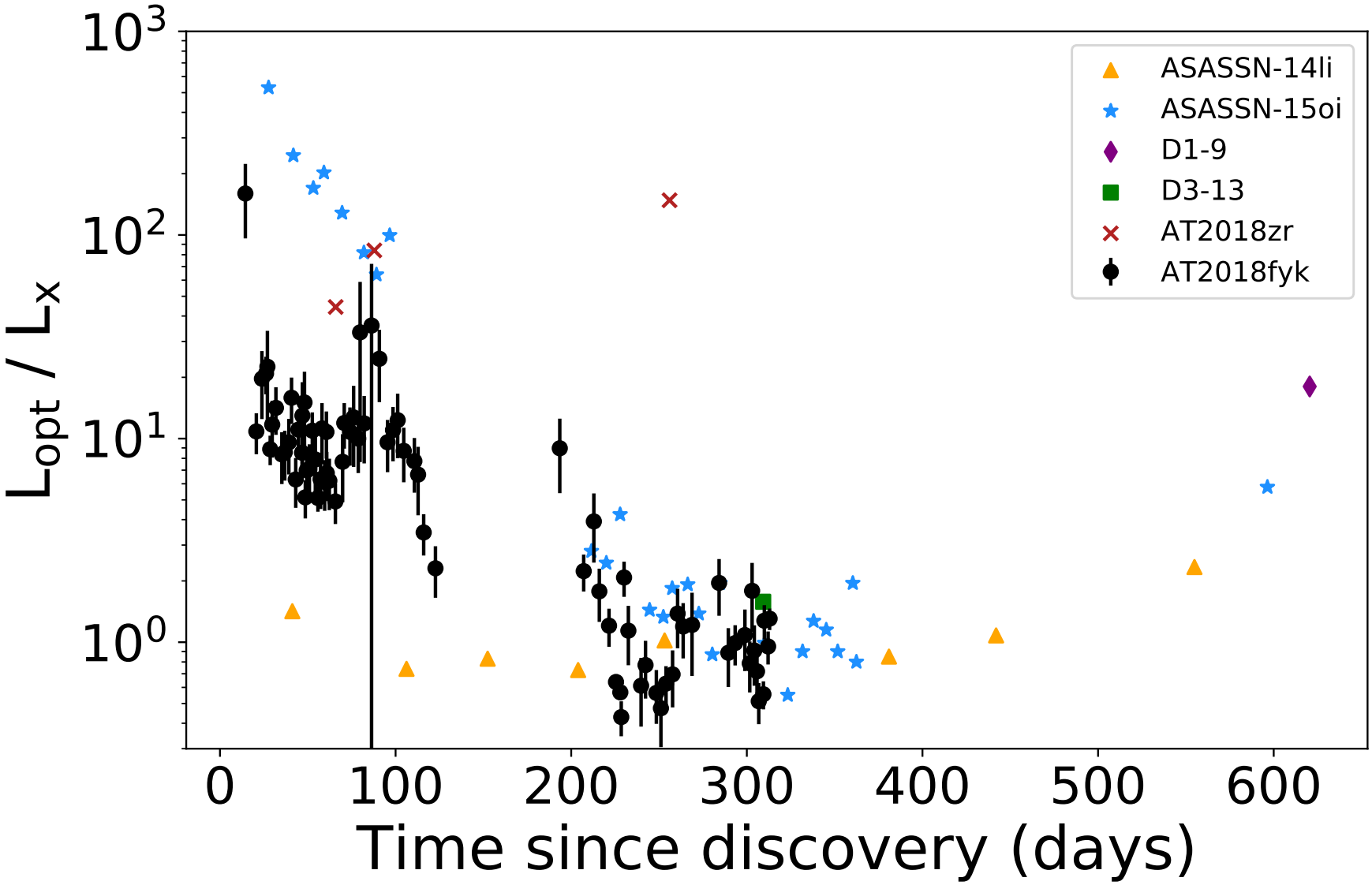


Late time evolution... blimey !!

