LIGO-G2301235

UO LIGO Group

Graduate Students

Matthew Ball
Lance Blagg*
Gino Carrillo
Genevieve Connolly*
Jaxen Godfrey
Adrian Helmling-Cornell
Benjamin Mannix
JD Merritt
Sangeet Paul

Undergraduate Students

Anna Boone
Joshua Iascau
Holden Jose
Owen Mitchem
Lexi Vives

Faculty

Jim Brau
Ben Farr
Ray Frey
Robert Schofield

Recent Grads Students

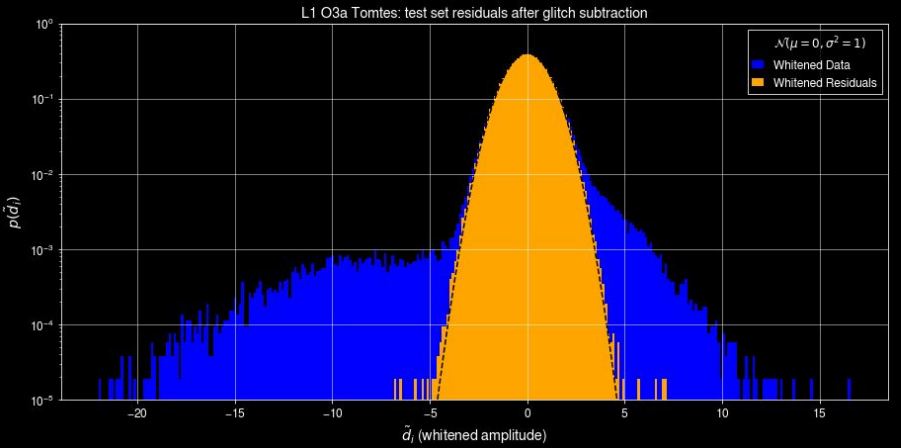
Dr. Bruce Edelman
Dr. Kara Merfeld

UNIVERSITY OF OREGON

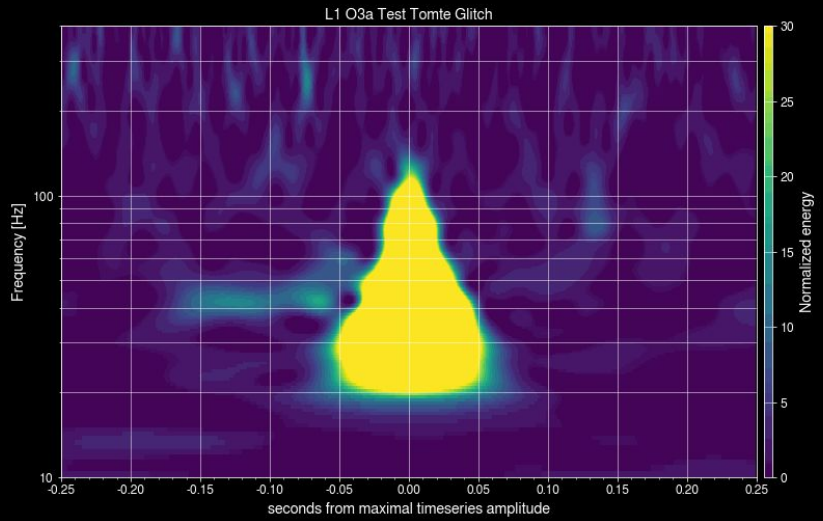
*LSC Fellows, LHO, Summer 2023

Glitschen

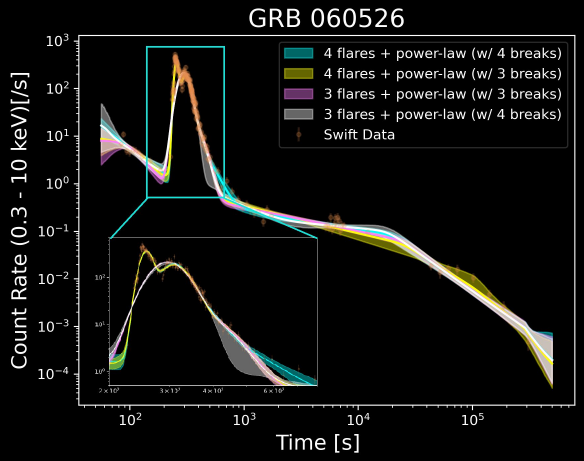
A data-driven model for transient glitch mitigation.

