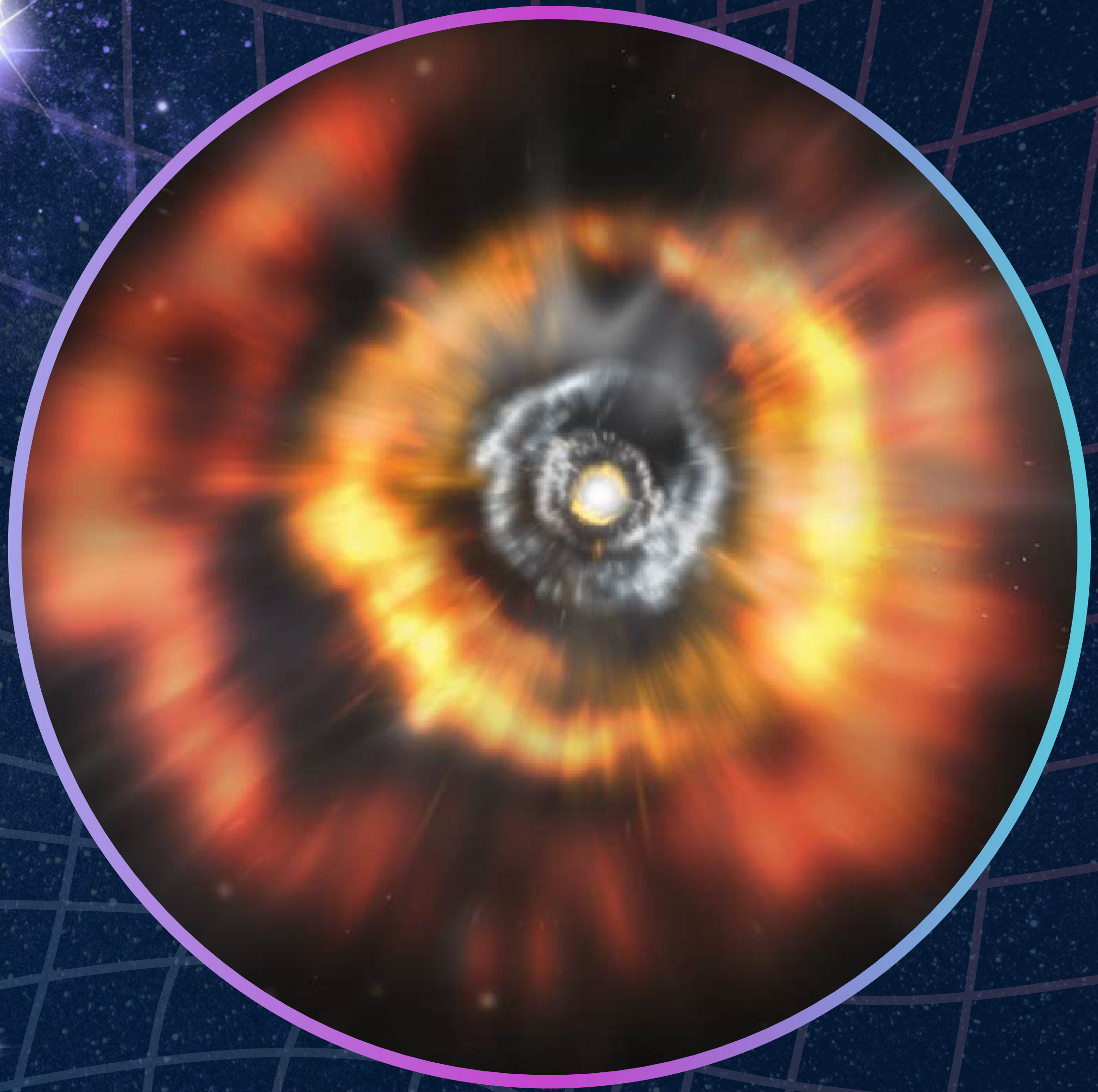
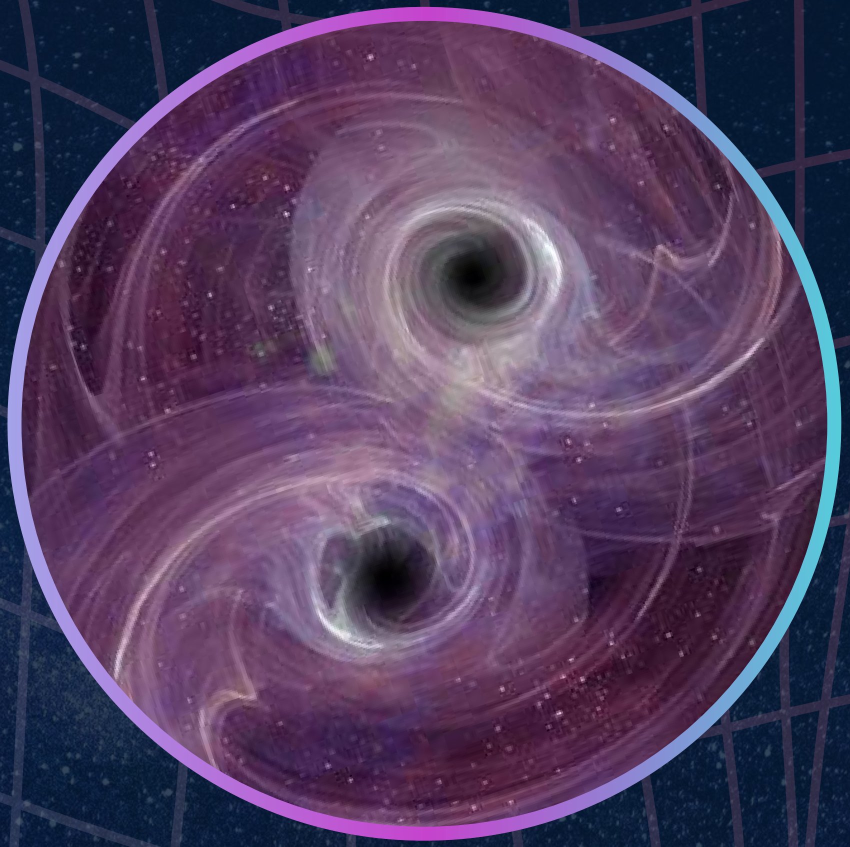


