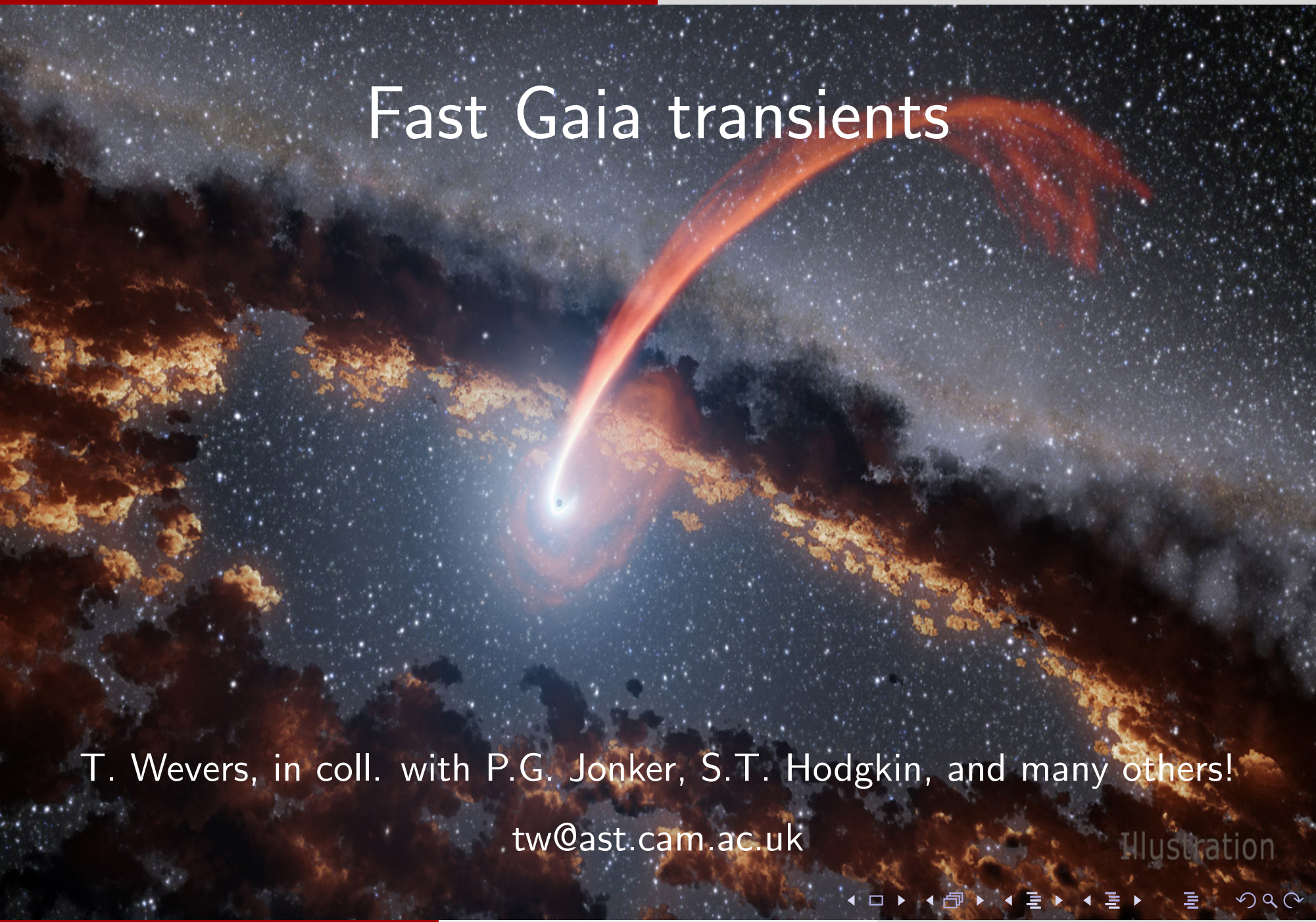
Fast Gaia transients



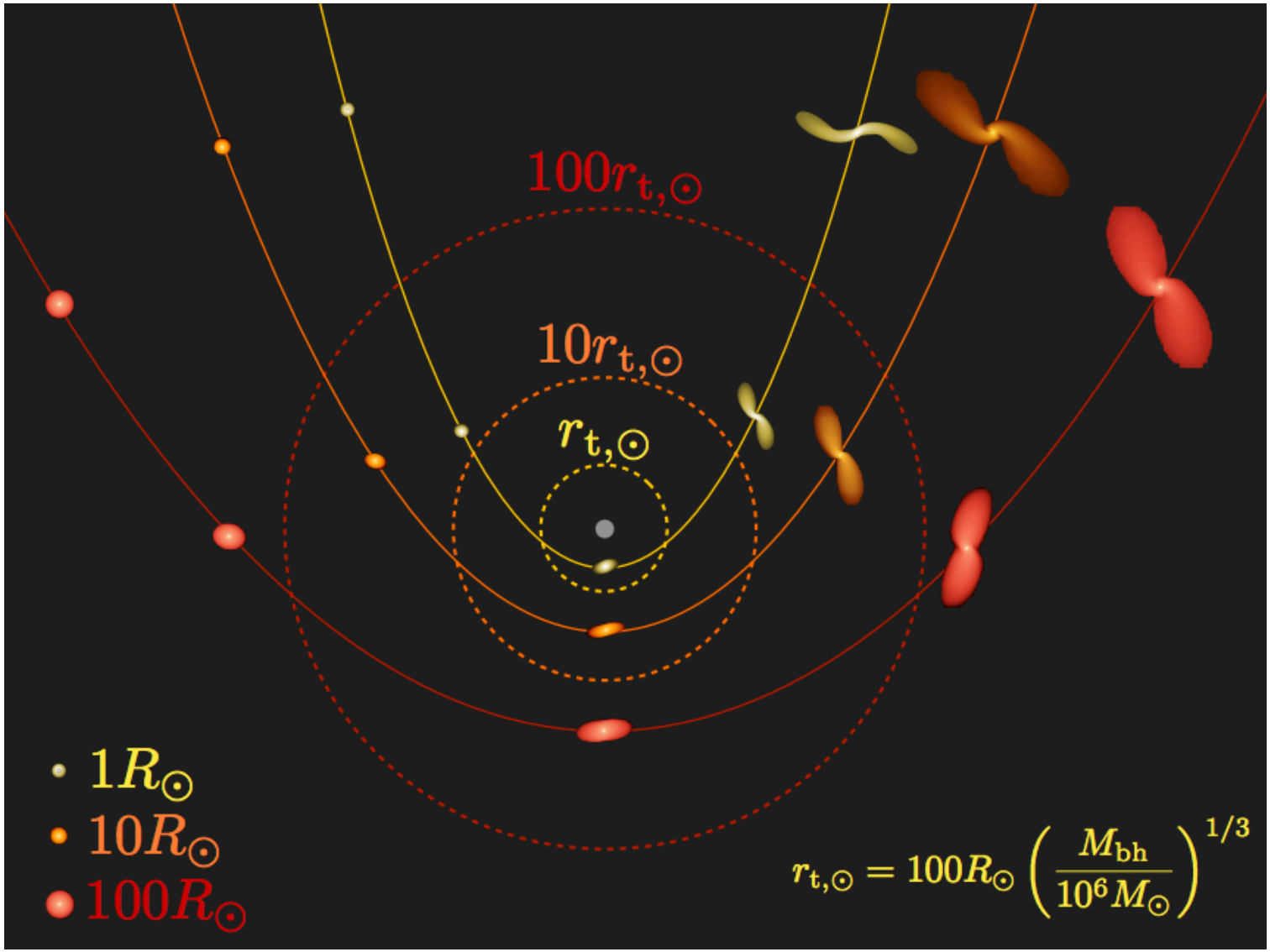
T. Wevers, in coll. with P.G. Jonker, S.T. Hodgkin, and many others!

tw@ast.cam.ac.uk


Radboud Universiteit


Duvel

TDEs in a nutshell



TDEs as tracers of IMBHs?

- Star enters tidal radius of BH: differential gravity leads to disruption
- A fraction of the material remains bound and accretes onto the BH

Typical fallback timescale (Lodato & Rossi, 2011):

$$t_{peak} \sim 41 \times m_{star,\odot}^{-1} \times r_{star,\odot}^{1.5} \times M_{BH,6}^{1/2} days \quad (1)$$