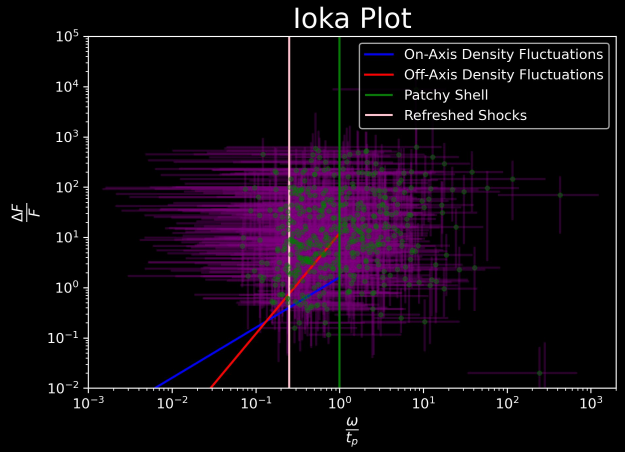


JD Merritt



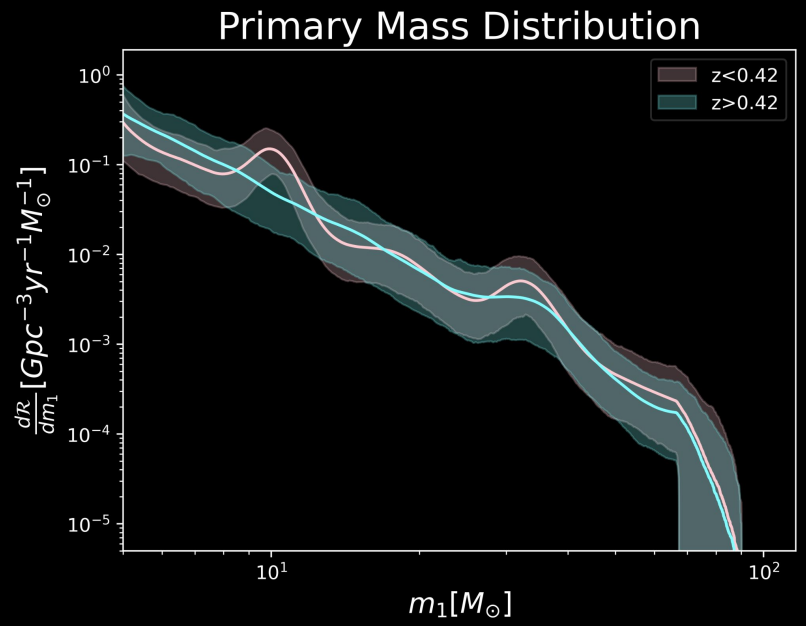
GRB Afterglows





Gino Carrillo

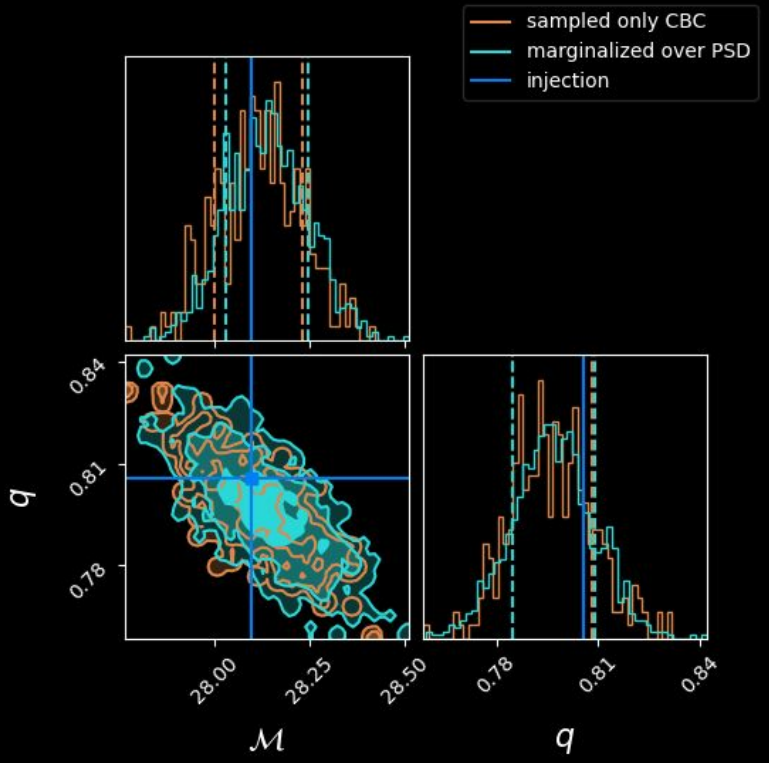
Search for Redshift Evolution of the Mass Spectrum

