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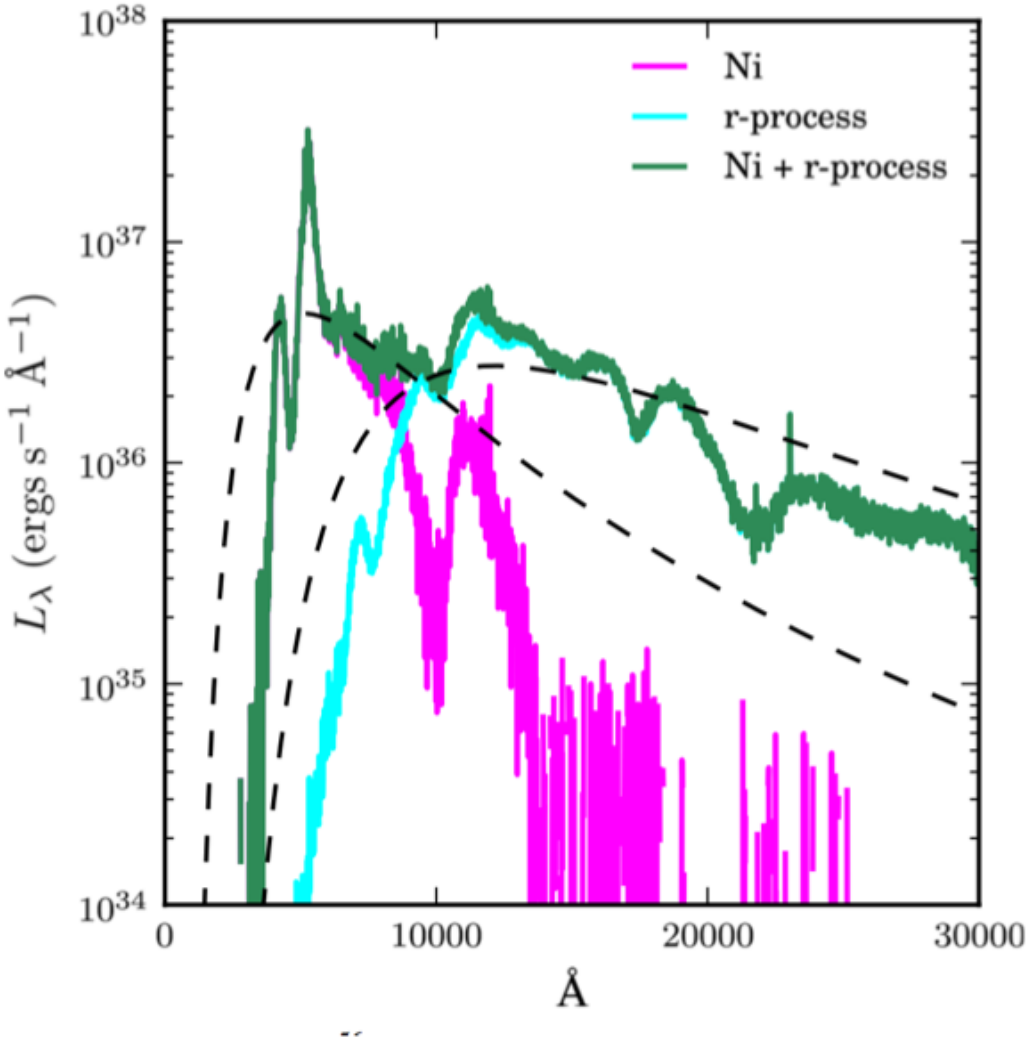
VIN ROUGE

VIsta Near infraRed Observations Unveiling Gravitational-wave Events

VISTA Public Survey (420 hours)

