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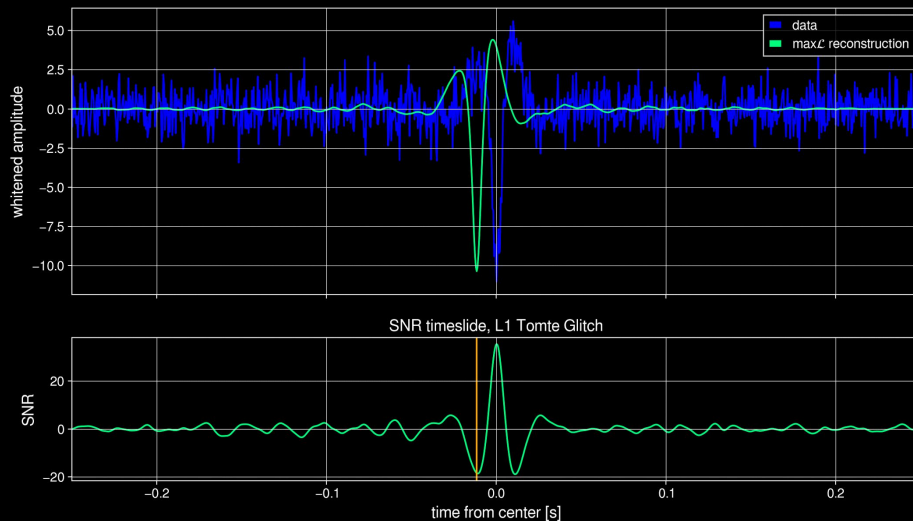
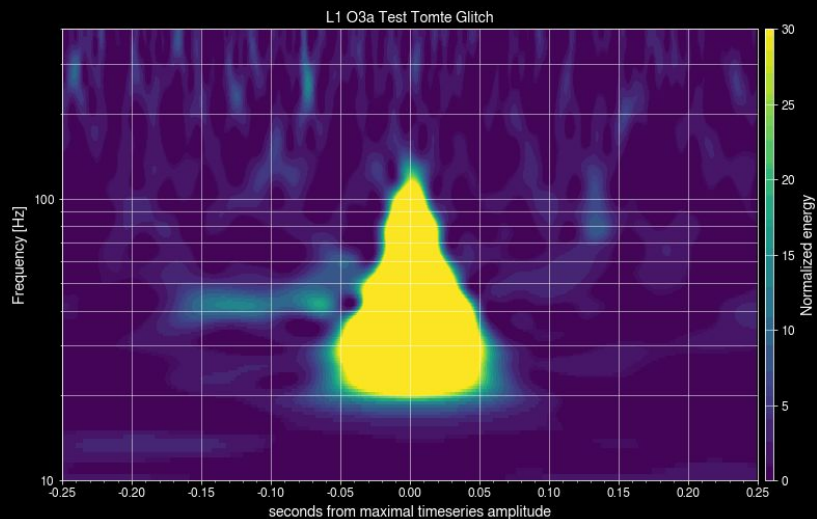
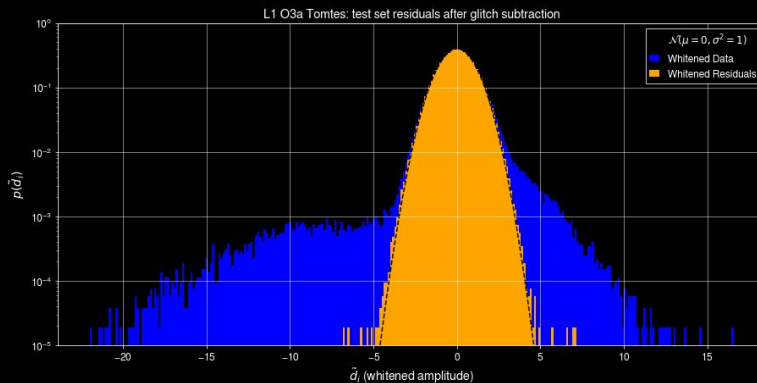
Jim Brau

