

Parameter estimation of the overlapping signals:
descending in frequency and ascending in speed

Harsh Narola



Universiteit
Utrecht

Nikhef

Parameter
Estimation

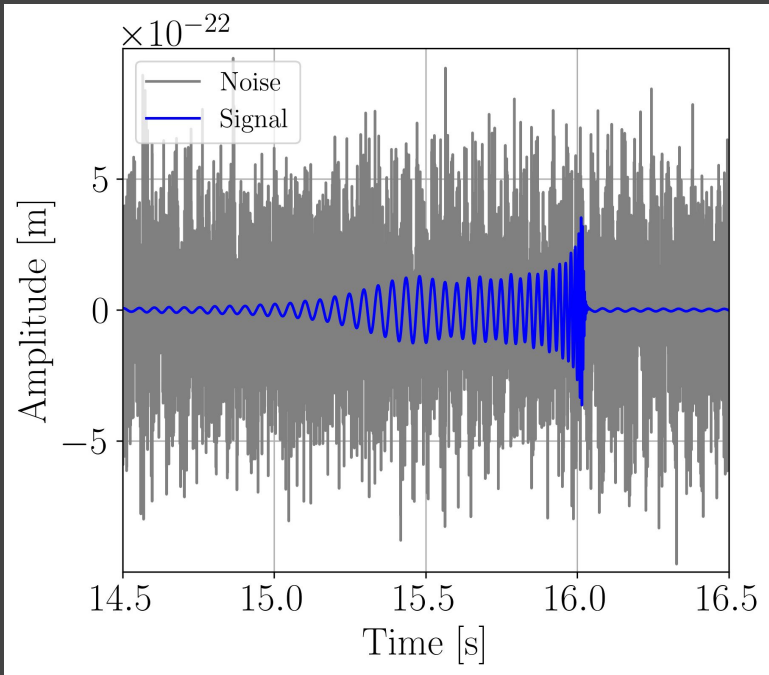
Relative
Binning

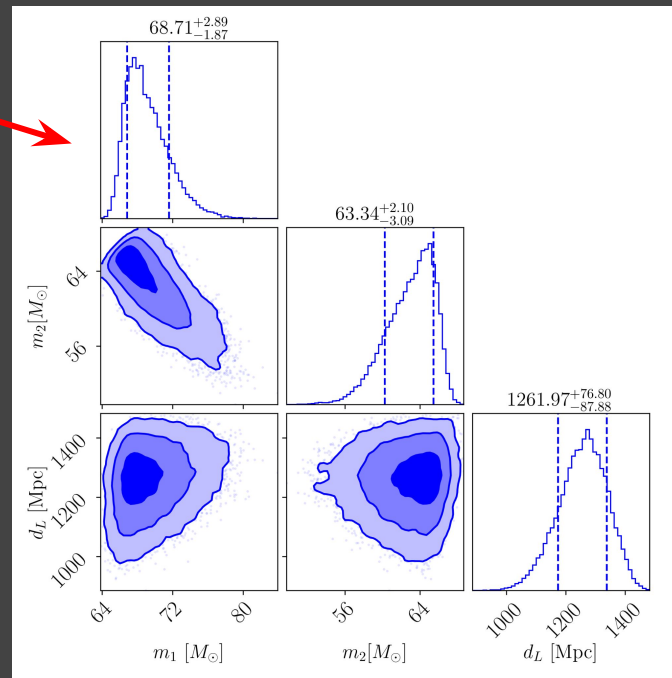
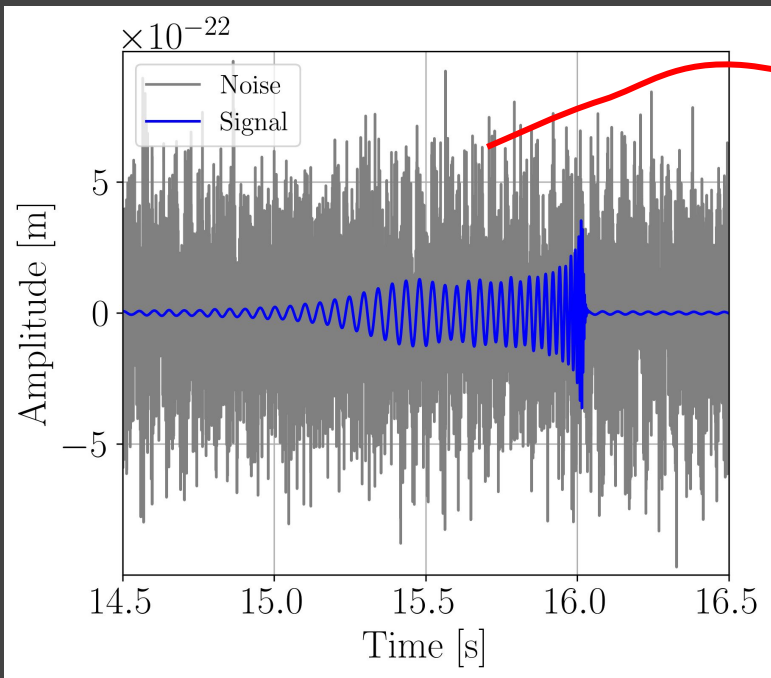
Overlapping
Signals