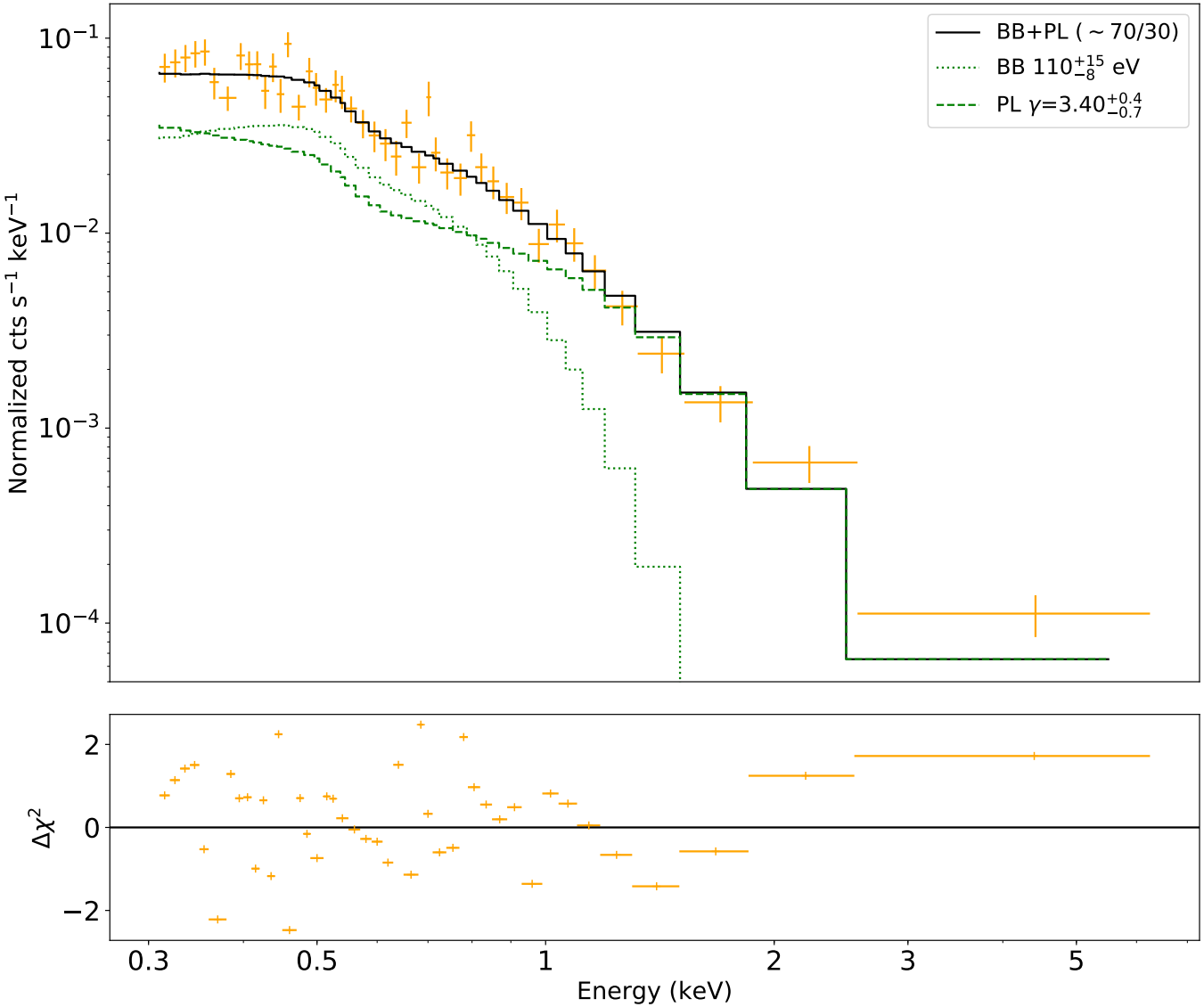




Late time L_{opt}/L_X evolution [preliminary]



Stacked Swift XRT spectrum (early time)



AT 2018fyk looks like other "super-Eddington" accretors... but why?

- Other TDEs show none of these signatures - but generally assumed super-Eddington $\dot{M}$
- With current M_{BH} estimate $\sim$2e7 $M_\odot$: peak L$\sim$0.05 L_{Edd}
- BUT now late-time spectrum – measure $\sigma_\star$ and M_{BH}
- Disk formation much more efficient than usual?
- Optical Fe II emission lines – NLS1s
- X-ray spectral properties reminiscent of ULXs [neutron stars!]/NLS1s
- *Fast* X-ray flares – NLS1s