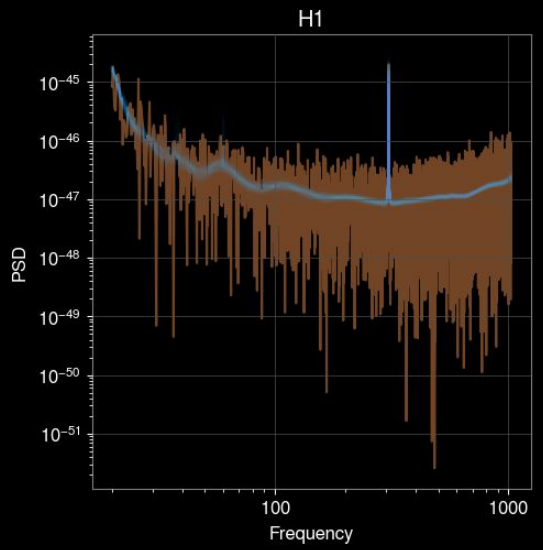


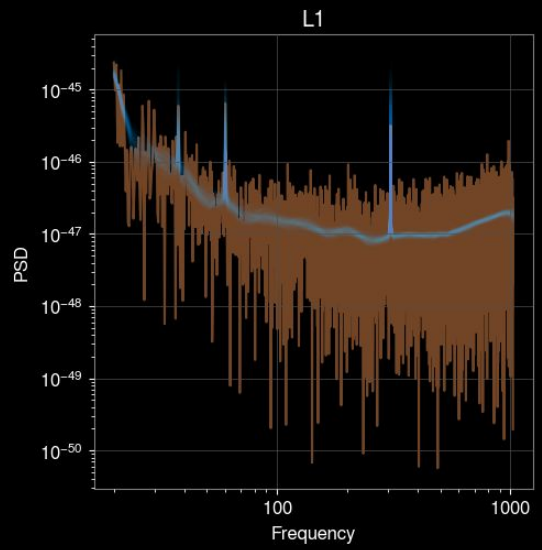
Sangeet Paul

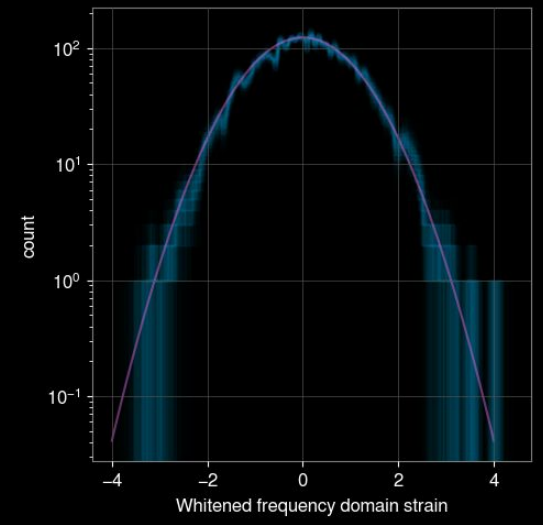
Parametric PSDs

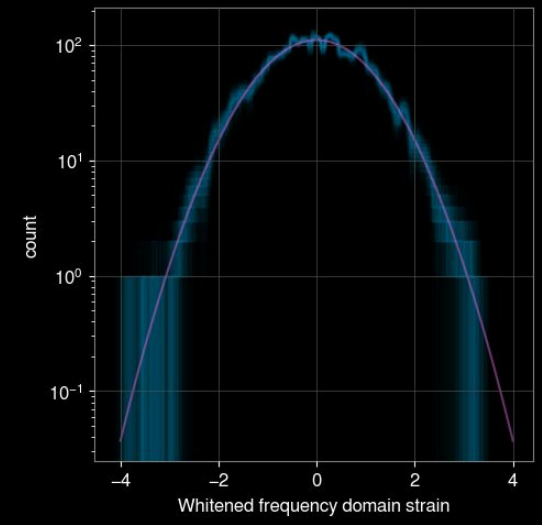
More on this tomorrow at 10:15







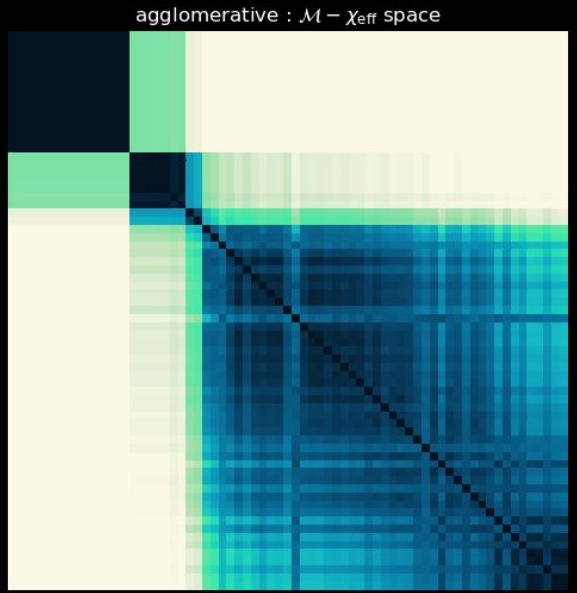


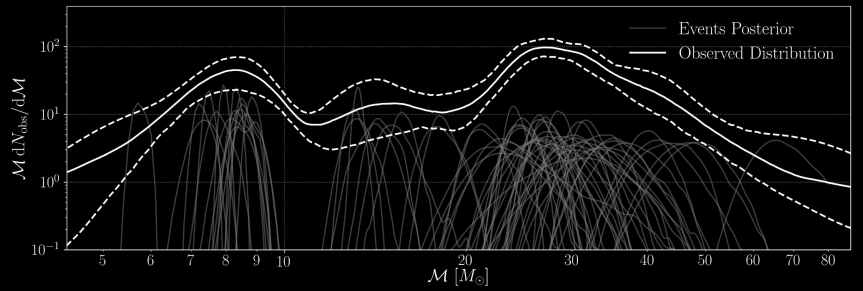


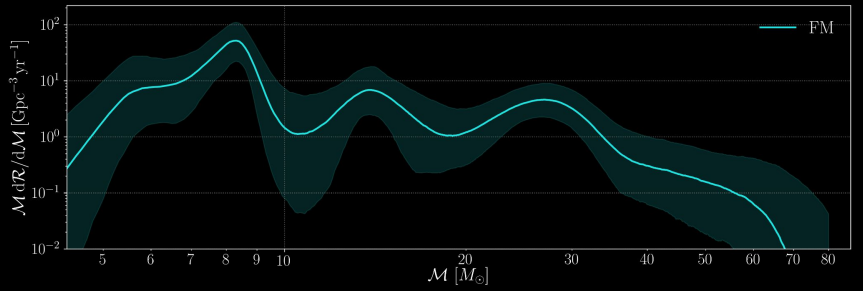
Sangeet Paul

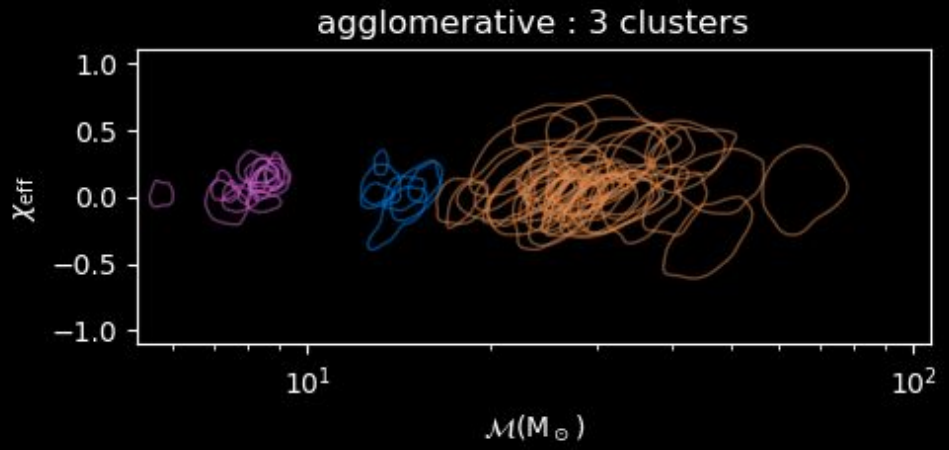
GW Clustering

Classification of detected GW sources using unsupervised ML algorithms.
Universality: works with any posterior samples in any parameter space.