Parameter
Estimation

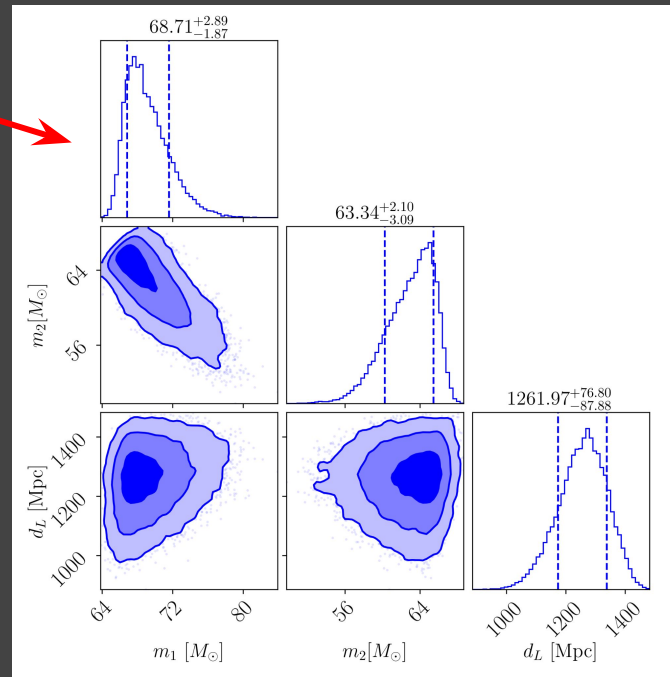
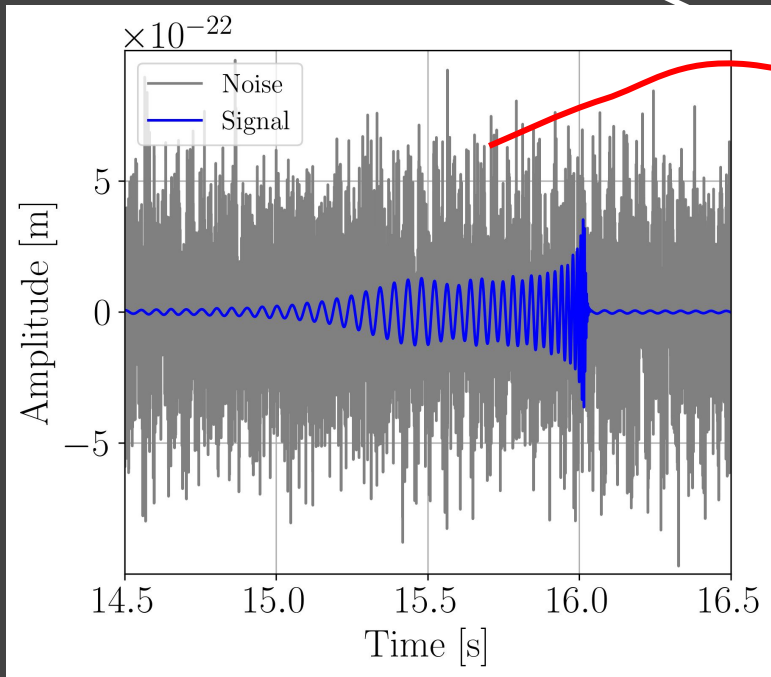
Relative
Binning