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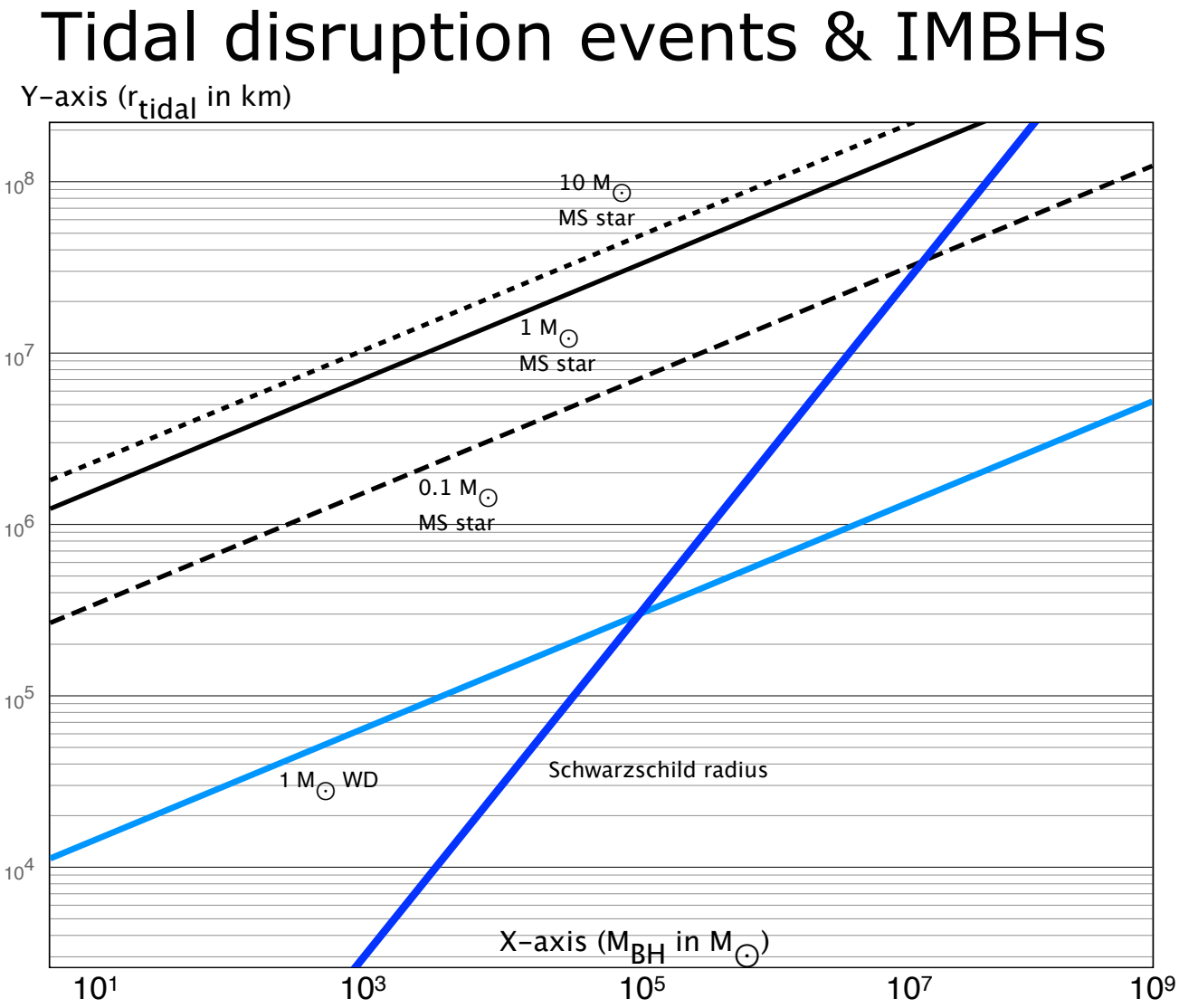