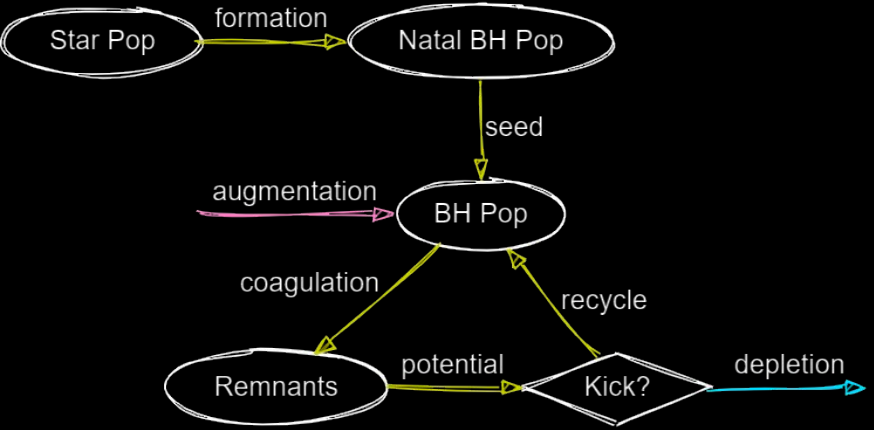


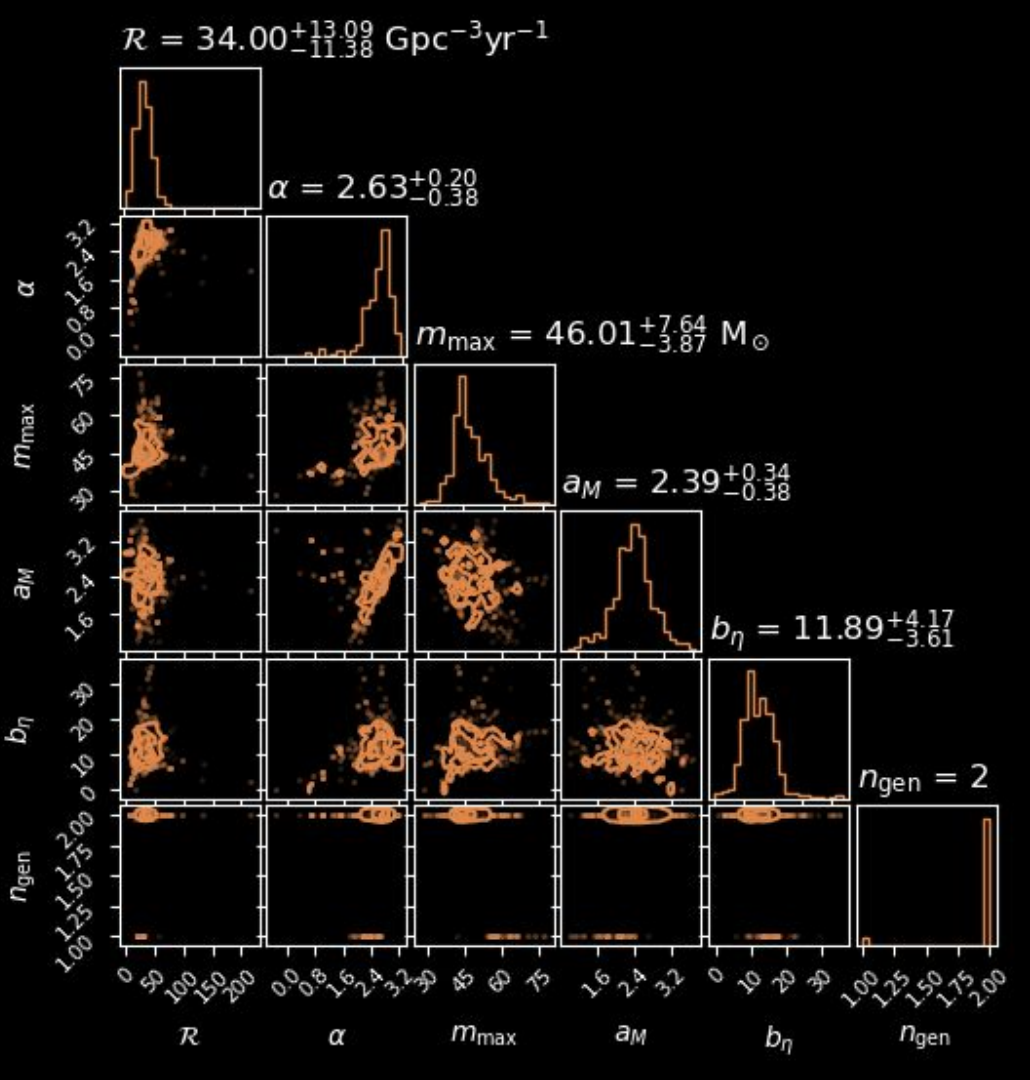
Sangeet Paul

Hierarchical Mergers

Model: BH Coagulation.

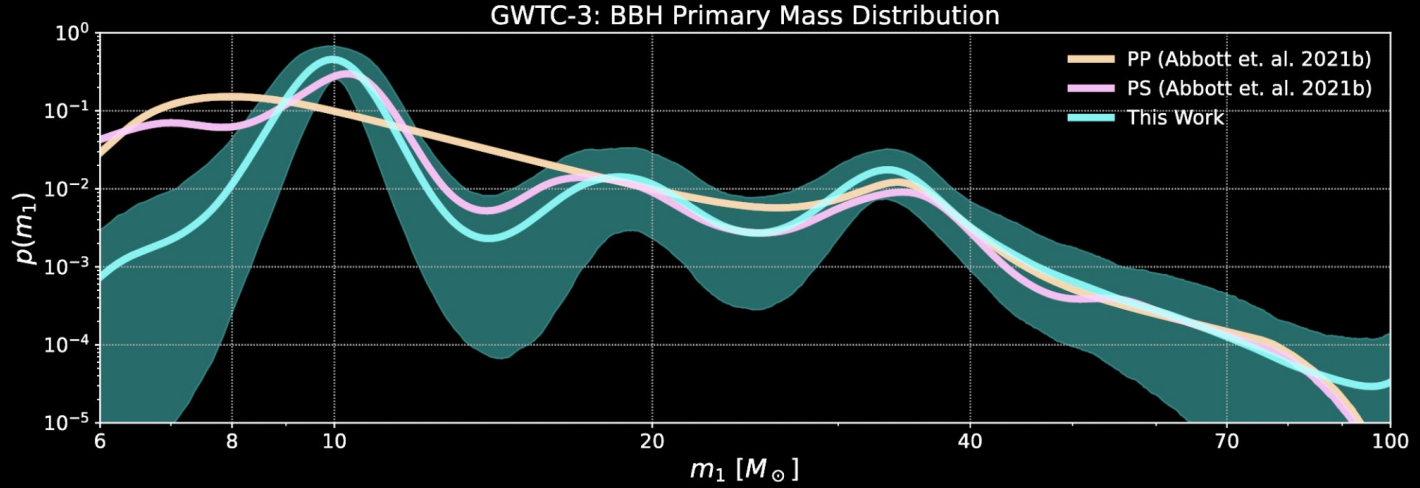
Bayesian inference of natal populations, dynamical environments, merger rates, and merger ancestries.

