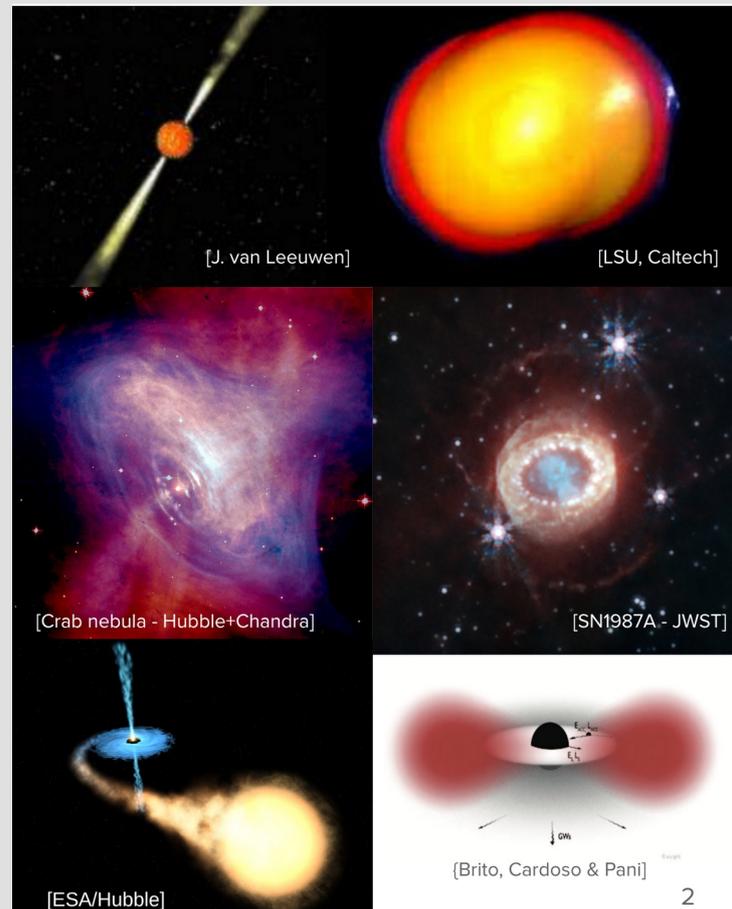# Zjazd CAMK 2026

Paweł Ciecieląg

GW Group @ CAMK

CW group science aims

Search for continuous (long-duration) GW signals;
fiducial source is an asymmetric rotating neutron star.

- **Targeted searches**: known frequency evolution, known sky location (e.g., pulsars with ''mountains'')

- **Directed searches**: known location (e.g., supernova remnants, Galactic Center, LMXBs), unknown frequency evolution, (some) unknown binary parameters, post-glitch (r-modes), post-merger…

- **All-sky searches**: unknown location and frequency evolution, binary parameters (model agnostic)

But also

- **''New physics''**: black hole boson clouds, inspirals of light primordial black holes, dark matter (including direct detection)

[J. van Leeuwen]   [LSU, Caltech]

[Crab nebula - Hubble+Chandra]   [SN1987A - JWST]

[Brito, Cardoso & Pani]

[ESA/Hubble]   2

TDFstat pipeline

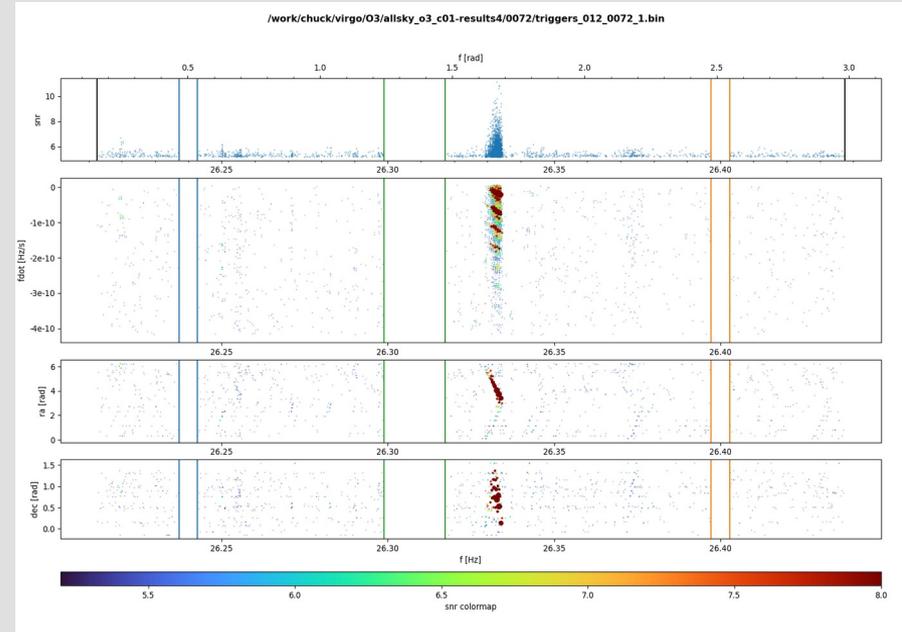How to detect continuous GW signal which is orders of magnitude weaker than the noise?