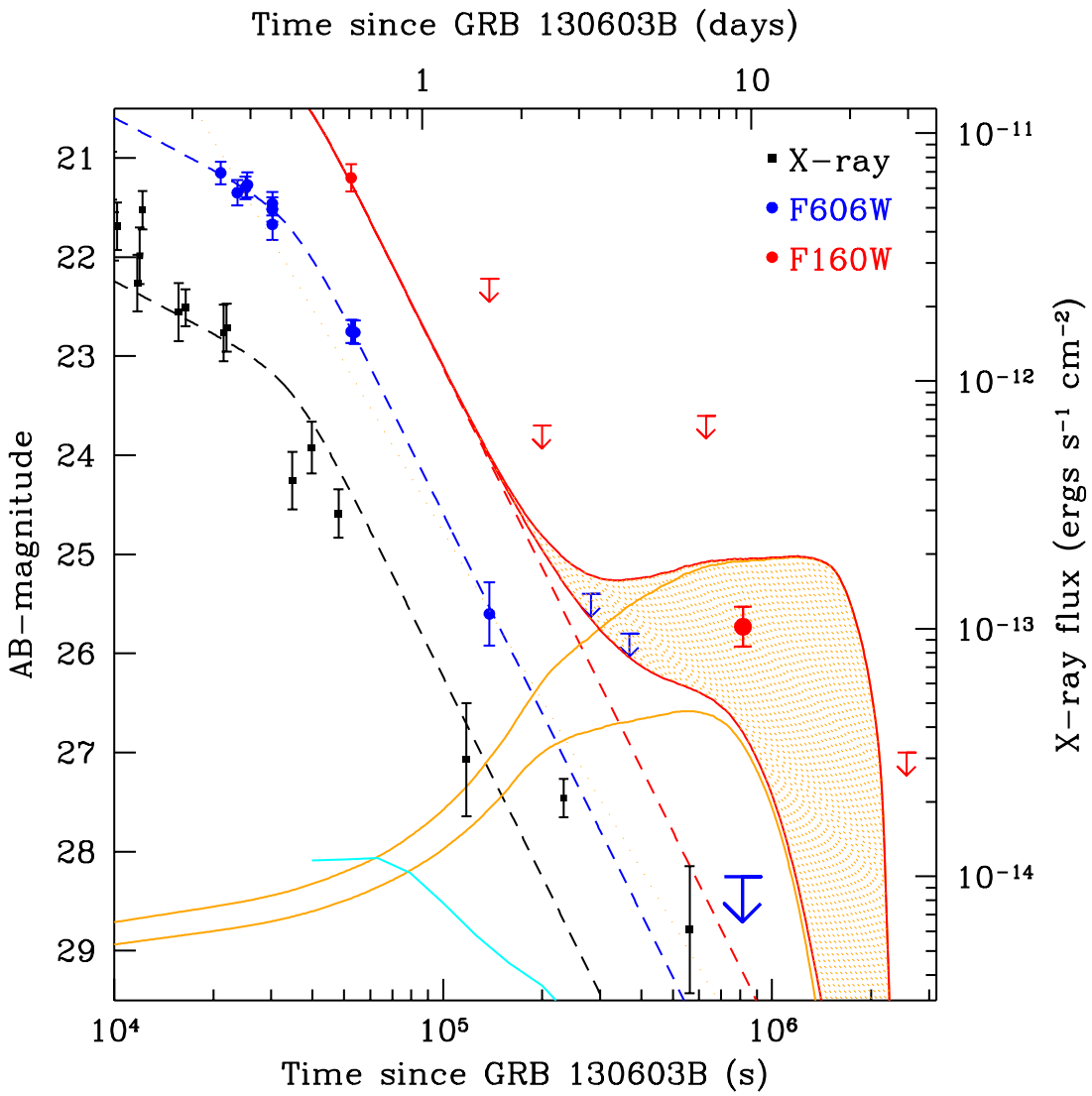
Why infrared, why VISTA?



Barnes & Kasen 2013

Why infrared, why VISTA?

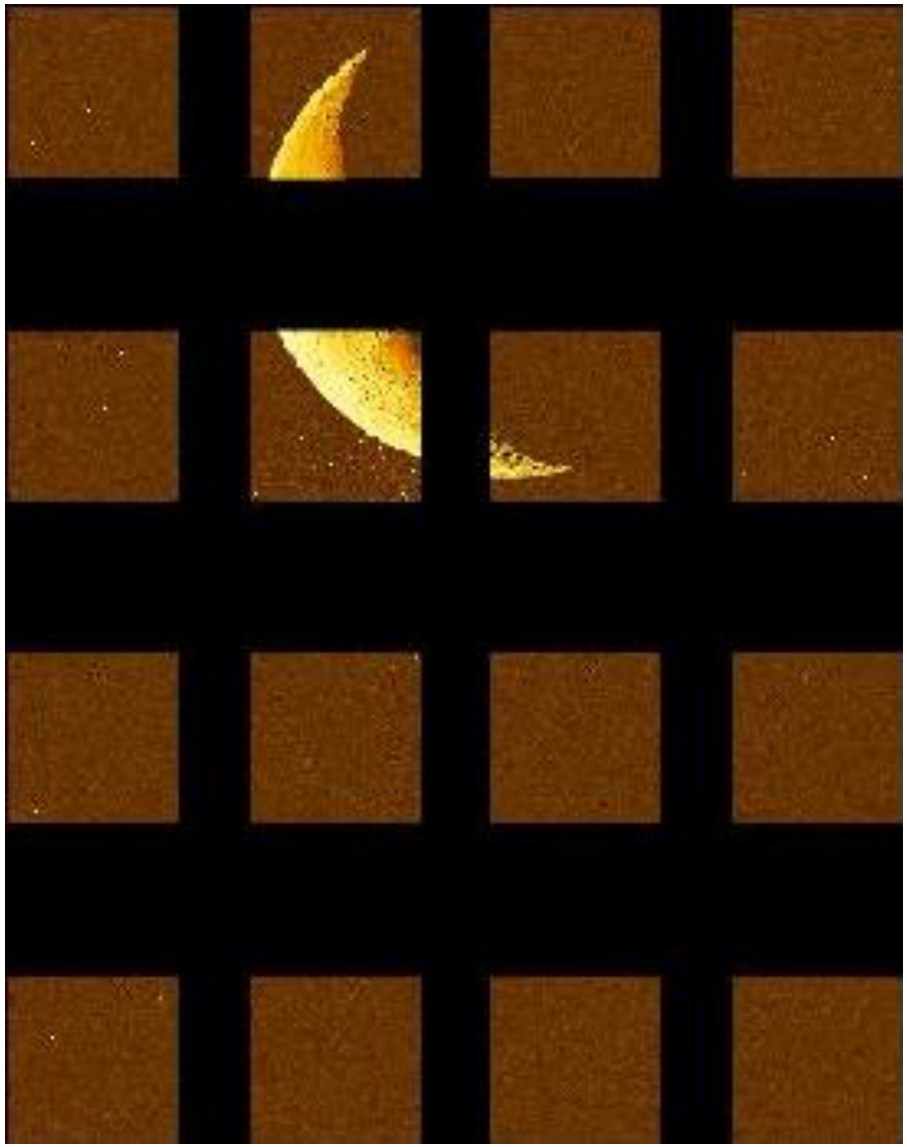
Kilonovae were expected to be red, and to evolve more slowly than blue “afterglow”–like emission



Tanvir, Levan, Fruchter et al. 2013

Why infrared, why VISTA?