Characterising GW bursts with minimal assumptions

Yi Shuen (Christine) Lee
The University of Melbourne



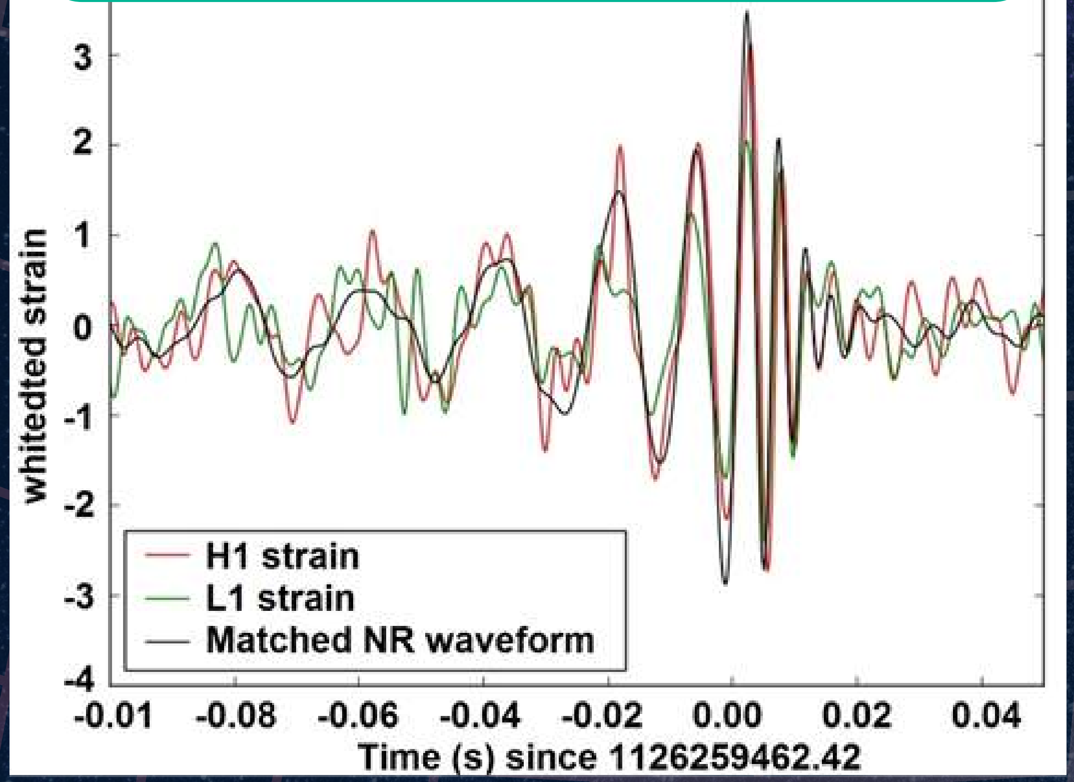
Well-modelled

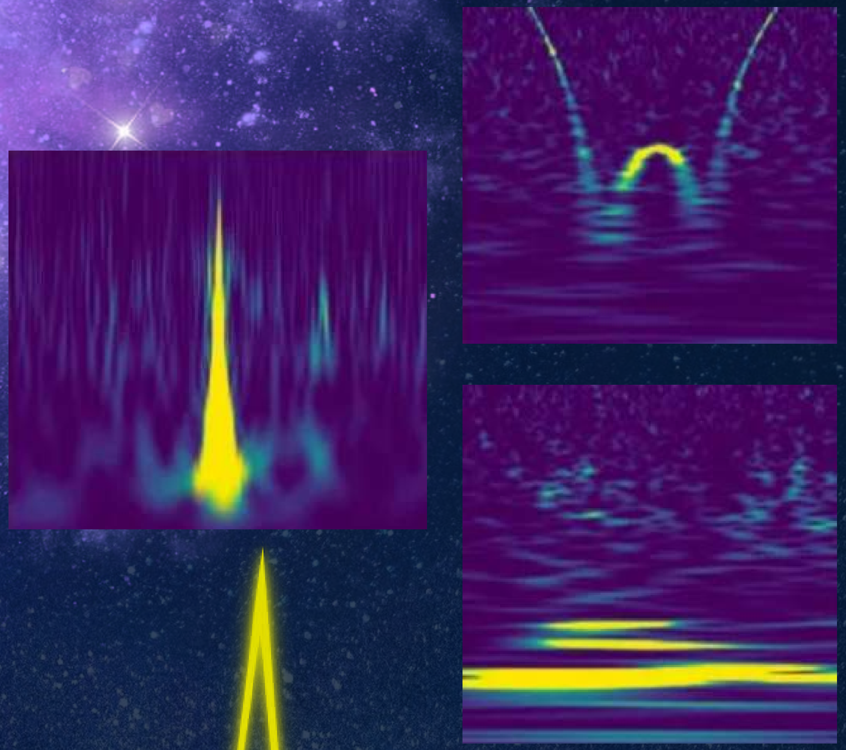
Compact binary coalescences

Poorly-modelled