↓

Likelihood of matching model with the data

↓

F-statistic (Jaranowski, Królak, Schutz 1998)

↓

All-sky, blind search pipeline (f,f',α,δ):
https://github.com/Polgraw/TDFstat

TDFstat pipeline

TDFstat development

Drivers: LVK deadlines, various searches (spotlight/directed), group activities: ML analysis, GW lensing

Directions: optimization, semi-automatic analysis, new applications

- Input data generation
  - extract_band (HDF files with STS data)
  - genseg (rewritten from scratch)
- Search
  - HDF output
  - Fractional grid with ranges

- Scripting in Julia
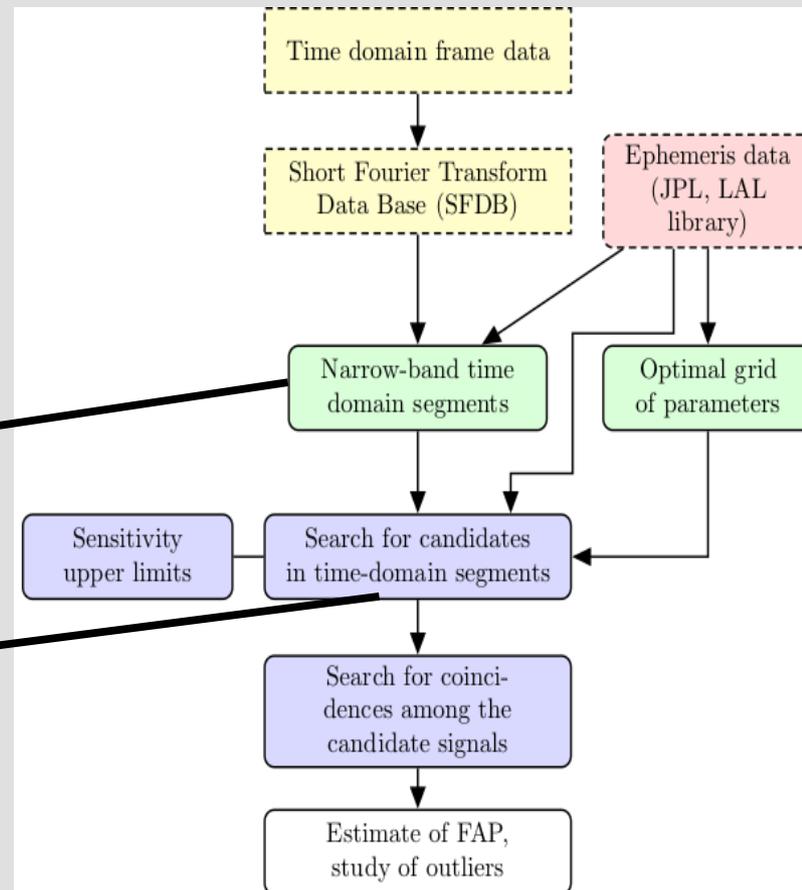
Virgo-PL: Computing

- IGWN Computing Tier-2 node at Cyfronet

  - 5 mln PLN for hardware + 1 FTE

  - >6000 CPU cores, >2 PB storage

  - Tier-2 site for offline processing, with full, local data cache

  - Part of IGWN computing network

  - Large contribution to the european resources in LVK

- **Support for Polgraw (archive, semi-automatic pipelines)**