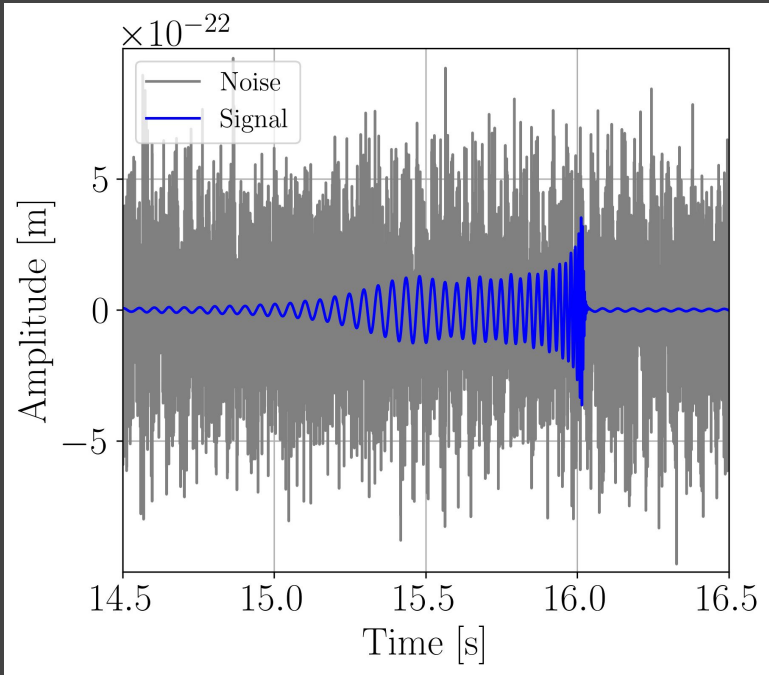
Overlapping
Signals

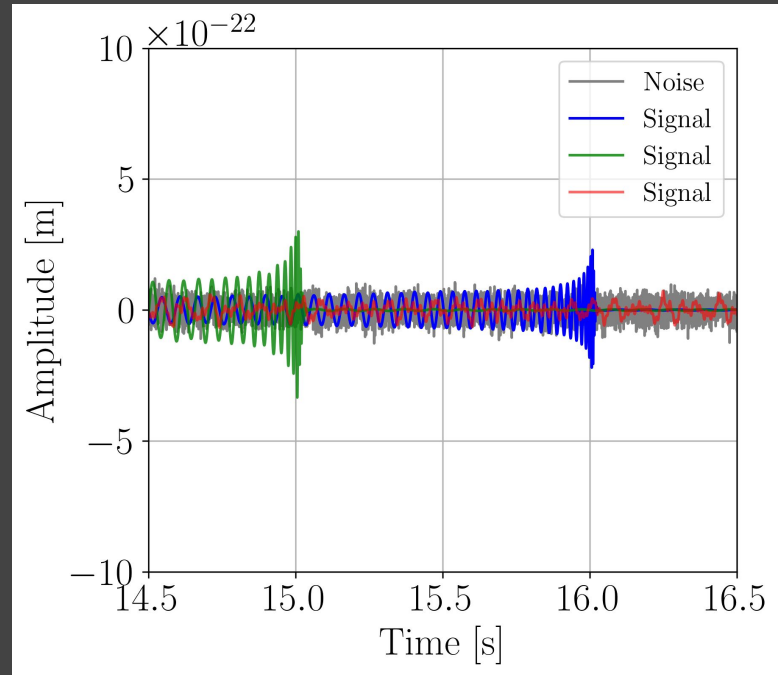
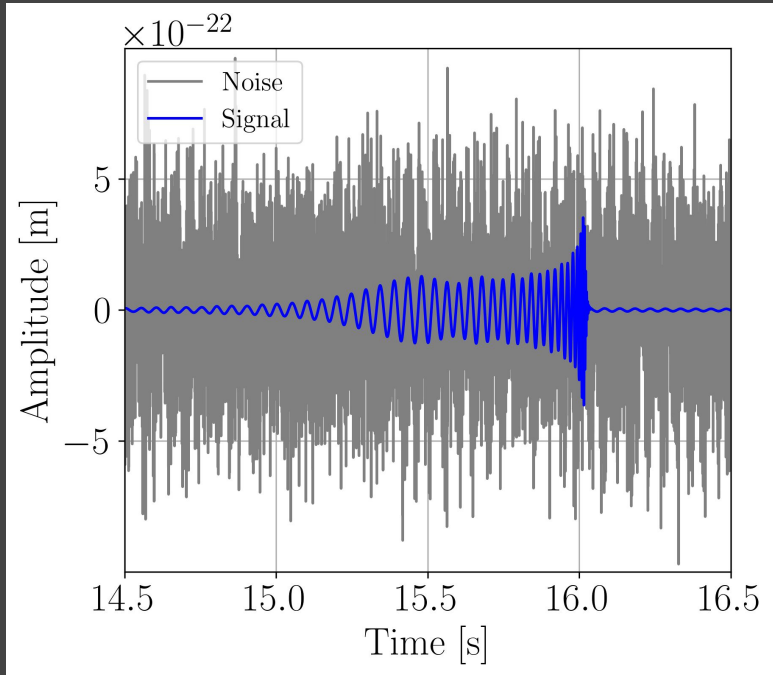




LALInference (2014-), Bilby(2018-),
Dingo(2021-), Cogwheel (2022-)
Peregrine(2023), Kolums(2023, 2024),
Wouters(2024)