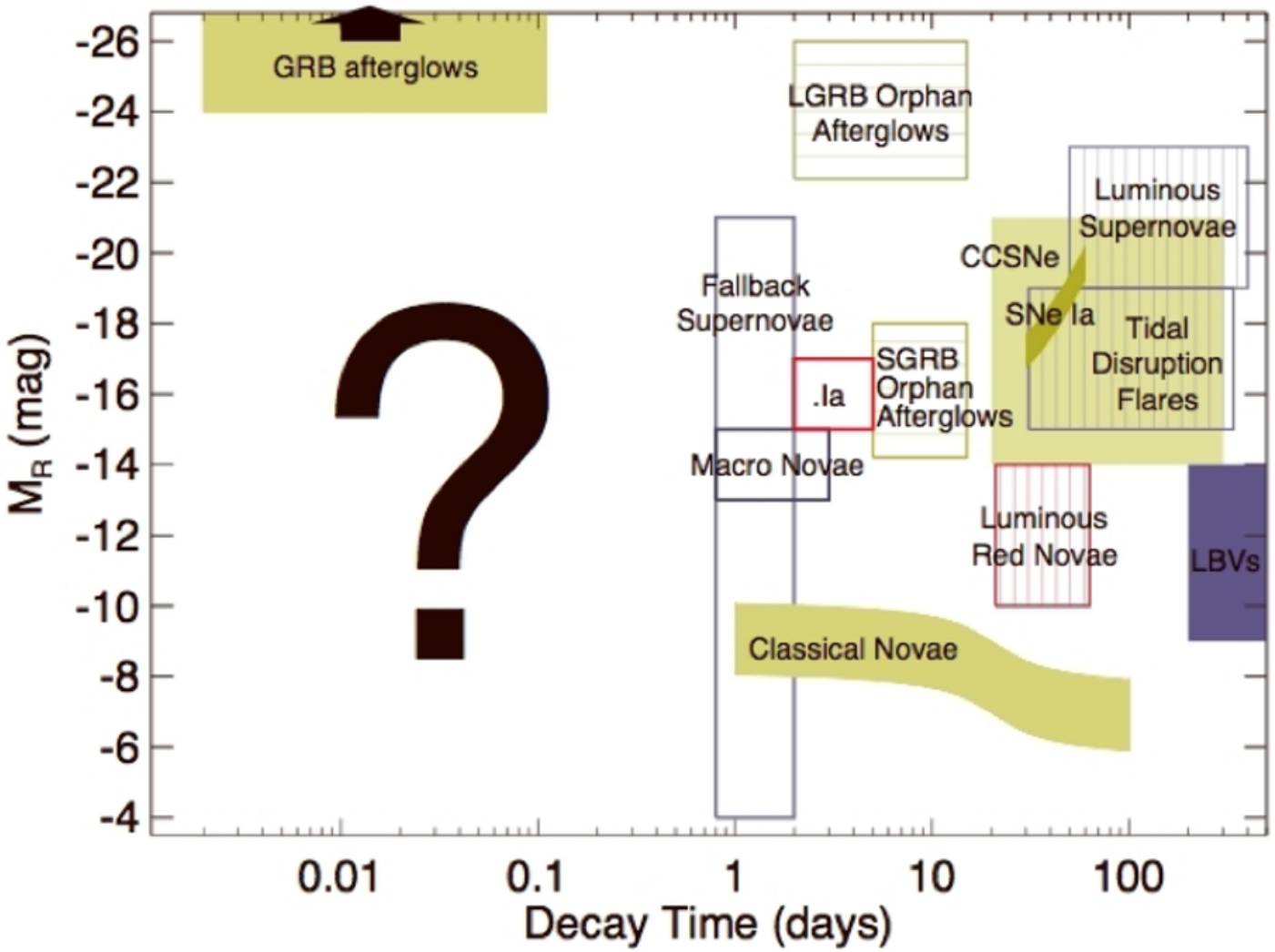
For a 0.6 $M_\odot$ WD:

- tens - 1800 sec for $M_{BH} \sim 100$ - $10^5 M_\odot$
  [see e.g. Jonker+13, Glennie+15, Bauer+17 for X-ray events]

Fast TDEs can only occur around IMBH!

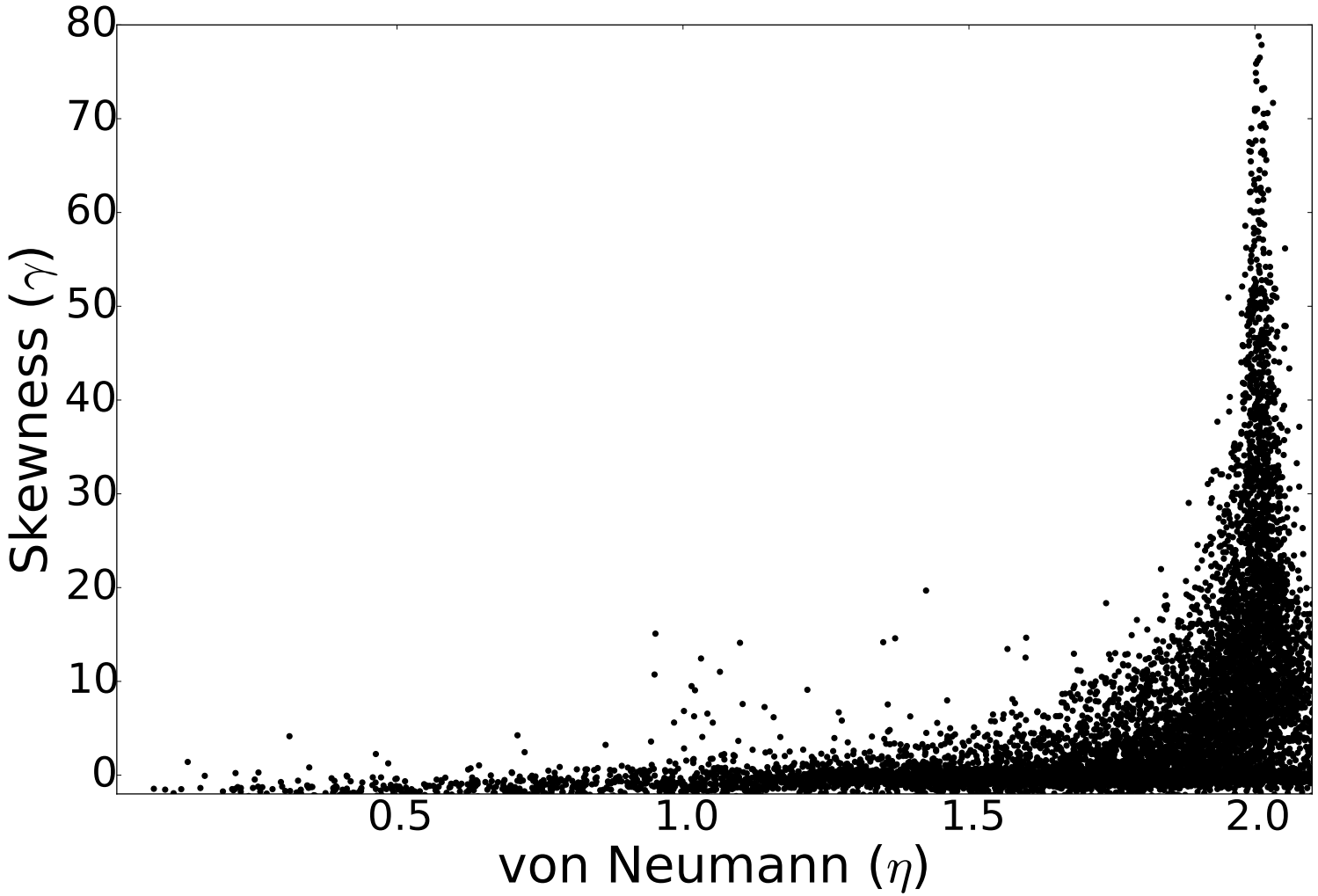


Fast transients with Gaia