Ray Frey

Robert Schofield

glitschen

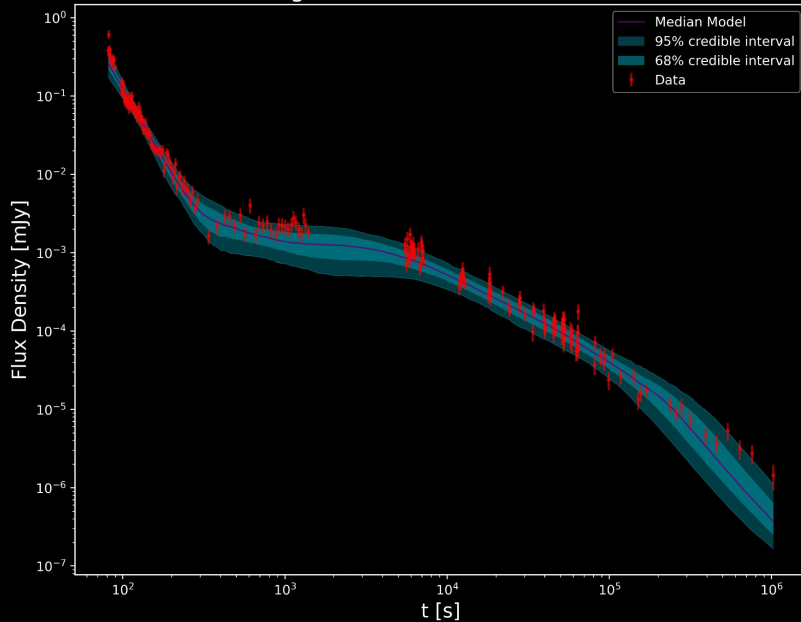
-A data-driven model for transient glitch mitigation.



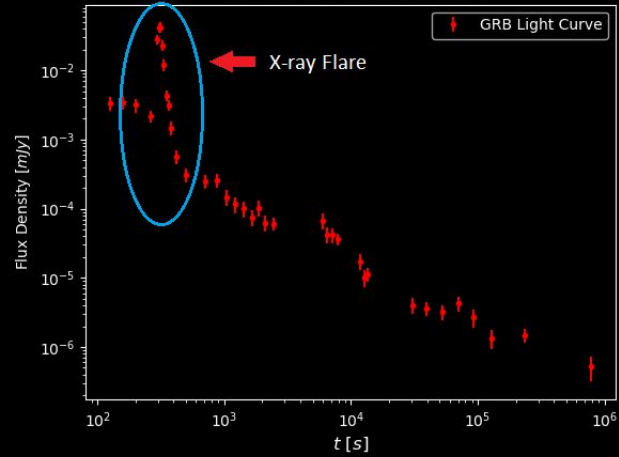
GRB Afterglows

GRB afterglow modeling with hybridized spline/hydro simulations.

