OzGrav
ARC CENTRE OF EXCELLENCE FOR GRAVITATIONAL WAVE DISCOVERY

Multi-messenger transients with the ATCA

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Science

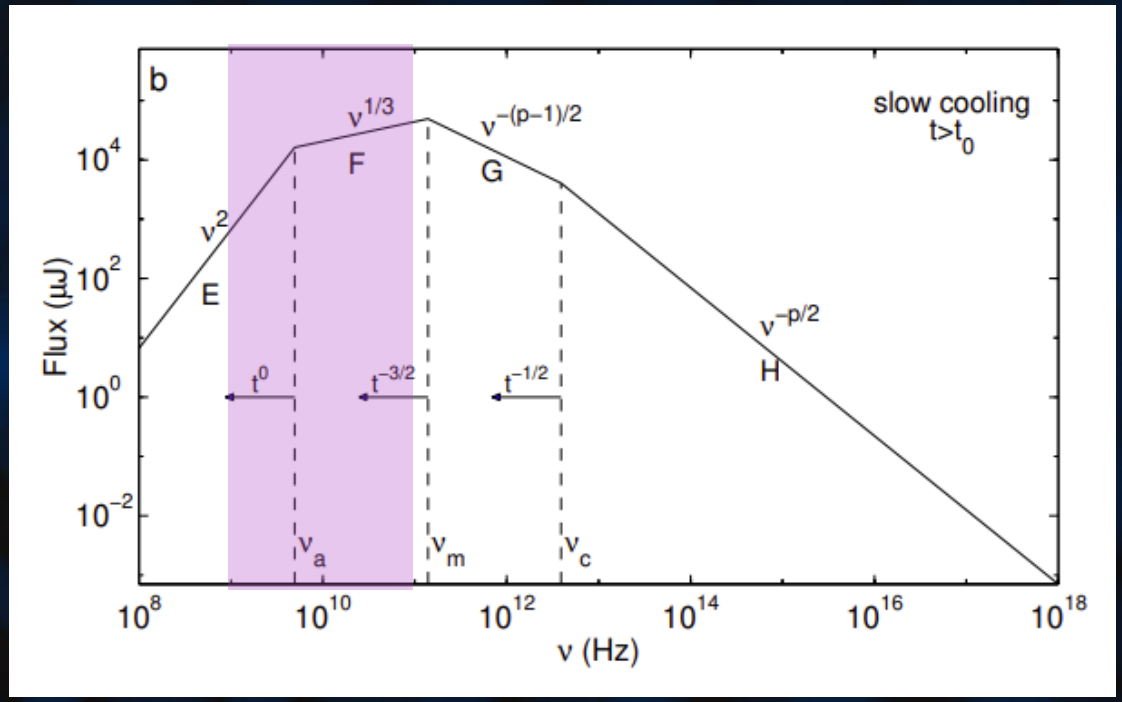
Physical properties of relativistic outflows

Radio is a unique probe:

- Lightcurve morphology
- Spectral evolution

Can measure:

- Total energy released
- Properties of surrounding medium
- Magnetic field properties
- Electron energy distribution