GW error boxes are large. VISTA is unique in having a sufficiently large IR field of view (1.65 deg diameter) to cover a good fraction of boxes



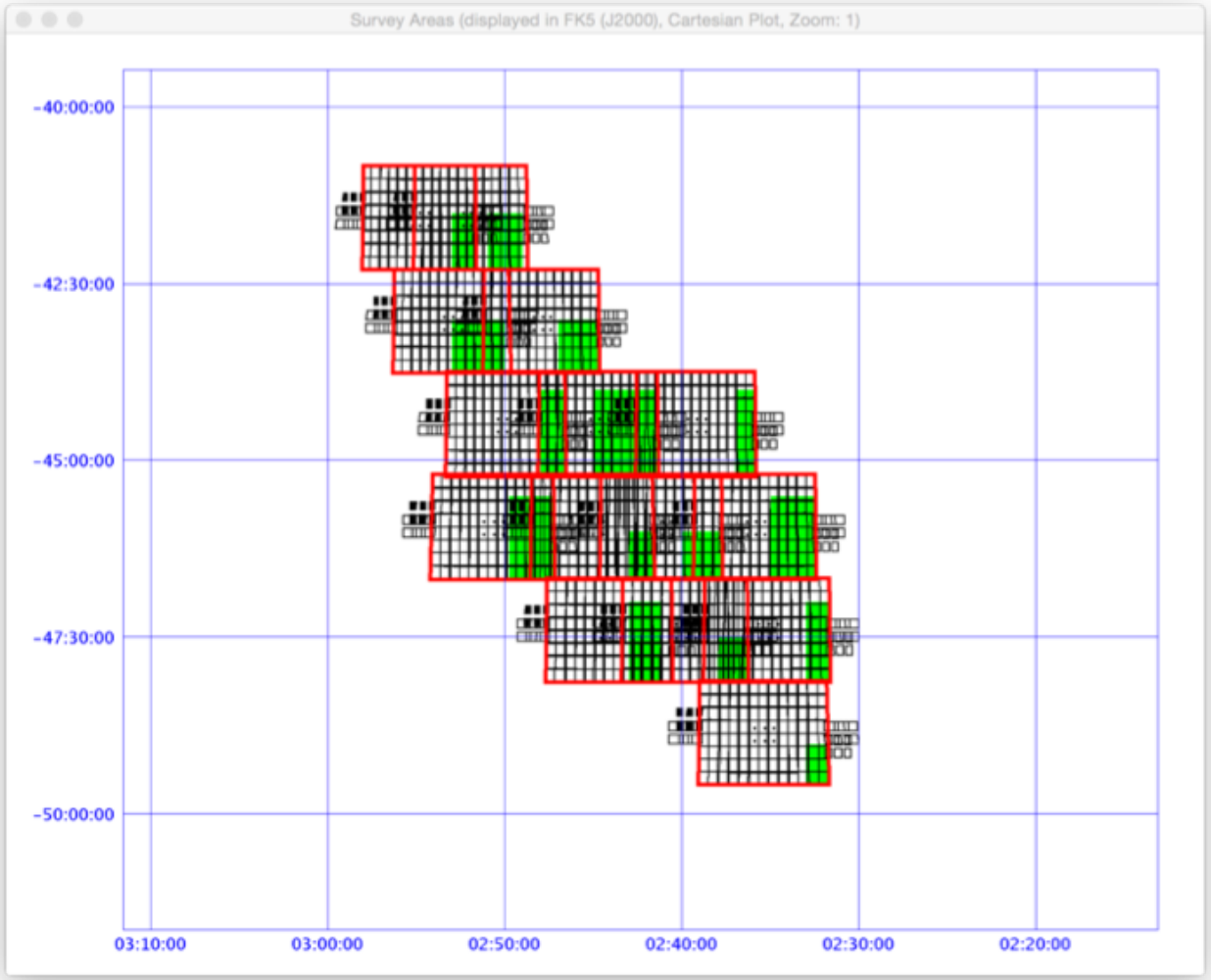
ESO

Generic strategy

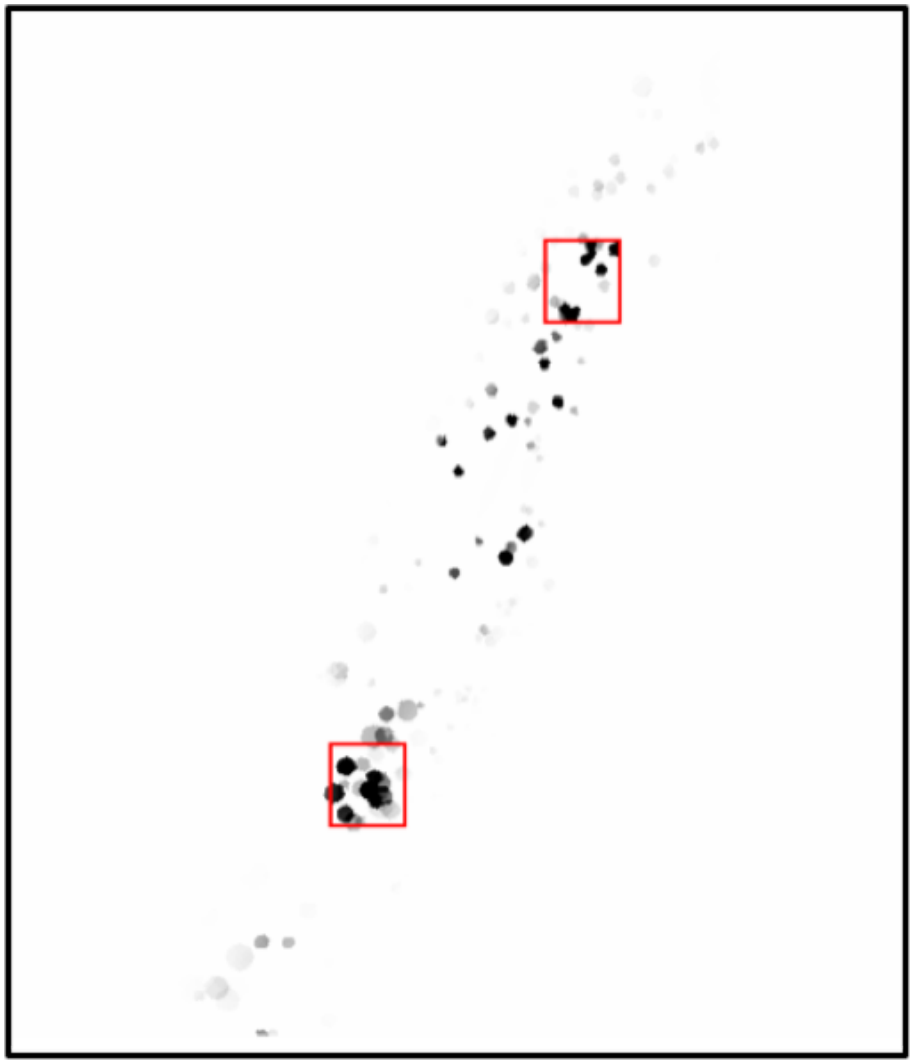
Reach depth of VISTA hemisphere survey for comparison in YJK.

Repeat observations on timescales of days to search for variability if none previously reported.
Follow-up from VISTA and elsewhere as necessary.
Programme CoIs lead programmes at VLT, HST, GTC, Swift, WHT, INT, NOT, LT, GROND and others