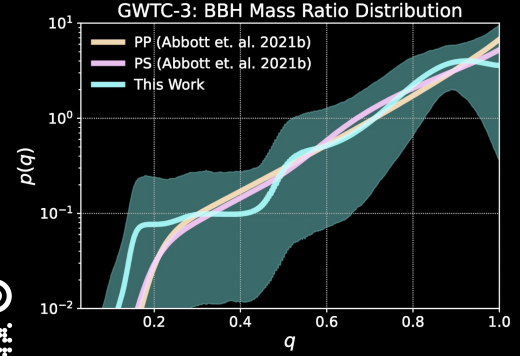


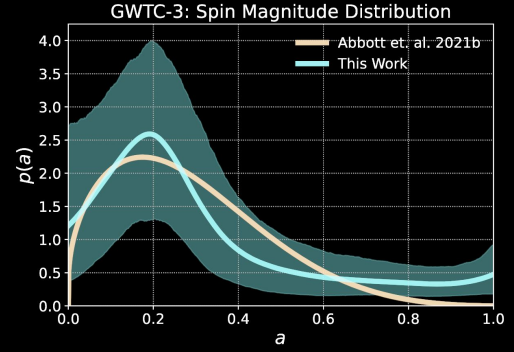


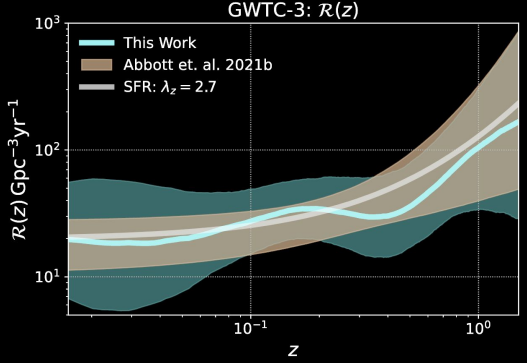
Non-Parametric Populations

Non-parametric modeling of the merger rate's evolution in mass, spin, and redshift.









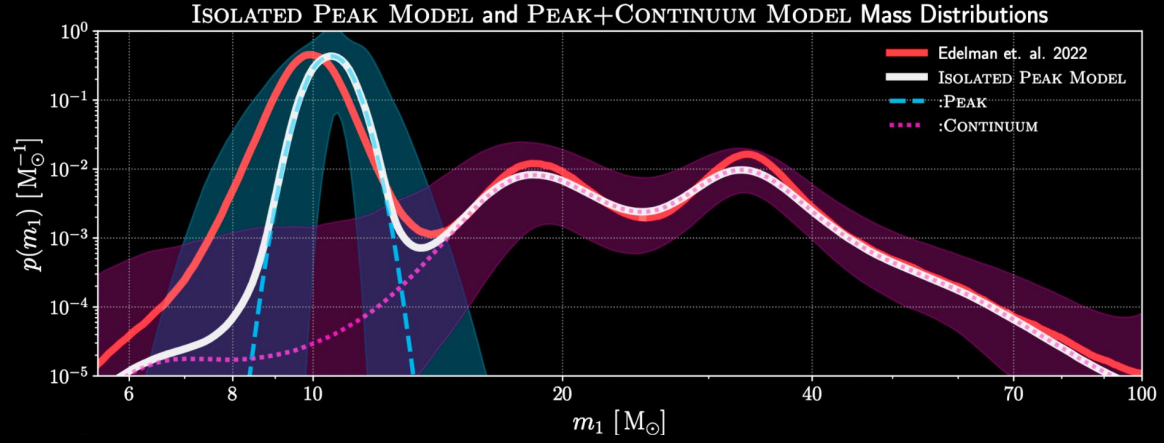
/FarrOutLab/GWInferno

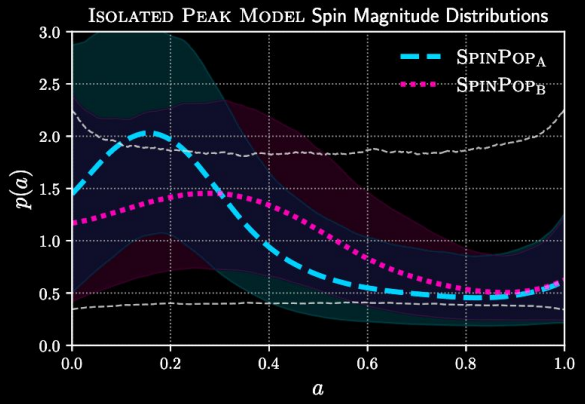
B. Edelman *et al* 2023 *ApJ* **946** 16

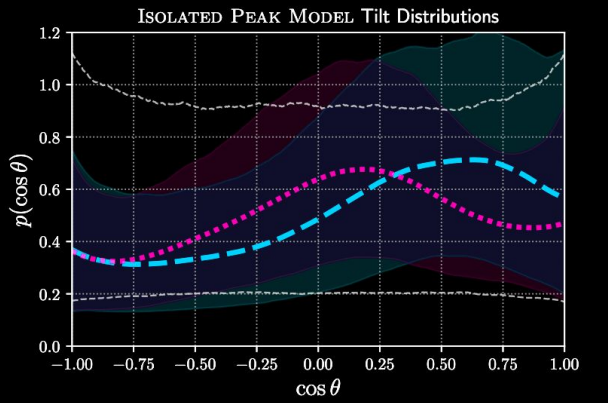
Jaxen Godfrey
See talk tomorrow!