Impact and Demand

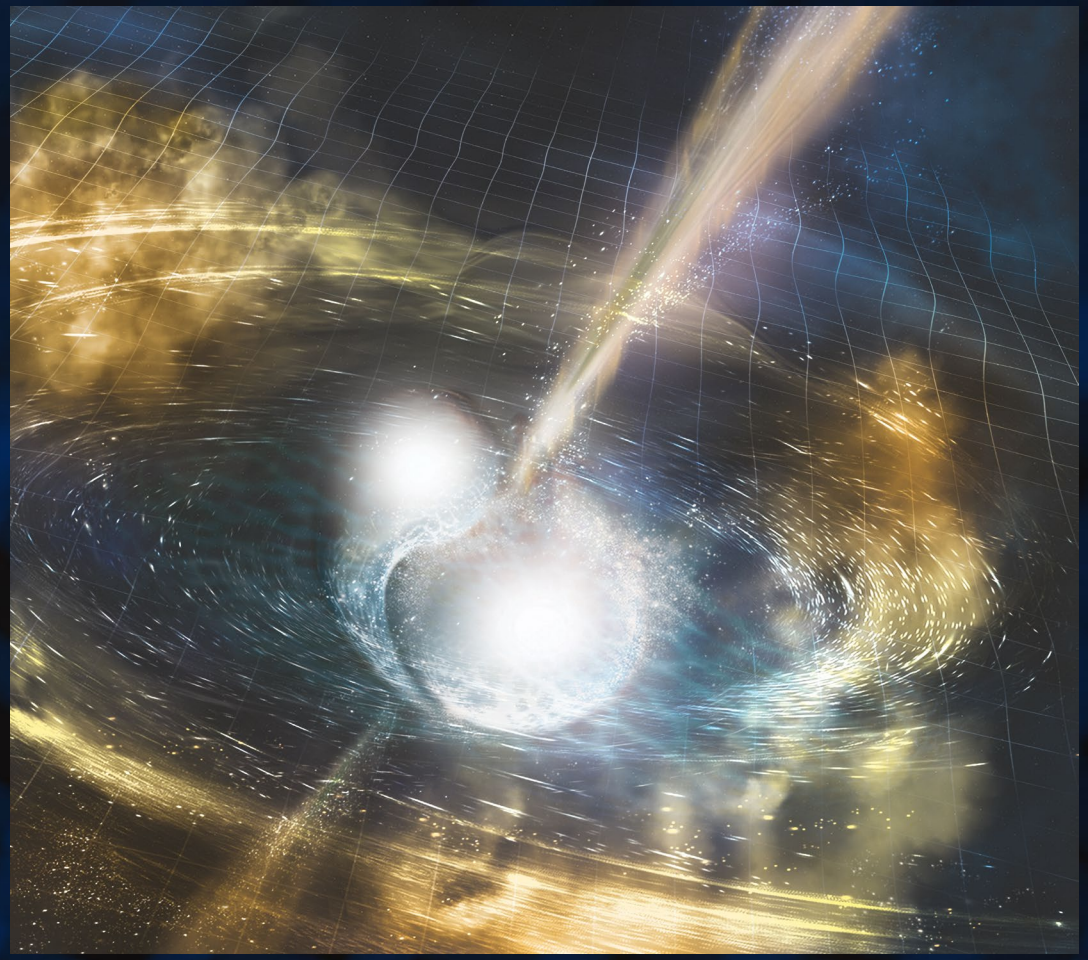
Gravitational Waves

GW170817

15 papers (2 *Nature*, 2 *Science*) reporting ATCA observations, >6800 citations

CSIRO media release reached audience of >4 million

5(?) programs for GW follow-up in 2024OCT

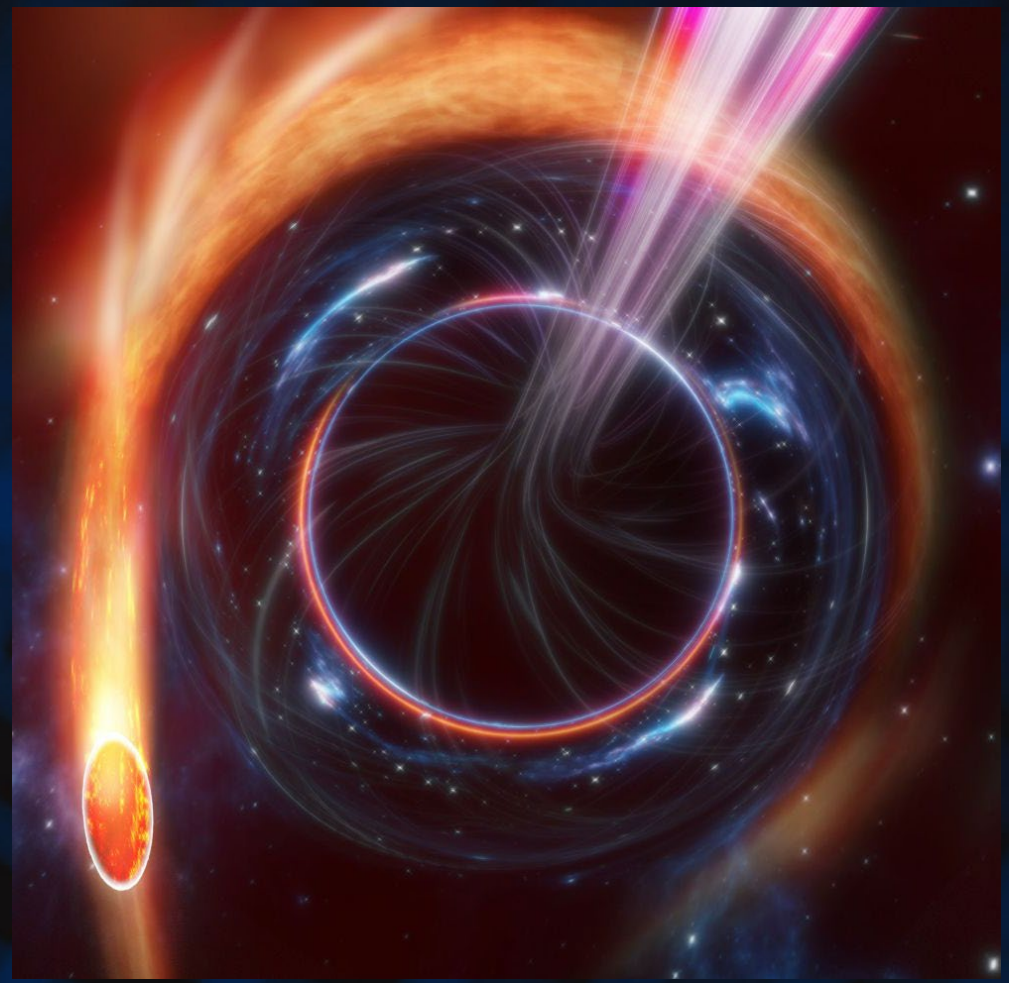


Relativistic Optical Transients

Key role in the first *Fast Blue Optical Transient* – AT2018cow
(2019-20 ATNF science highlight)

