The Best Case Scenario:
Towards Prompt Arcminute Localization of a GW source
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Want
Observational access to early-time post merger environment!

Problem
GW localizations LARGE, wide-field tiling SLOW, optical DELAYED

Solution (?)
Use the earliest emission (gamma-rays) to localize

But the GRB is
WEAK

Swift/BAT is the most sensitive GRB detector, but
Conventional cross-correlation coded aperture imaging is just not good enough:

Want a method to retain full intrinsic instrument sensitivity, while also achieving the arcminute localizations imaging provides…
Time to do some forward modelling!

Fernandez+Metzger (2017)

GW Treasure Map (Wyatt, Tohuvavohu+ 2020): treasuremap.space


I am GW190814, the best localized GW to date, at 20 deg^2 on the sky. I appear very well searched!
>4000 search exposures
>20 instruments spanning radio → gamma

Fernandez+Metzger (2017)

But look! The coverage was actually too slow to find the earliest emission! Even in this extremely well localized event…

But the GRB is WEAK and sky coverage INCOMPLETE

BAT coded Field-of-View only covers 1/6 sky, but sometimes we get lucky:
LVC S200114f

We can ‘get lucky’ more often by exploiting the structure of the GW network antenna pattern, and biasing the Swift schedule to follow it:

Come find me! Let’s talk about operating space telescopes, building space telescopes, and (not) breaking space telescopes to achieve the Best Case Scenario!
Also, data analysis.