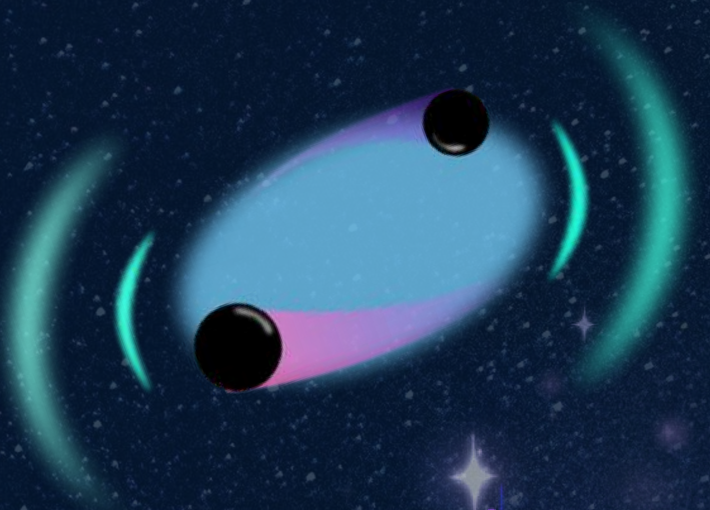
Core-collapse supernovae,
Gamma Ray Bursts

Matched filtering





BayesWave



- **Minimal assumptions**
  - Data reconstructions with generic frame functions
- **Bayesian inference**
  - Is it an instrumental glitch or a real GW burst?