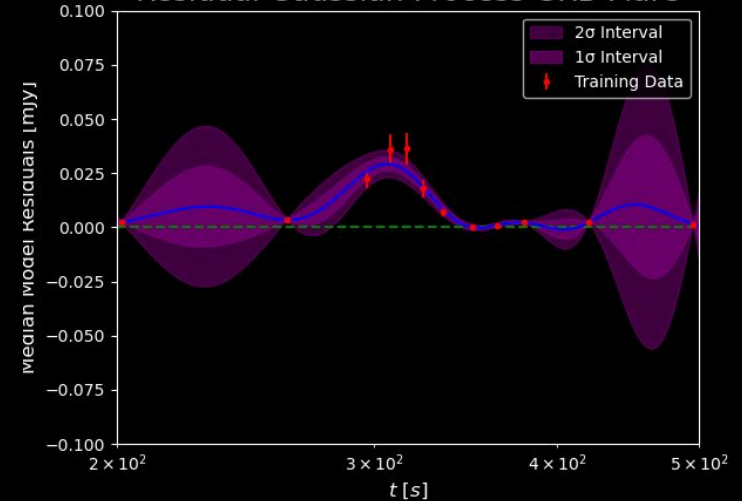
Light Curve for GRB111008A



GRB0050607 with x-ray Flare



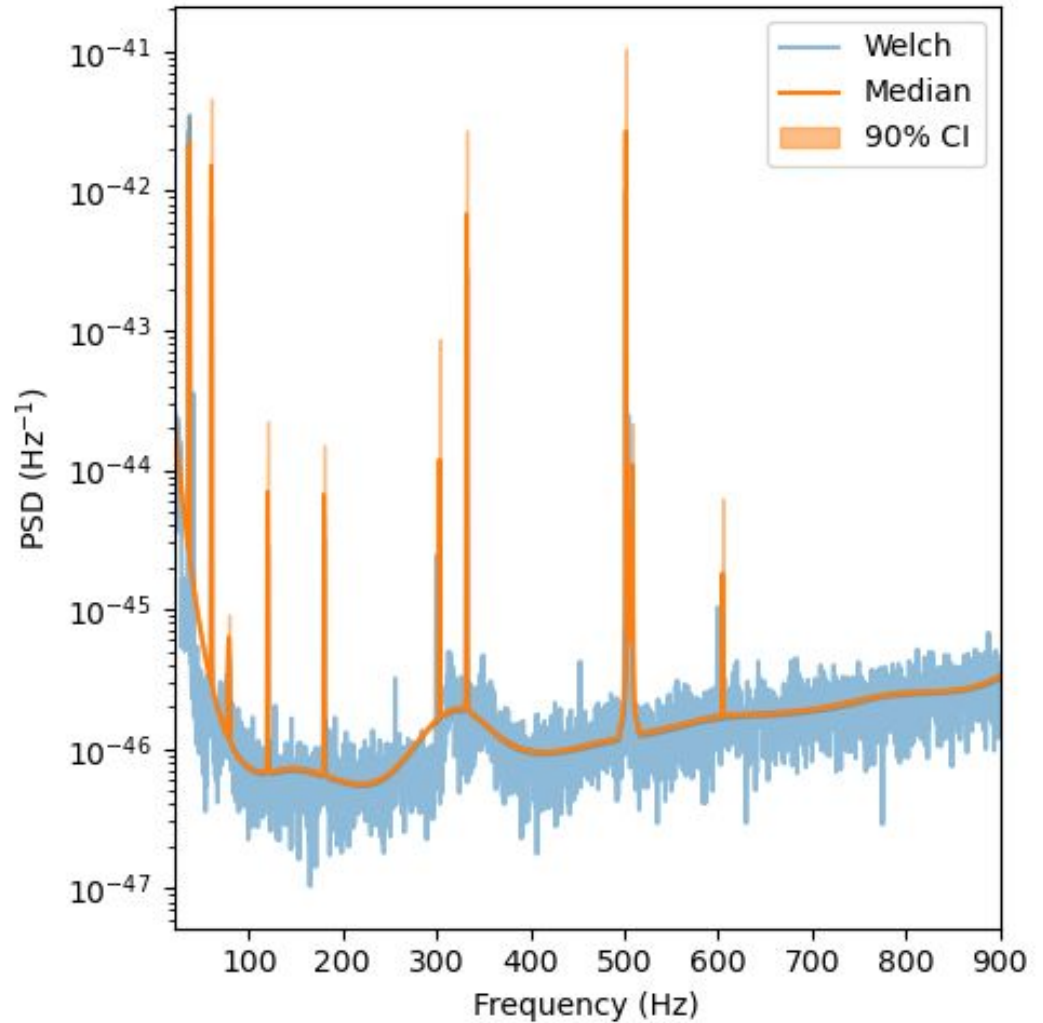
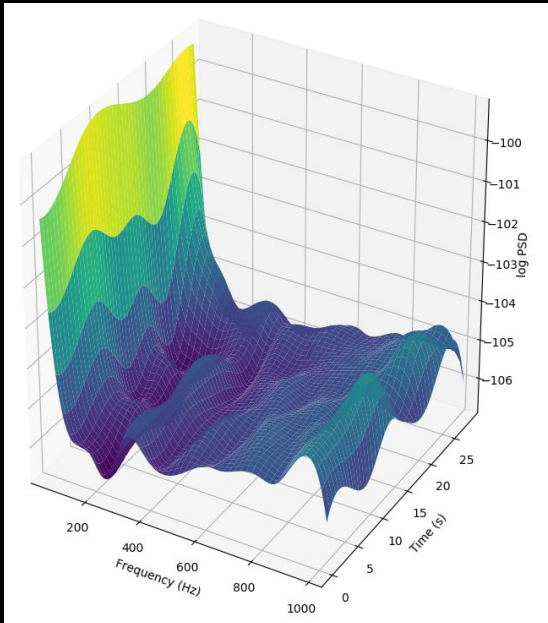
Residual Gaussian Process GRB Flare



