Amsterdam, July 2023

Presented by: Hannah Middleton.
**GWLab team:** Patrick Clearwater, Lewis Lakerink, Asher Leslie, Andrew Melatos, Meg Millhouse, Greg Poole, Thomas Reichardt

Hannah Middleton <hannahm[at]star.sr.bham.ac.uk>, Institute for Gravitational Wave Astronomy, University of Birmingham
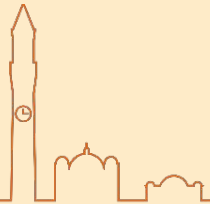
Overview

- Viterbi searches for continuous waves (a short reminder)

- The what and why of GWLab

- Continuous wave searches in GWLab

- Walkthrough

- Feedback very welcome!
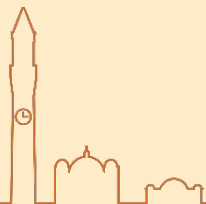
Viterbi searches for continuous waves

Viterbi is one of many search techniques.

Models for the continuous wave frequency to change slightly and randomly over time: *"wandering" frequency.*

Viterbi is able to efficiently track the wandering signal over time.

Viterbi 1967

Hannah Middleton <hannahm[at]star.sr.bham.ac.uk>, Institute for Gravitational Wave Astronomy, University of Birmingham
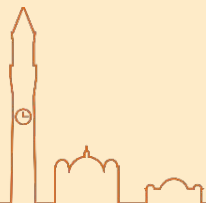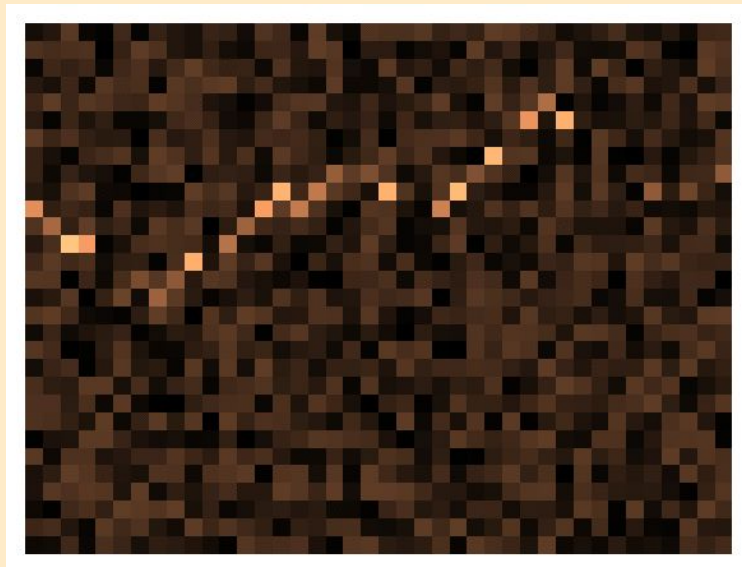
Viterbi searches for continuous waves

**Some Viterbi CW papers:**

LVK papers
- GW170817 post-merger remnant <1810.02581>
- O1 Scorpius X-1 search <1704.03719>
- O2 Scorpius X-1 search <1906.12040 >
- O3 Scorpius X-1 <2201.10104>
- O3 Young supernova remnants <2105.11641>
- O3 Accreting millisecond pulsars <2109.09255>

Short-author list papers:
- Suvorova+16,17 <1606.02412><1710.07092>
- Sun+17,19,18 <1710.00460><1810.03577><1903.03866>
- Bayley+19,20,22 <1903.12614><2007.08207><2209.02031>
- Melatos+20 <2107.12822>
- Millhouse+20 <2003.08588>
- HM+20 <2006.06907>
- Jones+20 <2007.08732>
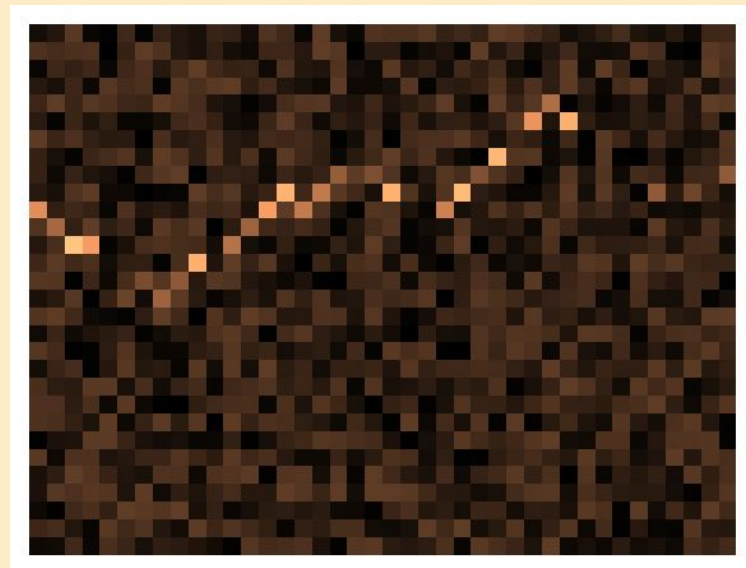
GWLab

- A virtual laboratory for GW science
- A modular system with the ability to pass results from module to module
- UX designed interface
- Jobs run on OzSTAR

GWLab is a project of the Astronomy Data And Computing Services (ADACS) Gravitational Wave Data Centre (GWDC).

GWLab Team

Project "shepherd": Andrew Melatos
Science team lead: Meg Millhouse
ADACS GWDC team: Patrick Clearwater, Lewis Lakerink, Asher Leslie, Greg Poole, Thomas Reichardt
Science team members & testers:
Deeksha Beniwal, Julian Carlin, HM, Lucy Strang, Karl Wette and more!

Why?

- Lower the barrier to entry for gravitational wave science

- Enable easy data provenance

- Enable easy results sharing
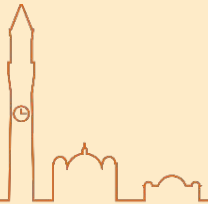
The Viterbi module

- The Viterbi search is the first CW search to be implemented in GWLab - starting with the familiar

- GWLab is designed so that it could be compatible with any CW search method
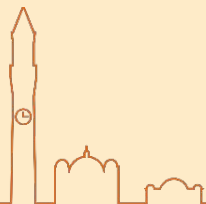
Logging into GWLab

gwlab.org.au

LVK credentials can be used to login to GWLab

or you can make a GWLab account here

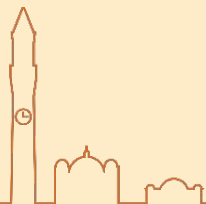# A Viterbi search with GWLab

gwlab.org.au

Next steps

gwlab.org.au

- More modules:
  - **GWCandidate:** for storing and sharing CW search candidates
  - **CWFollowUp:** for following up candidates, e.g. vetoes

Thank you!

gwlab.org.au

Let us know what
you think!
Any & all feedback welcome