Relativistic TDE AT2022cmc (Andreoni+22, *Nature*)
(Coverage in CNN, Reuters, BBC and more)

5(?) approved NAPAs in 2024OCT



High Energy Extragalactic Transients

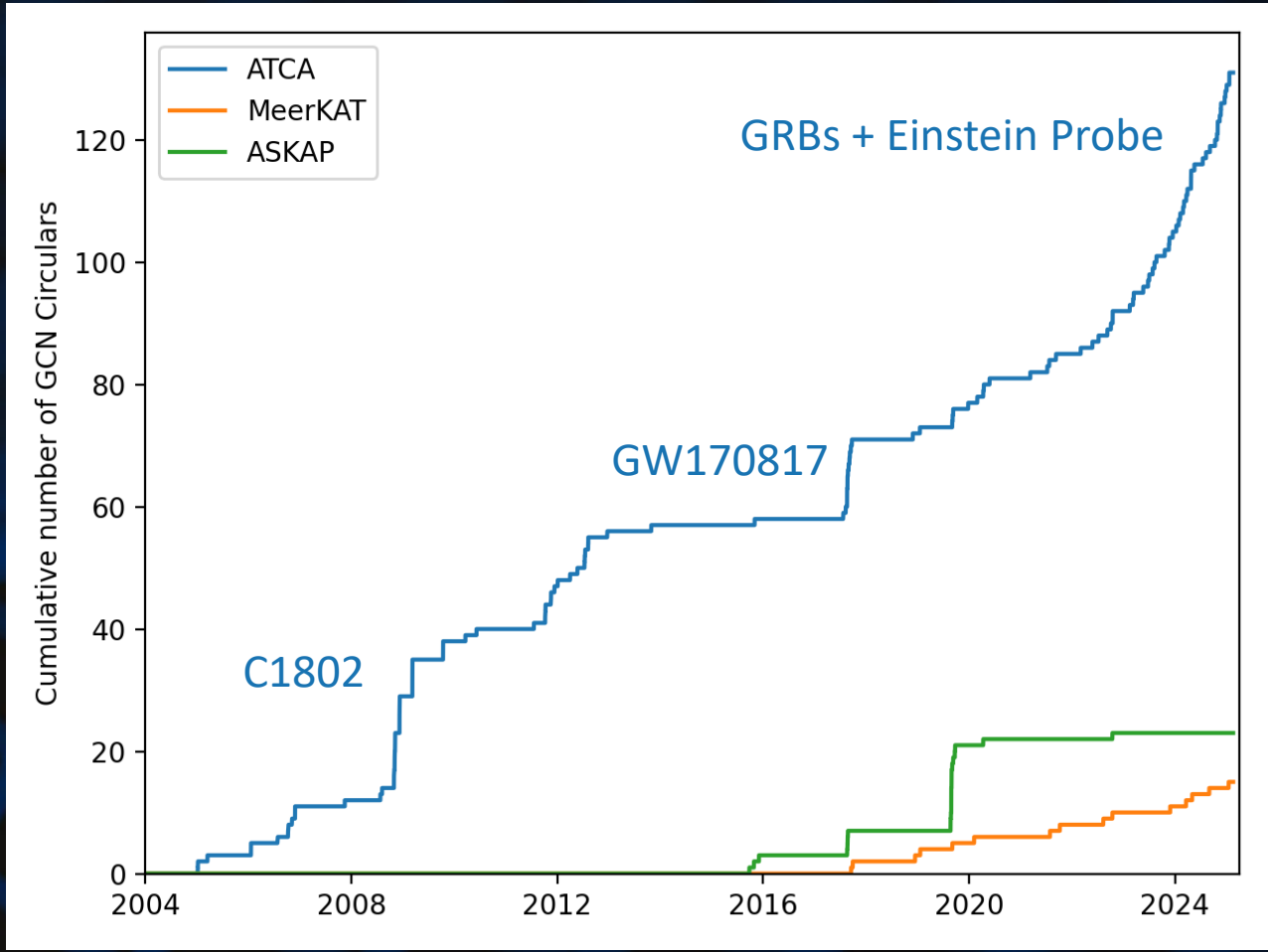
GRB221009A – The BOAT

- Several high-impact ATCA papers (incl. *Science)*
- Large global media response

2024OCT NAPA programs:

- Einstein Probe/X-rays: 6(?)
- GRBs: 9(?)

Quantifying Demand and Output



Future Needs

We’re finding more and more transients…

More high energy transients than ever…
Einstein Probe and SVOM (2024)

More optical transients than ever…
Rubin (2025) and *Roman* (2028)

More GW events than ever…
Einstein Telescope and Cosmic Explorer (2030s)

…and the ATCA fills a niche

Southern
- Complements SKA/Rubin/ESO
- Observe targets inaccessible to VLA

Frequency
- Fills gap between ALMA and the SKA

Flexible and available
- No other facility has sufficient time available

Quantifying ATCA follow-up