Parametric PSDs

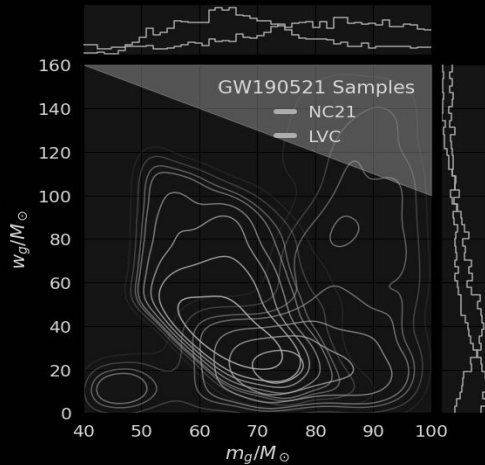
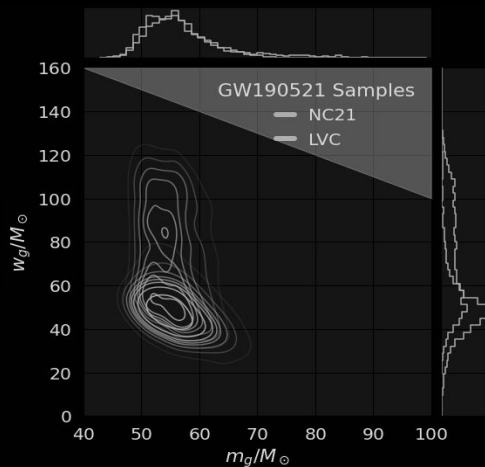
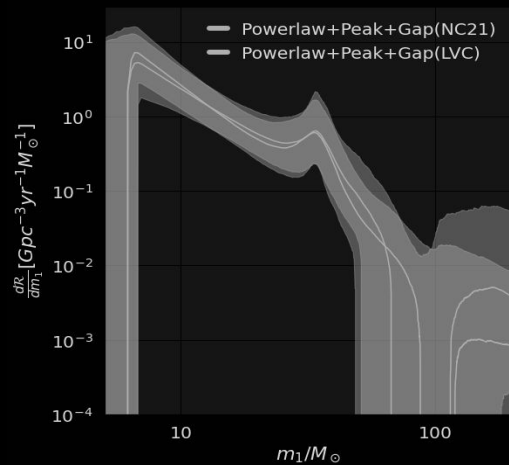
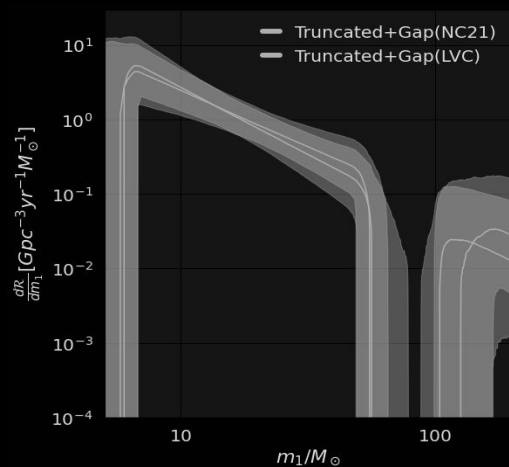
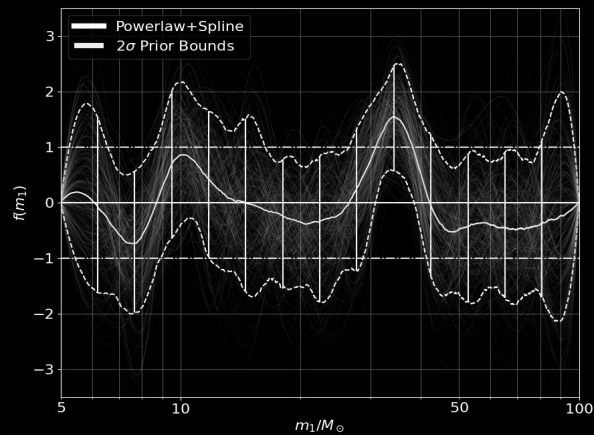
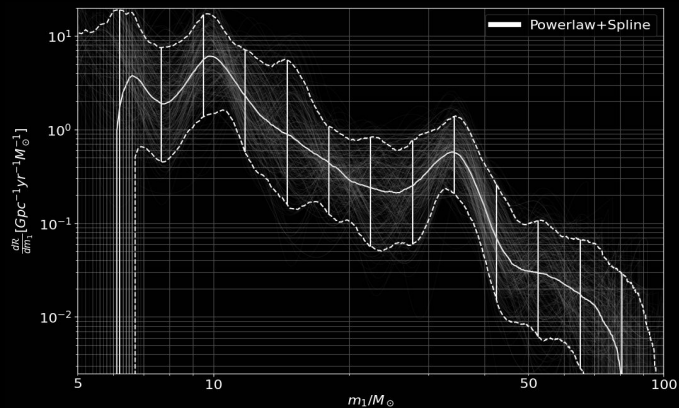
Dynamic modeling of strain PSD.