BBH Subpopulation Semi-Parametric Mixture Modeling

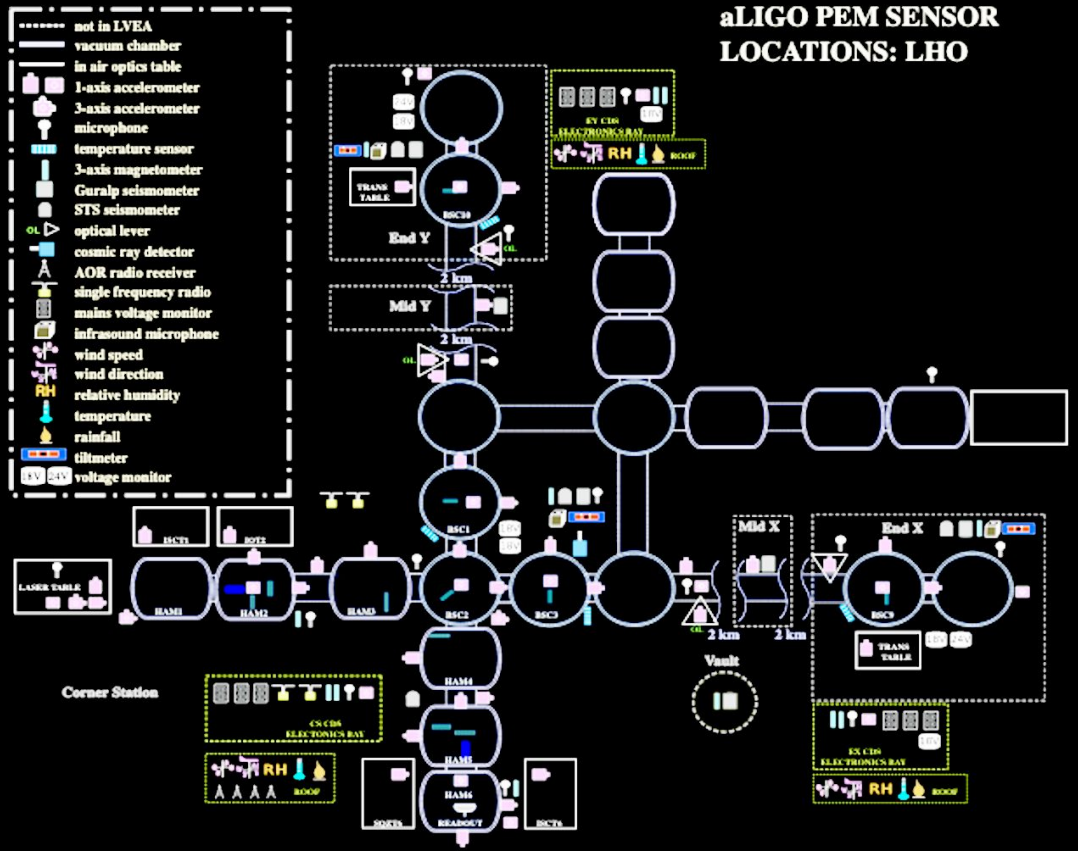
Split up the BBH population into subpopulations described different mass and spin distributions







Environmental noise measurement in aLIGO



- The non-GW environment – are the candidate GW signals

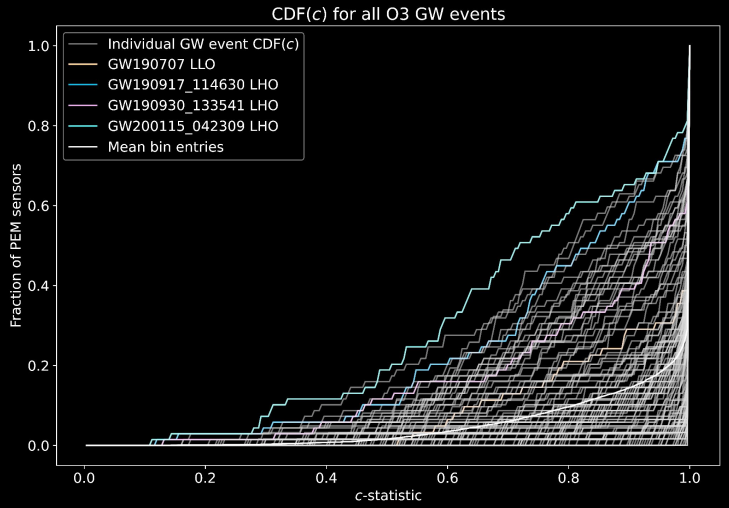
UO responsible for development and maintenance of instrumentation (PEM) required to measure the non-GW environment and its coupling to DARM

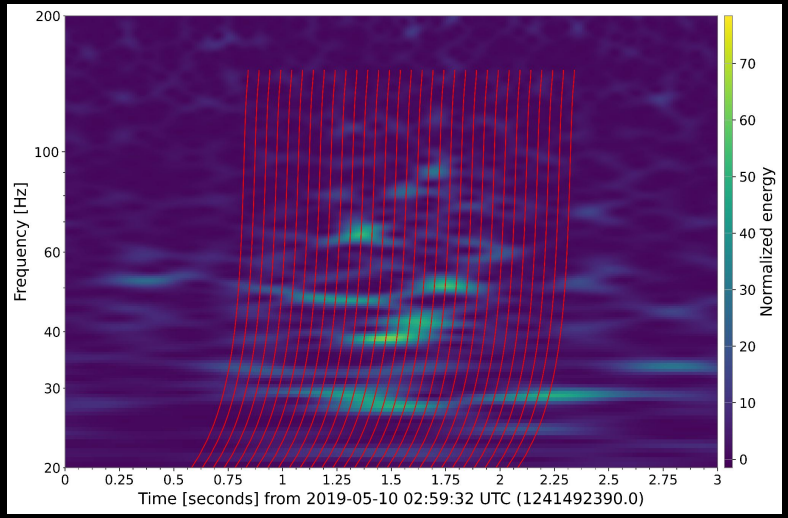
(Schofield, students)