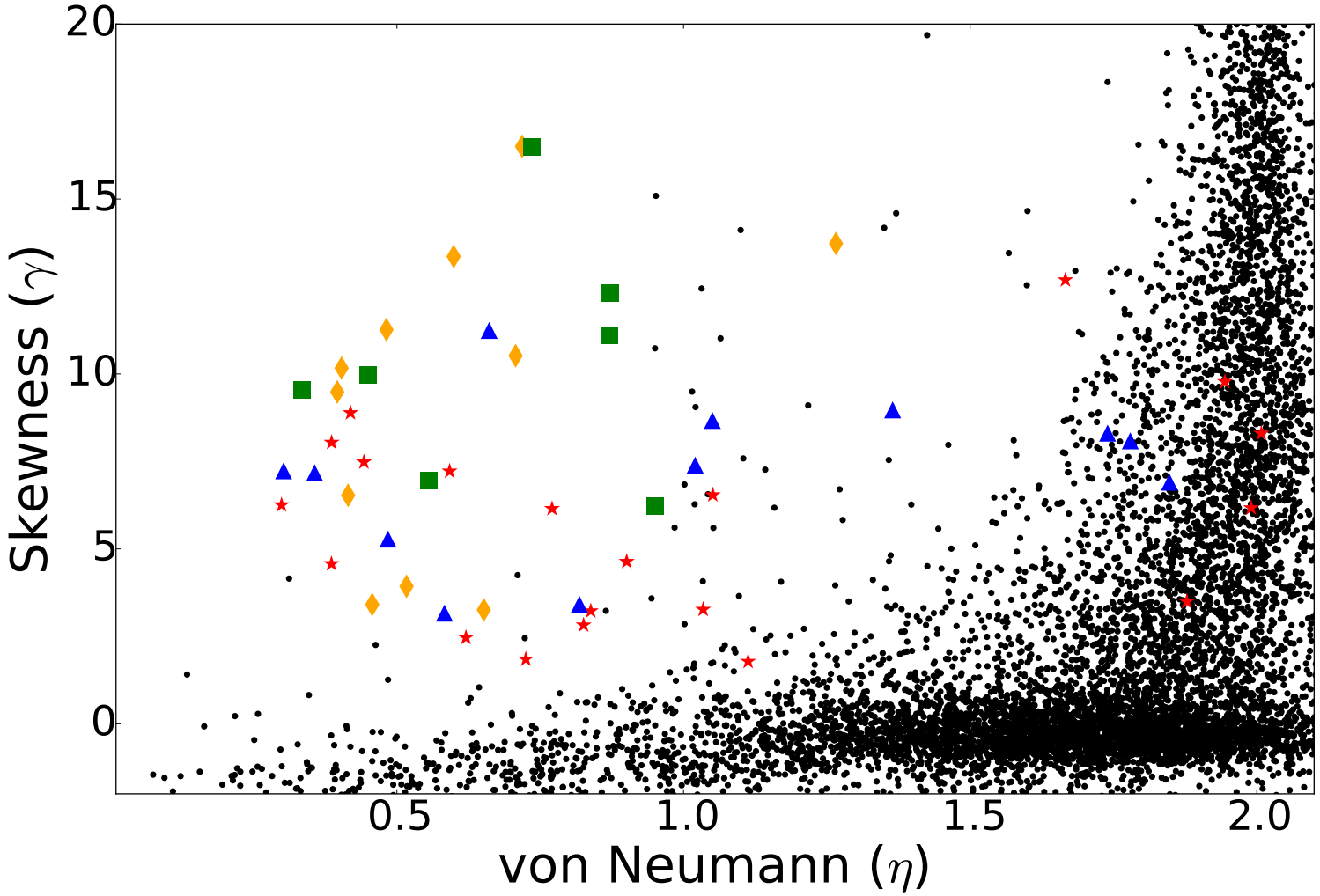
LSST Science book

Fast transients with Gaia



TW+2017d (arXiv:1710.08924)

Fast transients with Gaia



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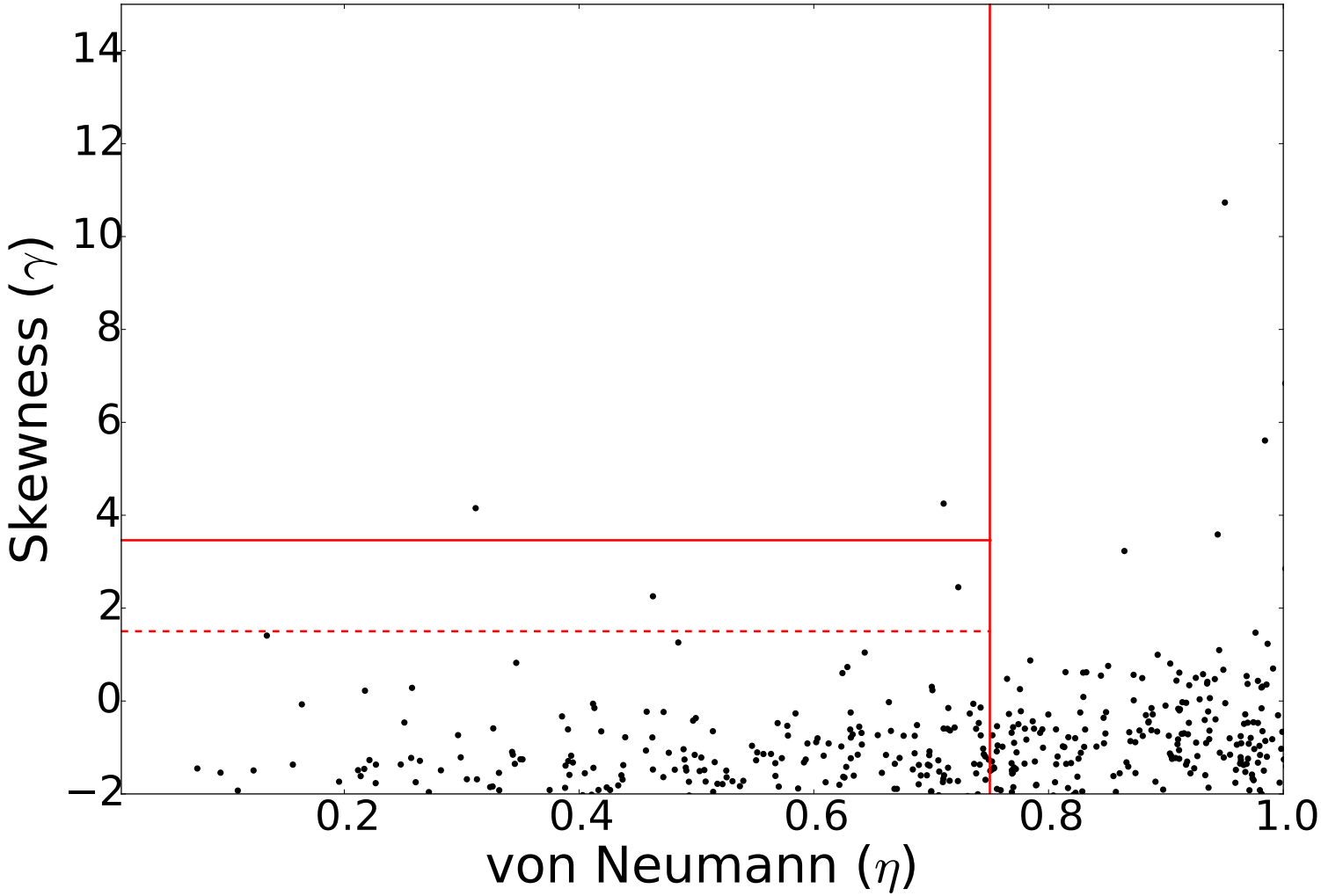