Model: Cubic spline + Lorentzians.



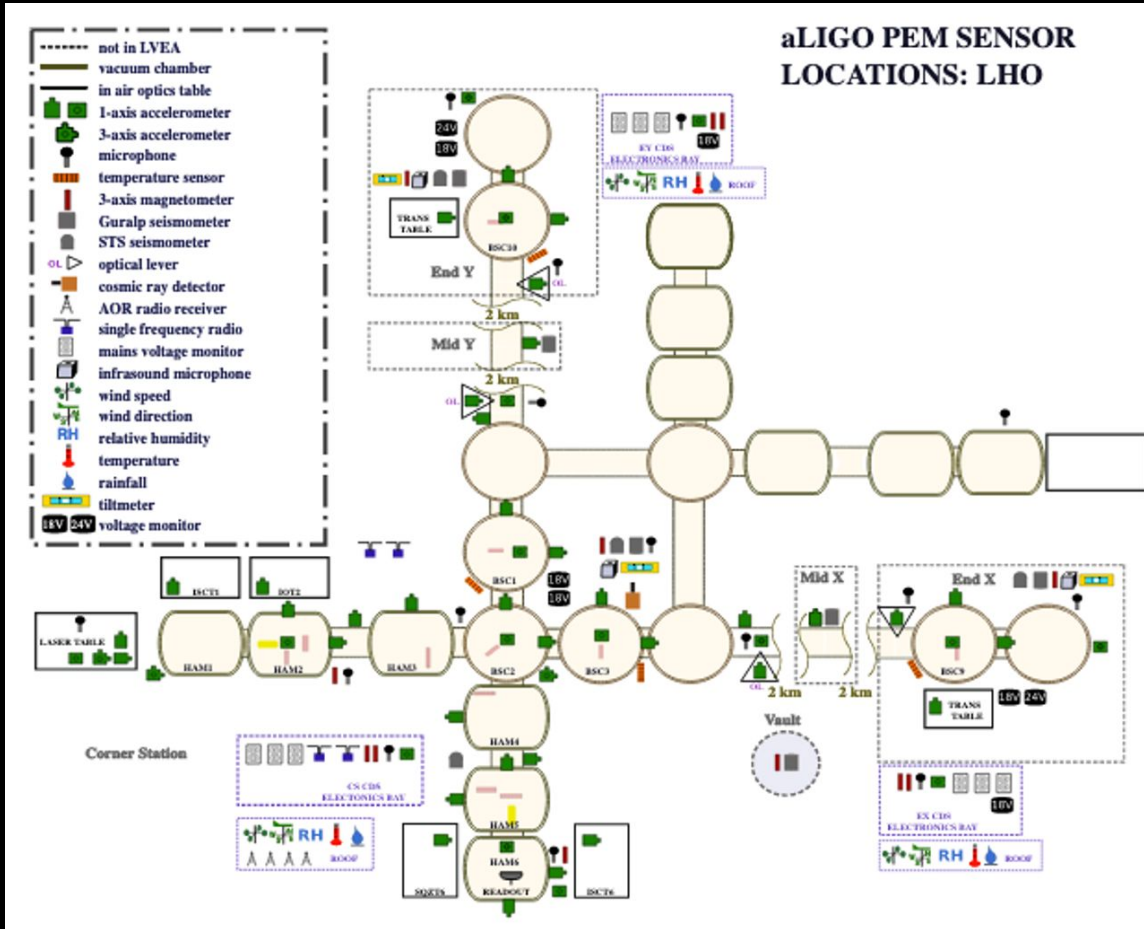
Spline & Gap Populations

Non-parametric Perturbation to a Powerlaw Mass Spectrum with Cubic Splines



2-parameter PISN Mass Gap BBH Population Model
B. Edelman *et al* 2021 *ApJL* 913 L23

