

# Oral Progress Report

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**WESTERN**  
**AUSTRALIA**

# Structure for this report

Background

Problem Description

Planned method

Progress

# Gravitational waves

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- ▶ Shown to exist in 1974 using a binary pair of neutron stars
- ▶ Detectors built throughout 2000s failed to reach the required sensitivity
- ▶ Increased sensitivity from rebuilds in the 2010s brought first direct detection
- ▶ New detectors still being brought online!
  - ▶ KAGRA
  - ▶ LIGO India

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- ▶ Summed Parallel Infinite Impulse Response (SPIIR) pipeline

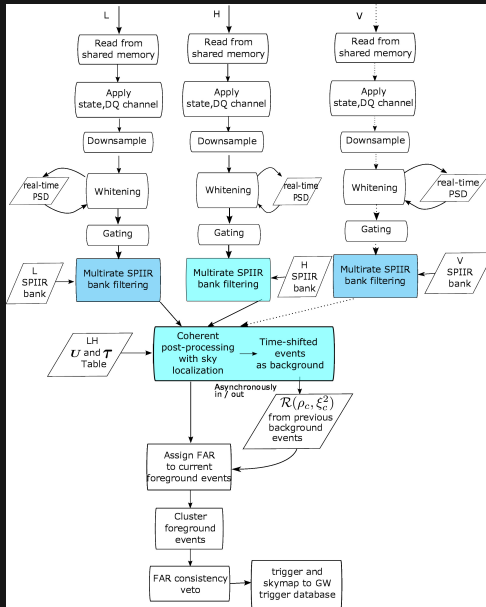
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- ▶ Can be used to approximate the shapes of potential gravitational waves
- ▶ Later development introduced GPU acceleration
- ▶ Detection and localization using frequentist coherent search added as post-processing step

# The SPIIR Pipeline



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- ▶ All detectors must be used for all parts of post-processing



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- ▶ Separation of detection and localization

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- ▶ Refactor the pipeline
- ▶ Measure performance differences

- ▶ Still in analysis phase

# Progress

- ▶ Still in analysis phase
- ▶ Developed tools to assist with analysis
- ▶ Can be useful for other people wishing to analyse similar codebases

# Progress

```
tommoa:~/Documents/research# [master] python3 -m utils --help
usage: utils [-h] {combine,co,iir,dot,pipeline} ...
```

Utilities to help with Tom Almeida's GENG5551 research.

optional arguments:

-h, --help show this help message and exit

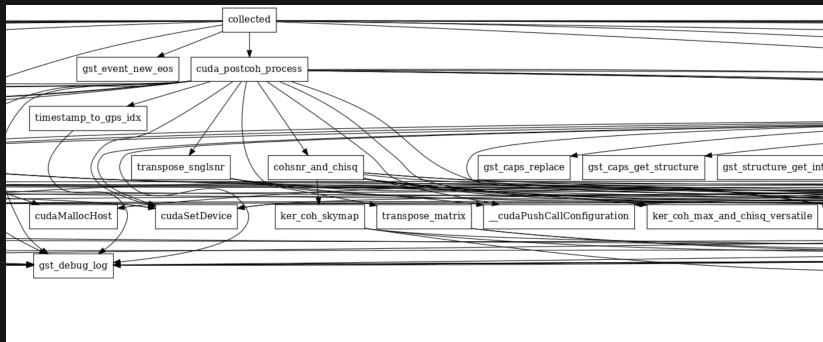
subcommands:

{combine,co,iir,dot,pipeline}

subcommand help

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```

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  - ▶  $O(P + C \log C + A)$
  - ▶ Best case could be optimized!
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  - ▶  $O(P(A \log A + H(A \log A + DA \log DA)))$

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- ▶ There are some constant term optimizations to be made!



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- ▶ Start on refactoring mid-July

Thank you!

Questions?