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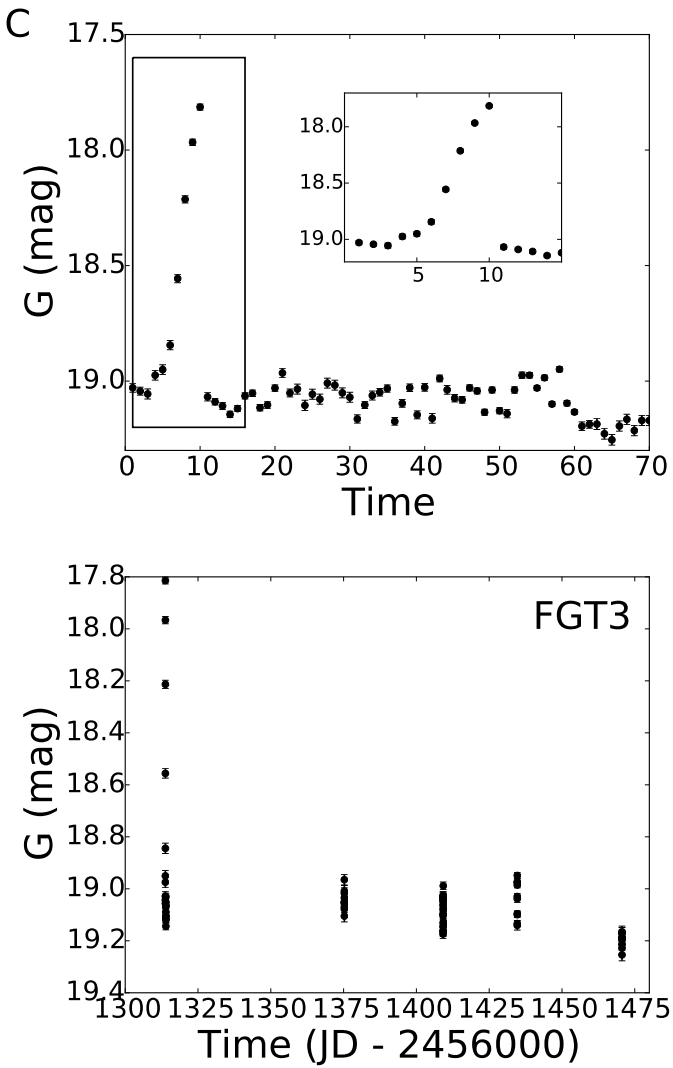