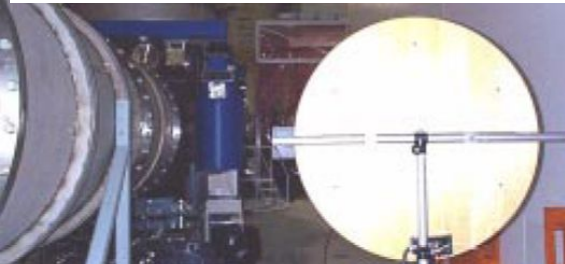
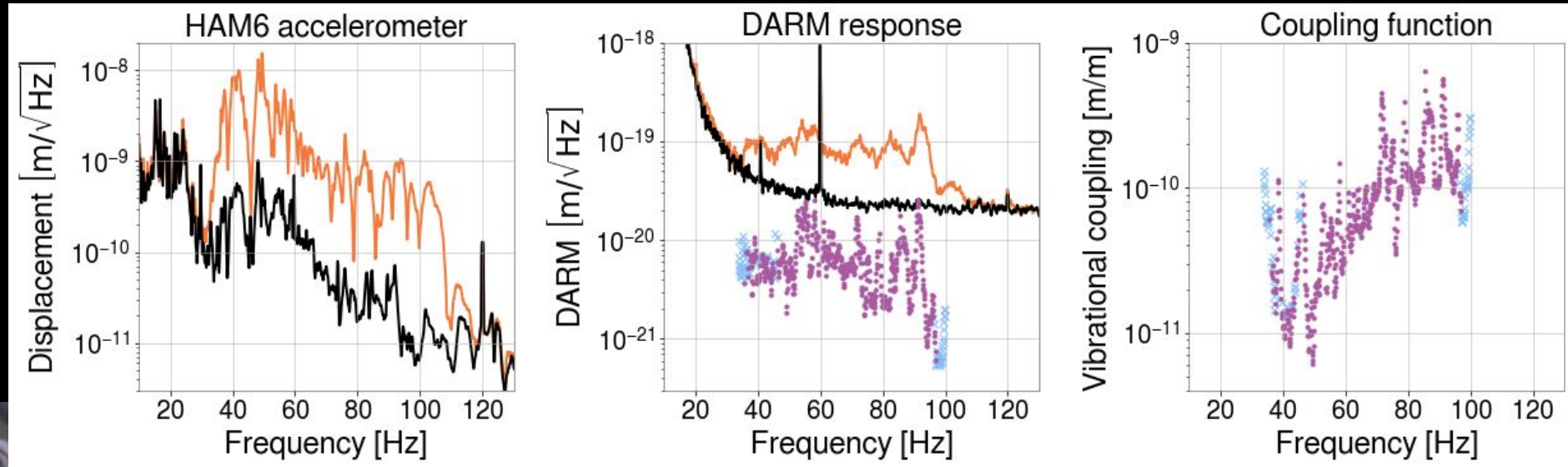
Environmental noise measurement in aLIGO



UO responsible for development and maintenance of instrumentation (PEM) required to measure the non-GW environment (Schofield, students)

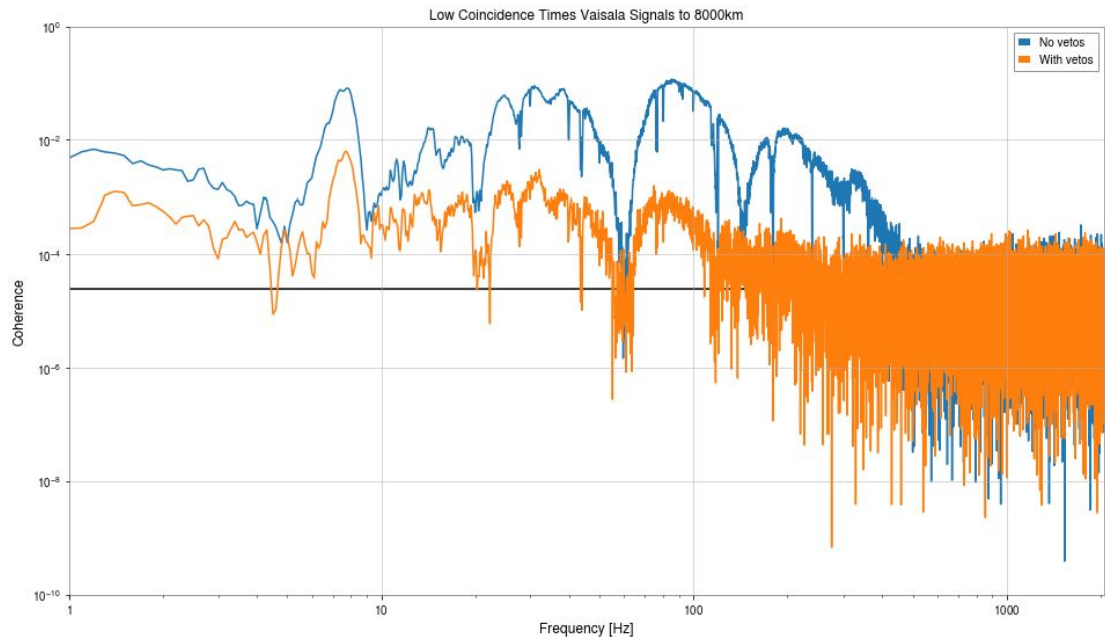
Measuring the GW background and GW candidate vetting