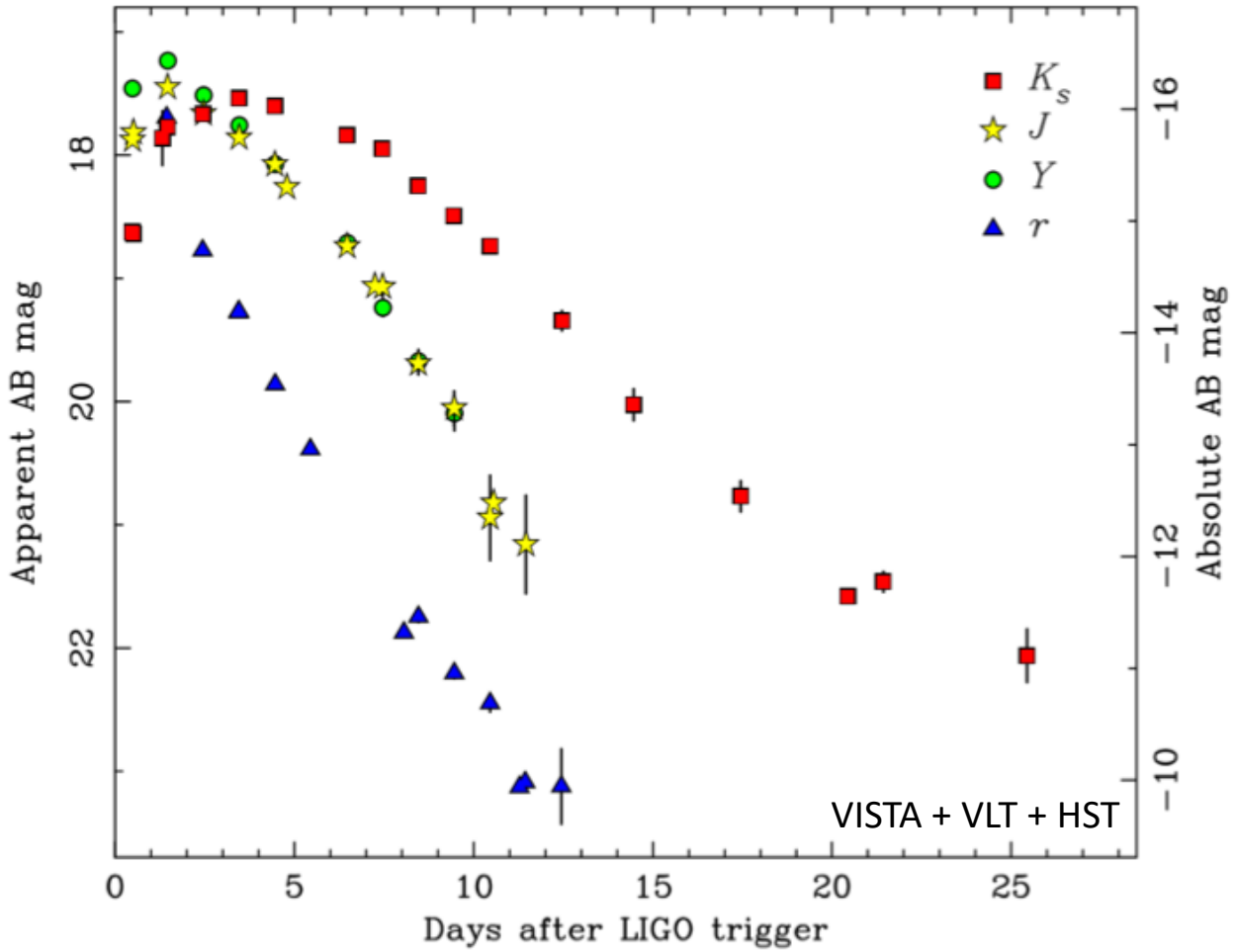
GW170814



GW170817

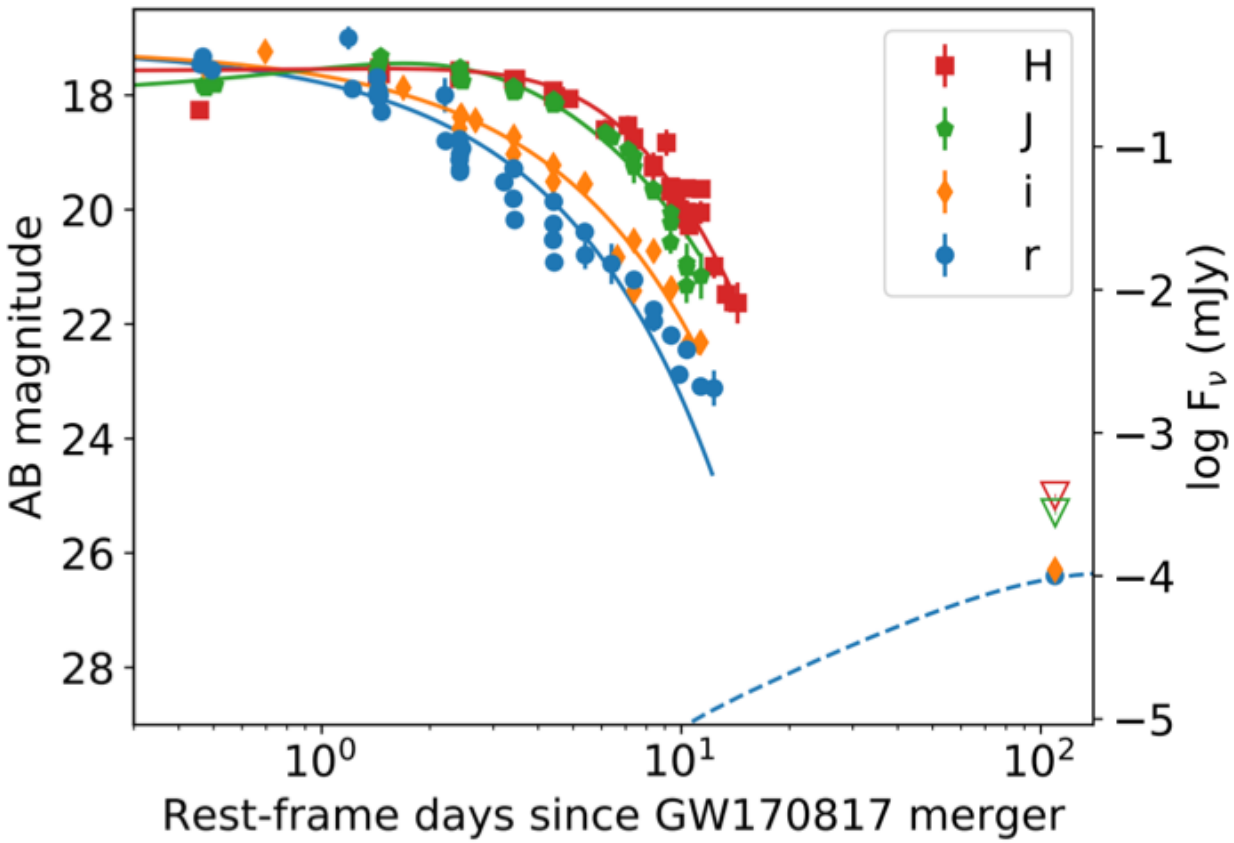


GW170817



Tanvir et al. 2017

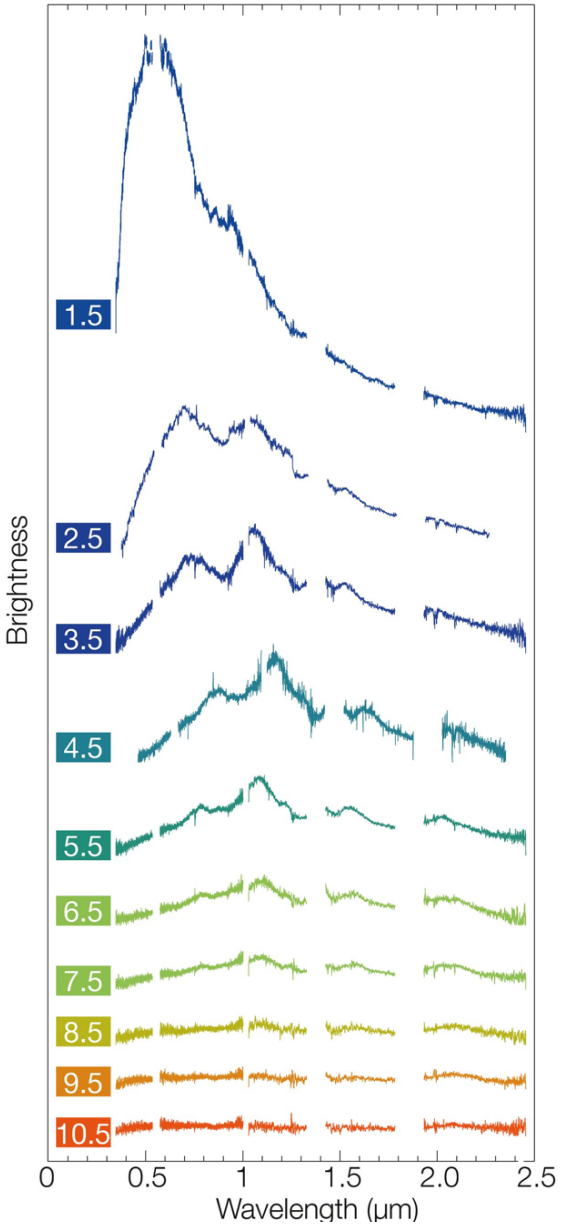
GW170817