Multi-detector networks

LIGO vs LIGO VIRGO

#1 Glitches against efficiency

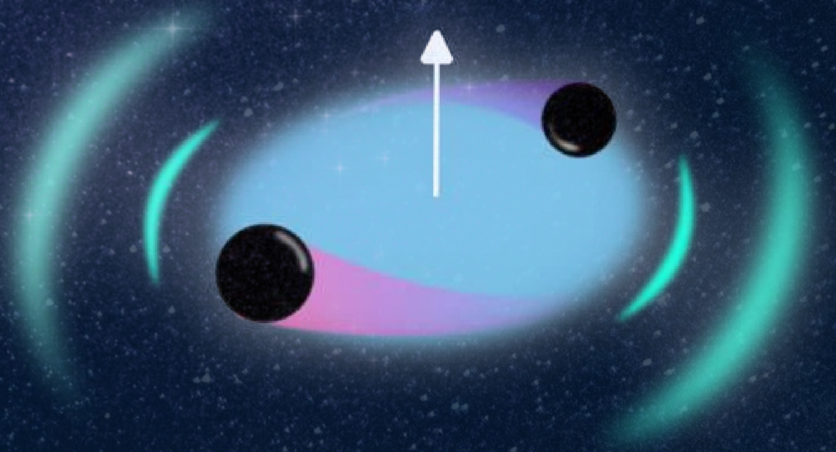
- More detectors = increased sensitivity
  - More astrophysical triggers
  - More glitches, i.e. false alarms (noise triggers)
- So….is adding more detectors better or worse?
- <u>KEY RESULT</u>
  - Adding Virgo does ***not*** improve burst detection efficiency <u>in O3</u>

Lee et al. (2024)

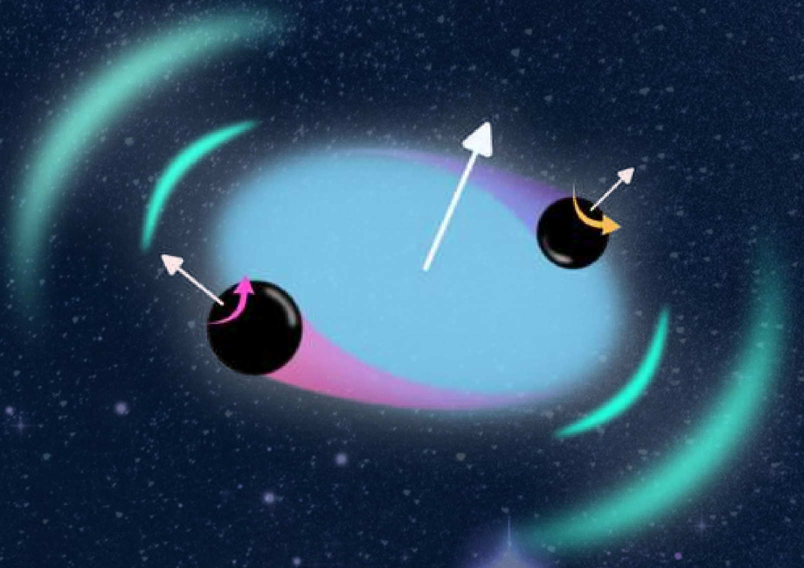
#2 Characterising burst polarisations

- Can we tell whether a burst signal polarisation is elliptical or not?
  - **Yes**, by comparing the Bayes factor between *BayesWave*’s elliptical and non-elliptical polarisation models
- Can *BayesWave* measure the polarisation content of the signal?
  - **Yes**, with Stokes parameters
- Both **improves** with more detectors!

NON-PRECESSING
(ELLIPTICALLY POLARISED)



PRECESSING



Lee et al. (2024, submitted)

#3 Constraining core-collapse supernovae models

in collaboration with **coherent WaveBurst (cWB)**

- What are we looking for?
  - Evidence of the standing accretion shock instability (SASI)
  - Low-frequency GW emissions, below ~250 Hz
- How?
  - Two-step analysis: cWB + *BayesWave*
  - Reanalysing the detected signal, but ignoring the data in high-frequency (i.e. above 250 Hz)
- Results coming soon!

Lee et al. (2024, in prep.)

Come chat with me!

- Bayesian inference
- Minimally-modelled GW burst characterisation
    - *BayesWave*
- GW polarisations and binary precession
- Core-collapse supernovae
- OUTREACH AND TEACHING (AND CATS!)

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