Environmental injections to determine ambient coupling (contamination) of environment to GW signals (Schofield, Nguyen, Ball, Helmling-Cornell, Merfeld, Frey)



Finding of high-frequency LHO-LLO magnetic coherence

Most environmental noise is uncorrelated between sites. But global geophysical magnetism can be coherent. At low-frequency (< 50 Hz): Schumann resonances. We now see high frequency magnetic coherence between LIGO (and Virgo) sites, which we show is due to lightning. This can be a difficult-to-reduce background for stochastic GW searches. (Ball, Schofield, Frey)

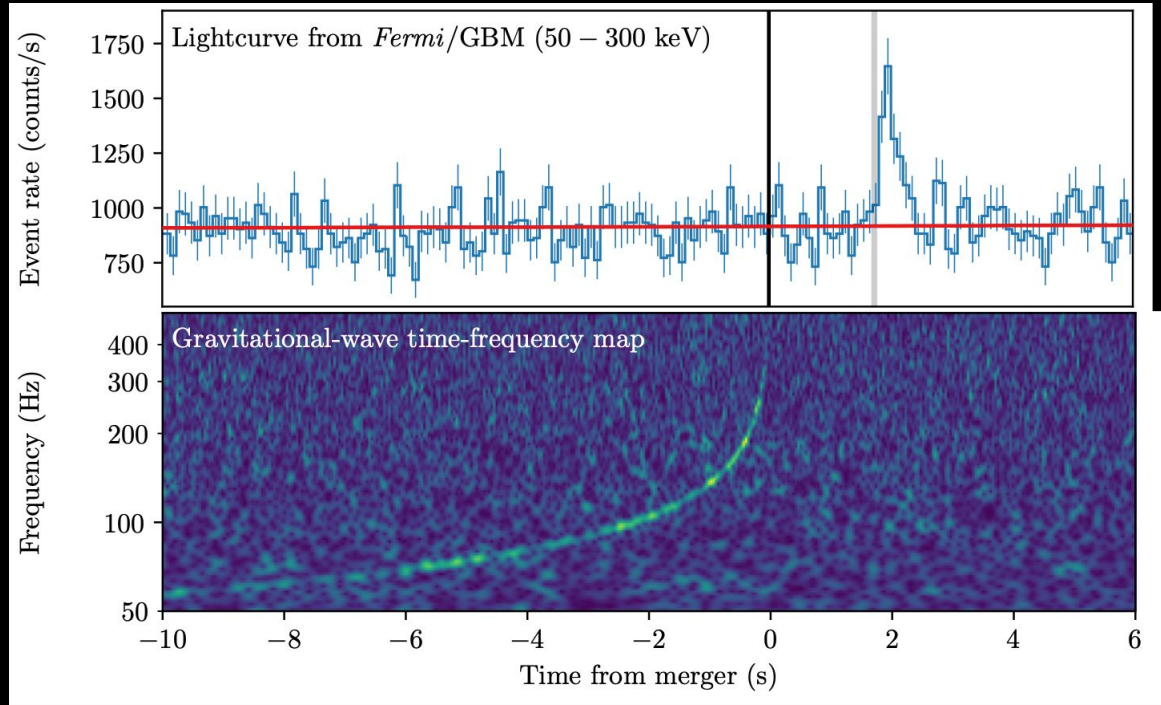


LLO-LHO coherence measured by on-site LEMI magnetometers as a fn of frequency (blue). After vetoing of (much of) the time with lightning signals (orange).