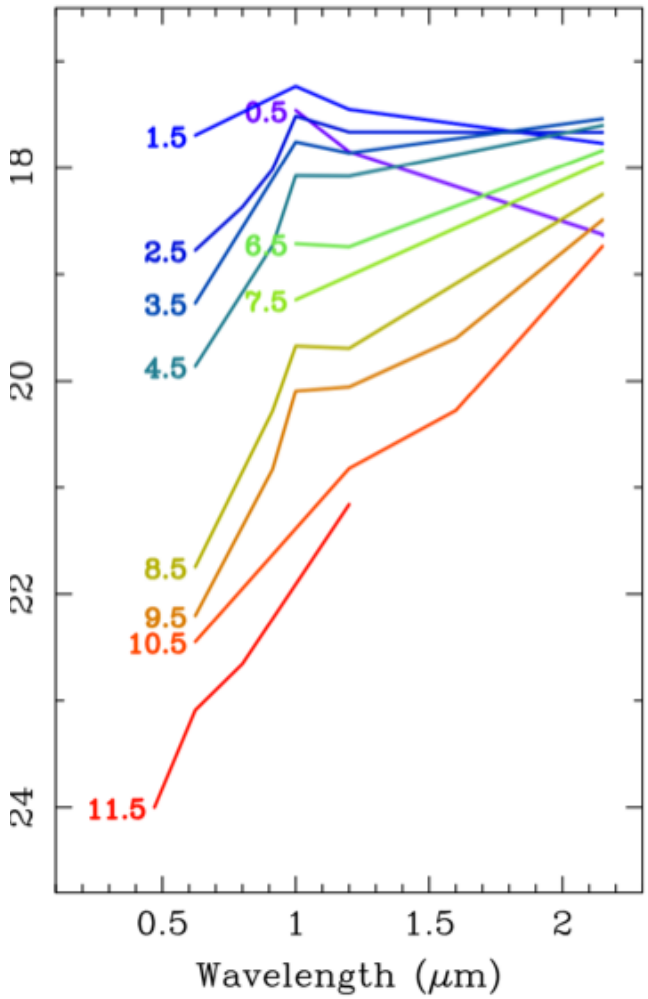


Lyman et al. 2018

Arcavi et al. 2017, Coulter et al. 2018, Cowperthwaite et al. 2017, Kasliwal et al. 2017, Lipunov et al. 2017, Pian et al. 2017, Smartt et al. 2017, Tanvir et al. 2017

