

# Preliminary neutron star sensitivity studies

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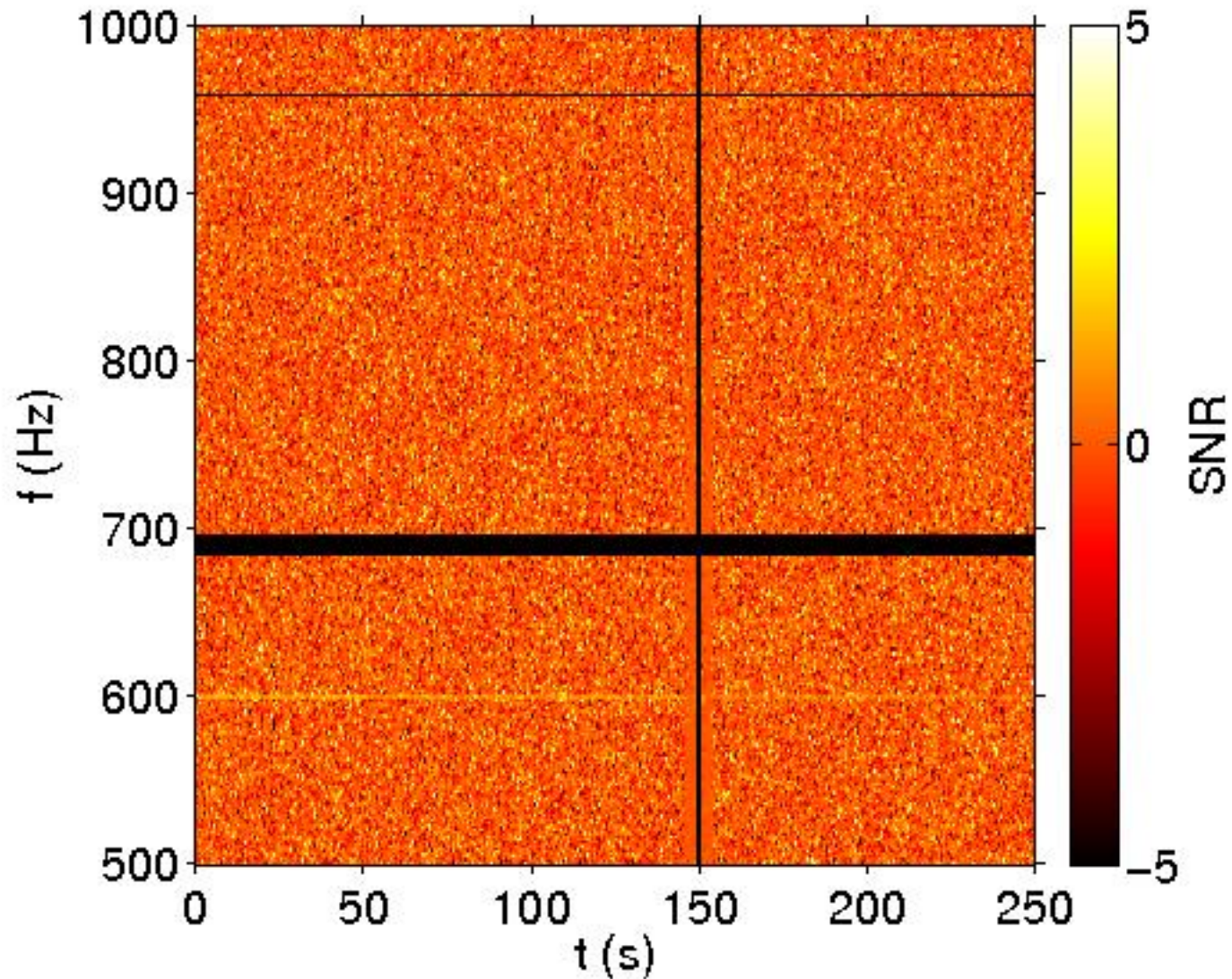
# Signal model

- We are looking at long-duration bursts from newly-born magnetars following binary neutron star inspirals?
  - We are using a model from <http://arxiv.org/abs/1408.0013>
  - From James: In short, if a \*stable\* post-merger neutron star is formed, and the magnetic field is sufficiently amplified/oriented, there will be GW emission starting (and chirping down) from kHz frequencies lasting for 100s of seconds, beginning 10s of minutes after the merger. The aLIGO (optimal) horizon may be as large as 75 Mpc. As with the immediate, short post-merger burst, i think we'd be lucky to see much in O1 but, again, if we see an inspiral, it'd be good to say \*something\* about the aftermath!

# Signal model (continued)

- The paper considers waveforms which can last on the order of weeks to months
  - We are being slightly less ambitious and starting with 250s waveforms
  - Relatively constant in frequency at 600Hz, 750Hz, 900Hz

# Example injection



# Mock data challenge

- James is developing code that can be used to form a mock data challenge containing these signals
  - Still working out some timing bugs, but mostly seems to be working
  - Injects signals at matched filter SNRs of 20, and we scale from there
- Scott (for X-pipeline) and I (for STAMP) are adding code to deal with MDC frames

# Mock data challenge (continued)

- Ryan chose a relatively quiet week during S6 to perform the tests
- Perform time-slides (currently about 100) and injections (5 MDC sets of 21 injections each) to determine sensitivity distances

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# Preliminary Results

- Using a background threshold corresponding to about 1/10000 maps
- We determine 50% FAP sensitivity distances (SNRs) of
  - Mag-a (600 Hz): 33
  - Mag-b (900 Hz): 33
- Seems reasonable given waveform duration and expected sensitivity loss due to clusteringg



# Conclusion

- We have the infrastructure in place to successfully inject and recover MDC signals
- We have preliminary sensitivity to our toy waveform models
- Need to work out timing bug (if it exists)
- Look at increasing the number of toy model waveforms