GWs associated with GRBs

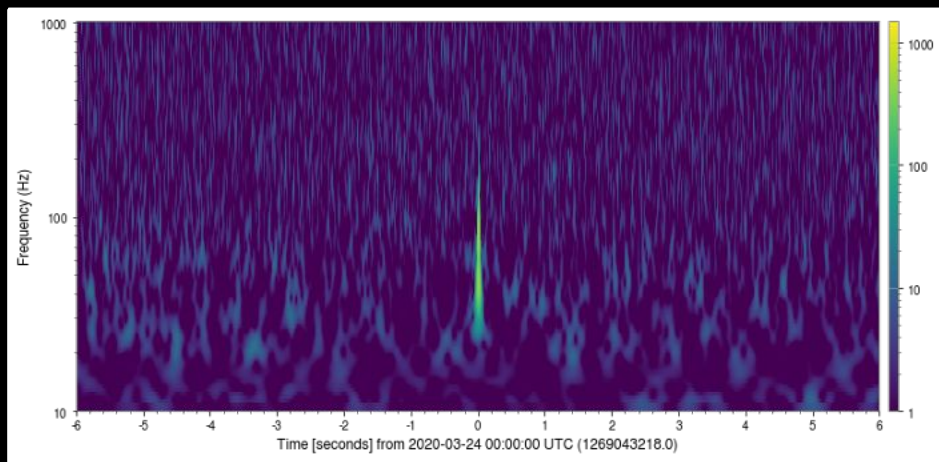
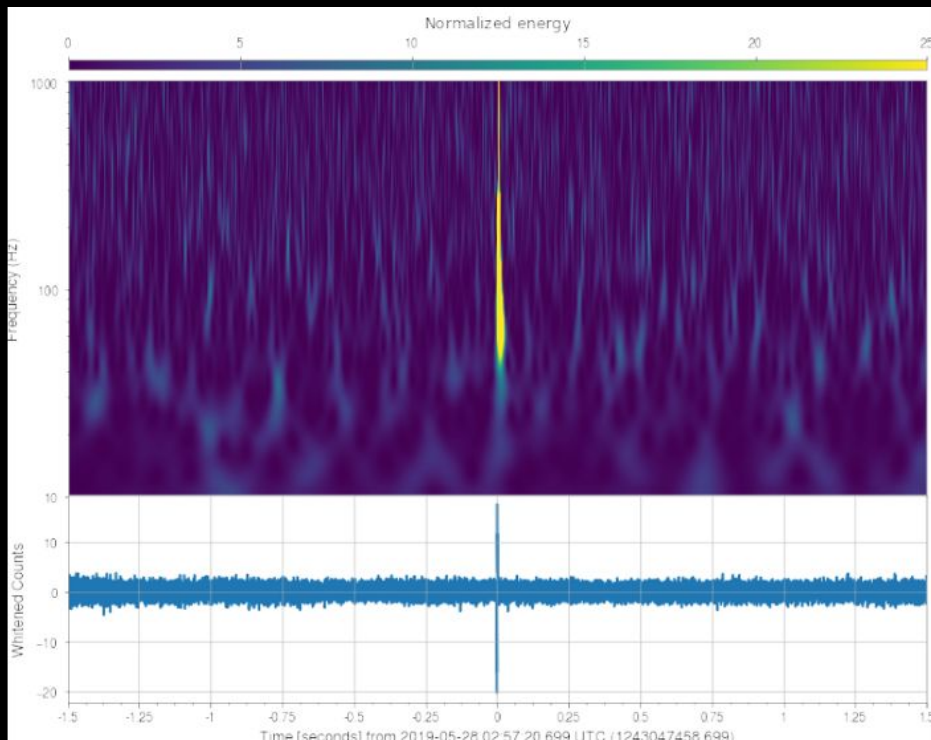
GW170817 + GRB 170817A was a watershed BNS merger + GRB detection.

We have continued to look for these types of events in O3. (Nguyen - O3a and O3b paper writing teams)



Glitches and Cosmic Strings

One of these spectrograms is a blip glitch and one is a simulated GW signal from a cosmic string cusp. Which is which? Work to improve the O4 Burst search (Helmling-Cornell)



Magnetars and FRBs

- Fast Radio Bursts are a mysterious cosmic phenomenon. And magnetars are highly magnetized neutron stars which occasionally emit large x-ray bursts.
- The CHIME radio detector has found hundreds of FRBs (~100x increase)
- April 28, 2020: galactic FRB (first!) associated with known magnetar SGR 1935+2154
- In O3, searching for GWs associated with FRBs and galactic magnetars (Merfeld, co-chair of paper writing team)