GW170817

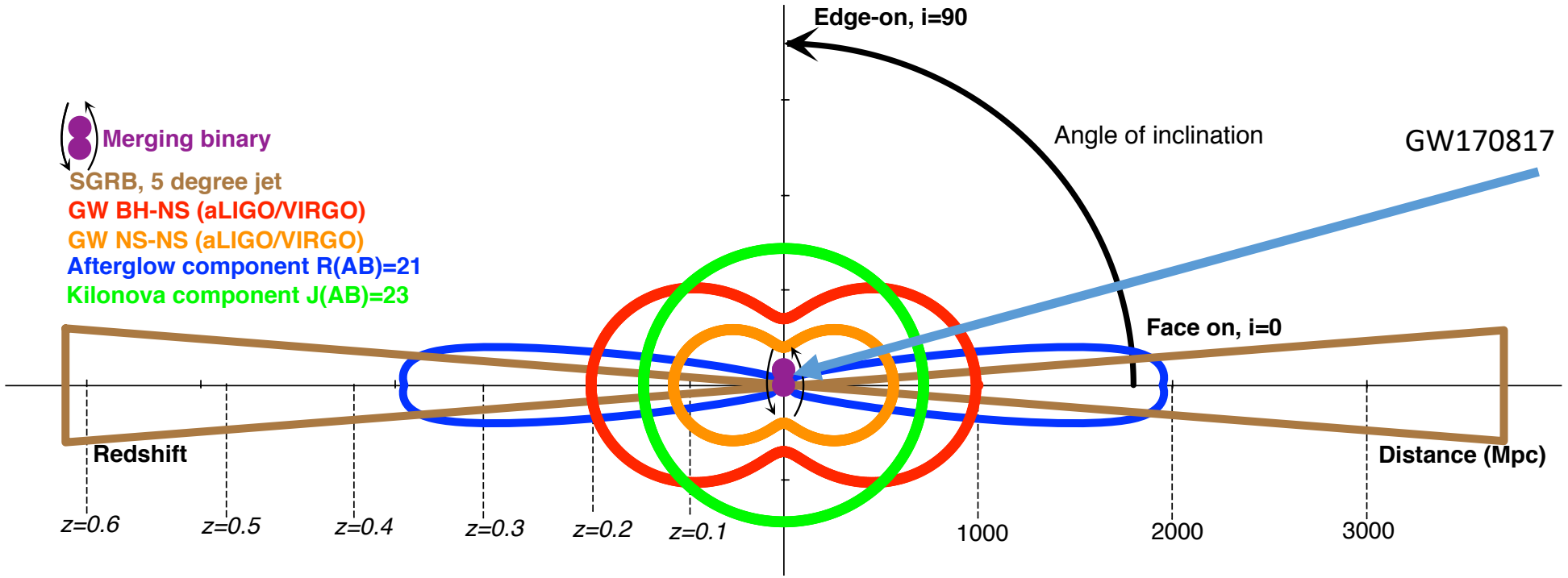




Pian et al. 2017, Smartt et al. 2017,
Tanvir et al. 2017

GW170817

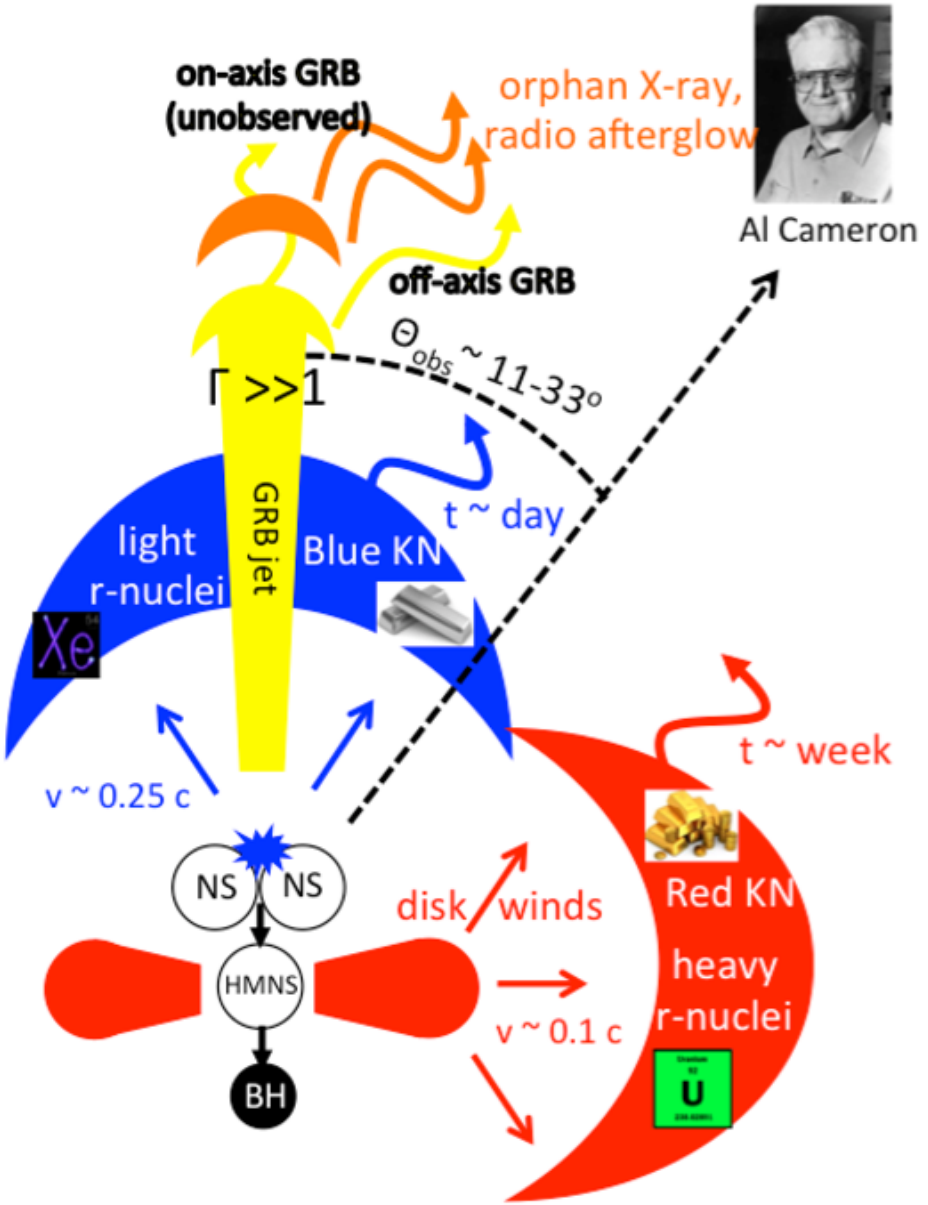
Expectations for future LIGO runs



Levan et al. 2016

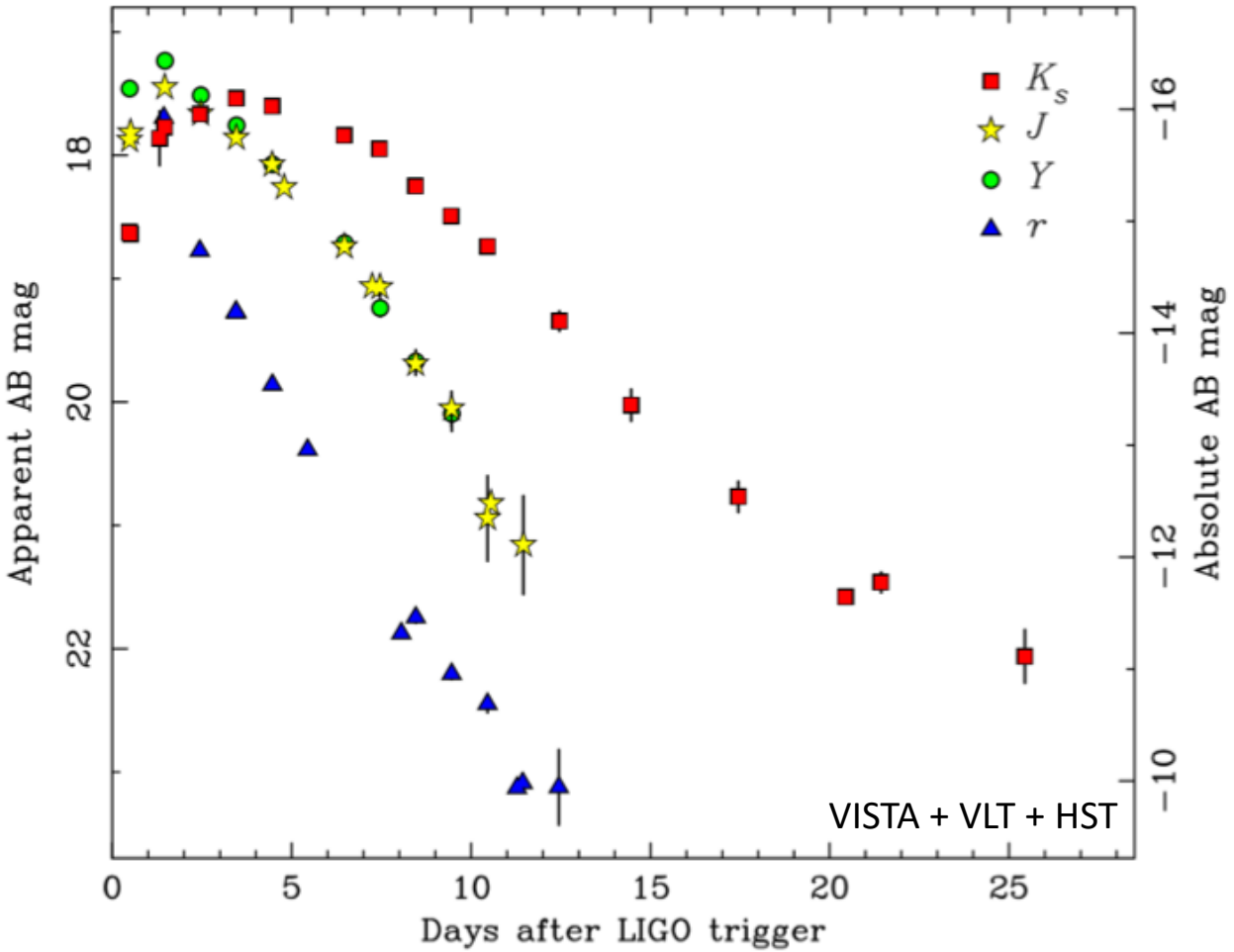
GW170817

Good reasons to expect diversity in emission observed.



Metzger 2017

GW170817



Expect 2–3 magnitudes fainter, perhaps sometimes with little optical emission

Tanvir et al. 2017

Points for the future

There could well be a wide variety of properties for EM counterparts to GW wave sources. We should keep an open mind, and make sure we remain able to conduct searches in a range of wavelengths and depths.

Near-IR observations will be vital for follow-up, and could well be vital for the discovery.

Value of galaxy targeting versus tiling of error box?

Rates are still highly uncertain, but if they are moderately high (>few per year) there may rapidly be a decrease in the intensity of follow-up (especially from telescopes with visiting observers).

Will there be a need to ”choose” events for further follow-up (with associated risks of missing something)?

Follow-up of GW170817 was hard (for observers and observatories), but still a lot of time. We need this level of cadence and wavelength coverage.

Can we avoid duplications? Do we want to?

It was fortunate that GW170817 was associated with a GRB (extra ~35+ hours of VLT available)