- Commissioning, noise hunting and mitigation (Schofield, et al)

Measuring the GW background and GW candidate vetting

Environmental injections to determine ambient coupling of environment to GW signals, vetting GW event candidates with evidence of environmental contamination (Schofield, Ball, Helmling-Cornell, Frey)

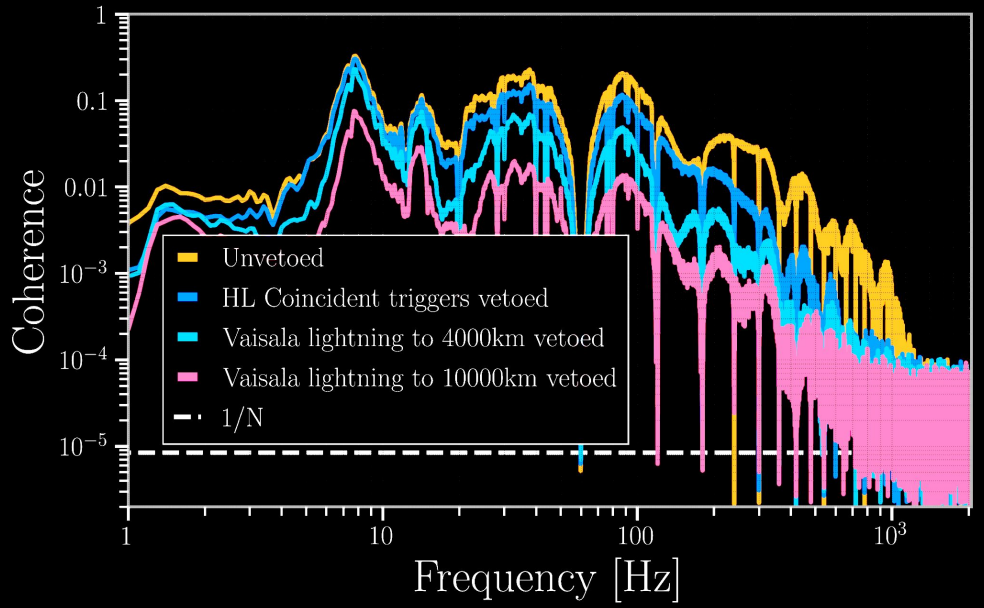




See Adrian's talk tomorrow morning!

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 (yellow, orange, green).

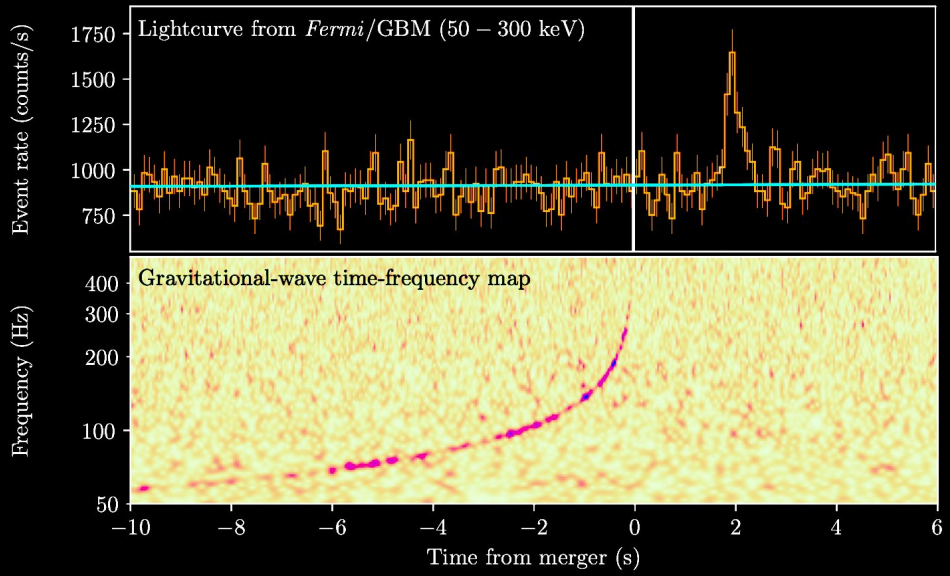
See talk by Matthew Ball tomorrow morning

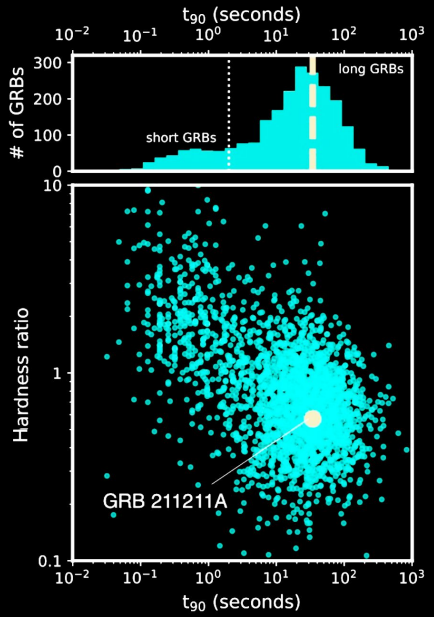
PRD 107 (2023) 022004

Ben Mannix

GWs associated with Gamma-Ray Bursts

- We use triggers from gamma-ray satellites to perform targeted GW searches (Mannix - will be part of O4 paper writing teams)
- GRBs originate from two sources that we could detect with gravitational waves; neutron star (short GRBs) and collapsars (long GRBs)
- Developing tools to analyze potential GW detection from collapsar GRB (Mannix)