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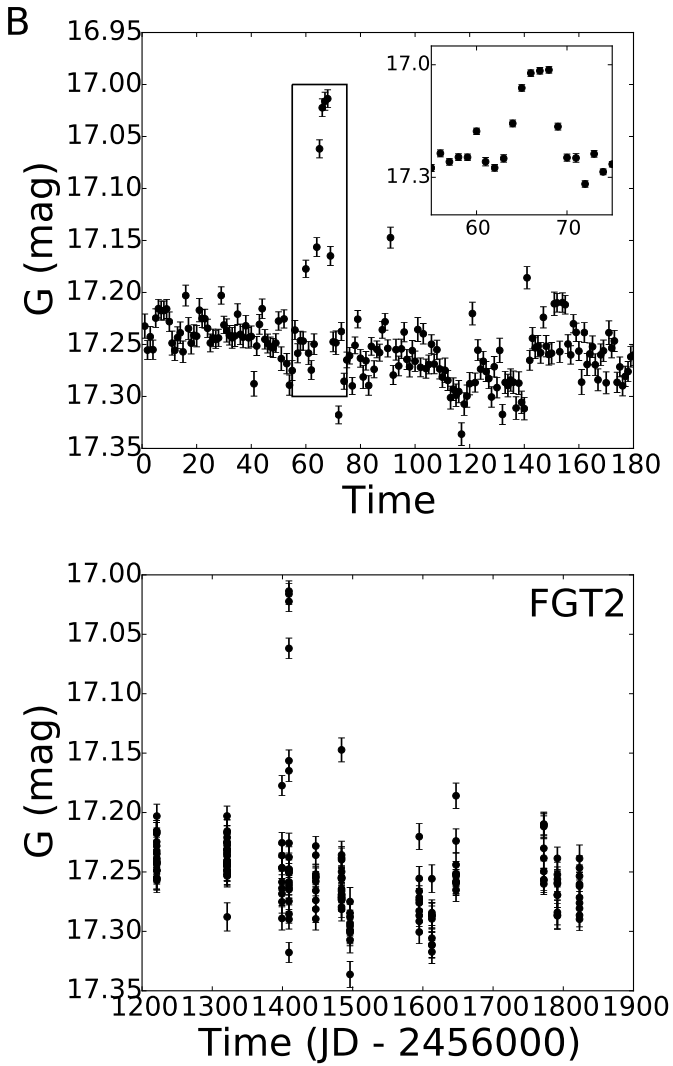

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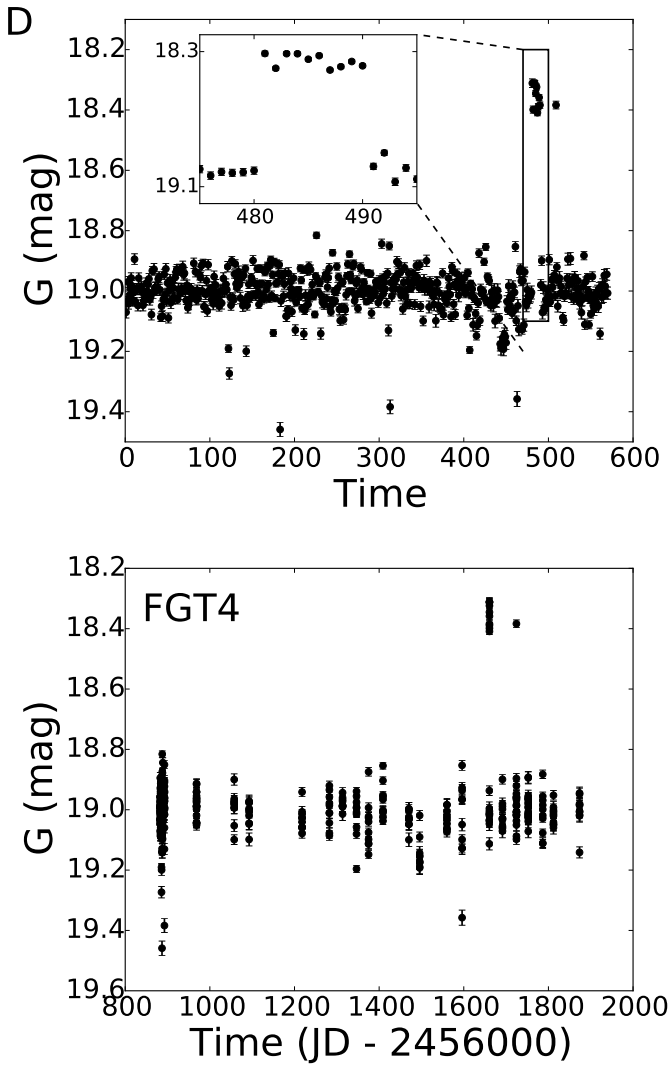

TW+2017d (arXiv:1710.08924)

Summary

- Gaia per-CCD data is great!
- Through aggressive filtering, we can find real transients
- Gaia is the only mission with this capability, now and the foreseeable future
- Use spectra, colours, etc for "classification" (?)
- Real-time alerts of fast transients?