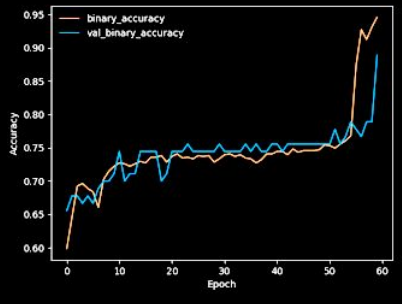


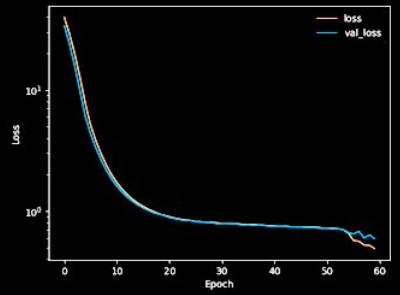
GRB population plotted in duration and spectral hardness. GRB211211A is a long GRB that had a measured kilonova and is believed to be from a merger event

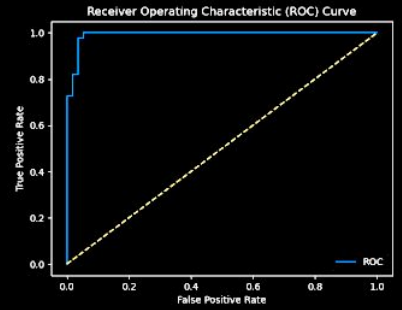
Adrian Helmling-Cornell

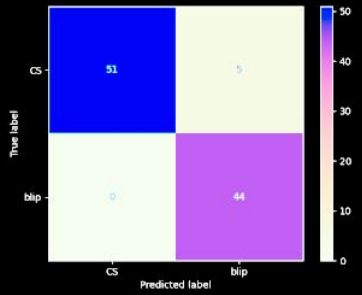
Blip Glitches and Cosmic Strings

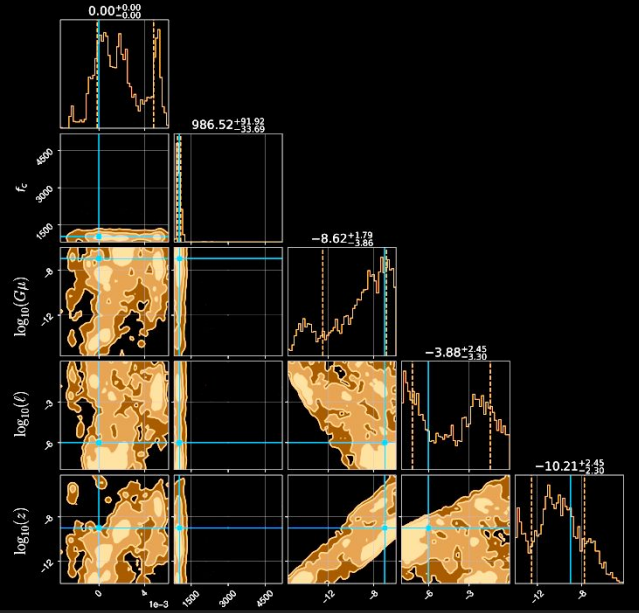
Machine learning methods for distinguishing GWs from cosmic strings from glitches in the detector, parameter estimation with injected GW CS signals, O4 burst search (Helmling-Cornell)







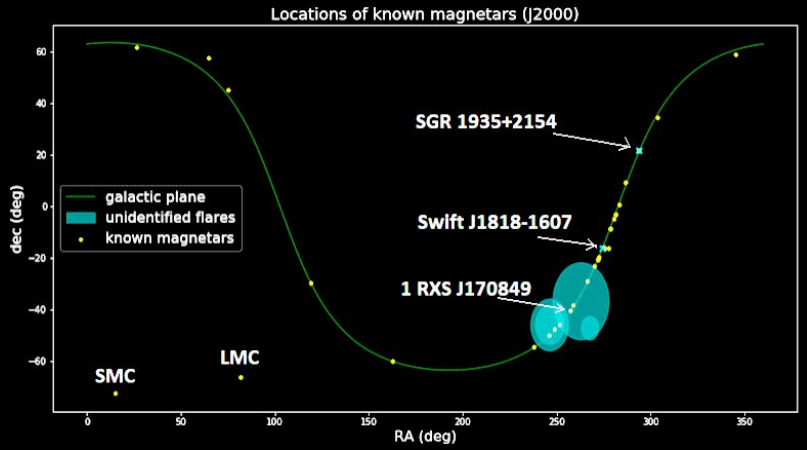


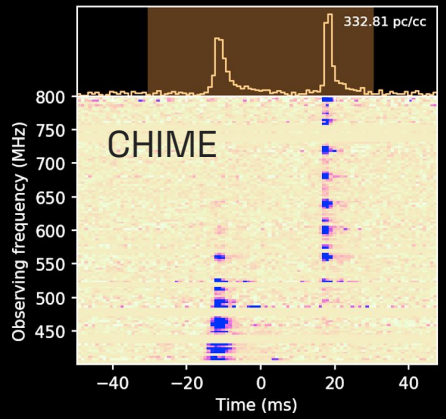


Magnetars and FRBs

Kara Merfeld
See talk by Matthew Ball

- Fast Radio Bursts are a mysterious cosmic phenomenon. And magnetars are highly magnetized neutron stars which occasionally emit large x-ray bursts.
- April 28, 2020: galactic FRB (first!) associated with known magnetar SGR 1935+2154
- In O3, searching for GWs associated with FRBs and x-ray flares from galactic magentars (Merfeld, LVK lead): upper limits on GW emission (LVK paper)
- Astrophysical inferences on magnetars based on GW data and f-mode modeling – talk by Matthew BallhA knon magnetar 1935+215





7pm
Thursday
May 18th

@ Ninkasi's
Better Living Room

Universe on Tap

Science, Trivia, and Prizes

A Day in the Life of CERN and LIGO Scientists

Presented by the Institute of Fundamental Science

Universe on Tap

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