Parameter
Estimation

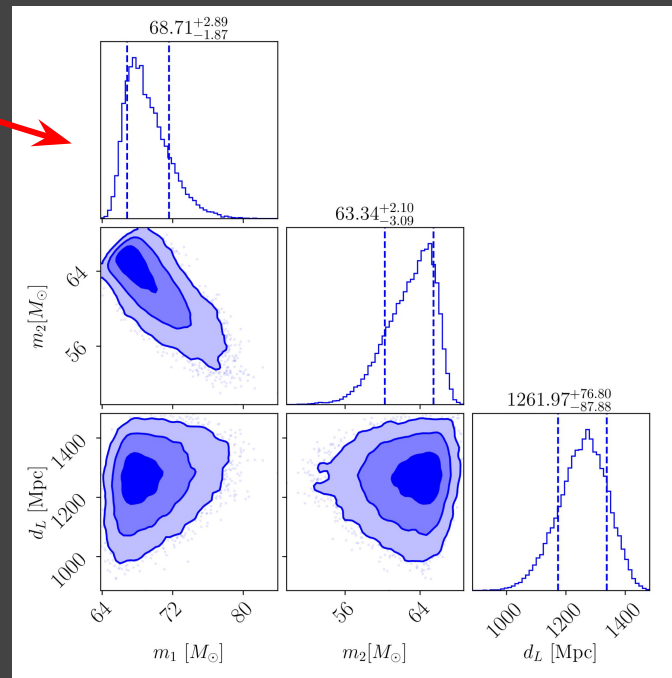
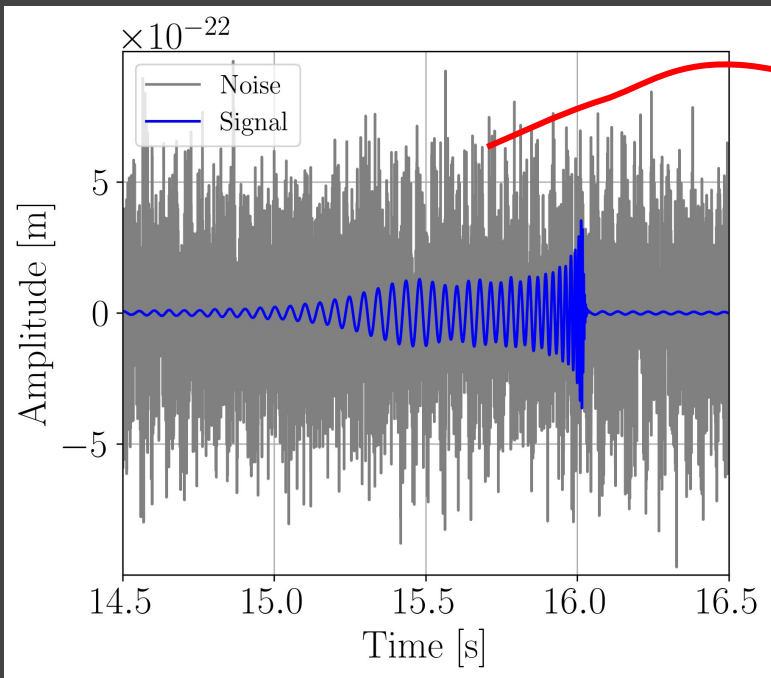
Relative
Binning

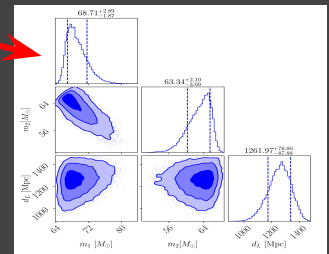
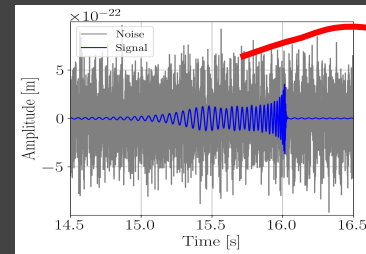
Overlapping
Signals

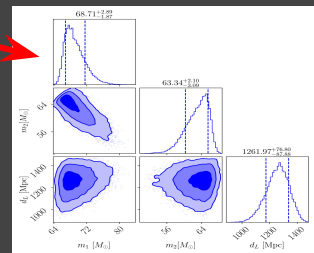
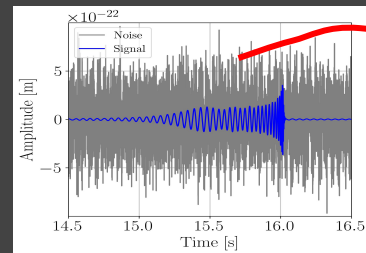
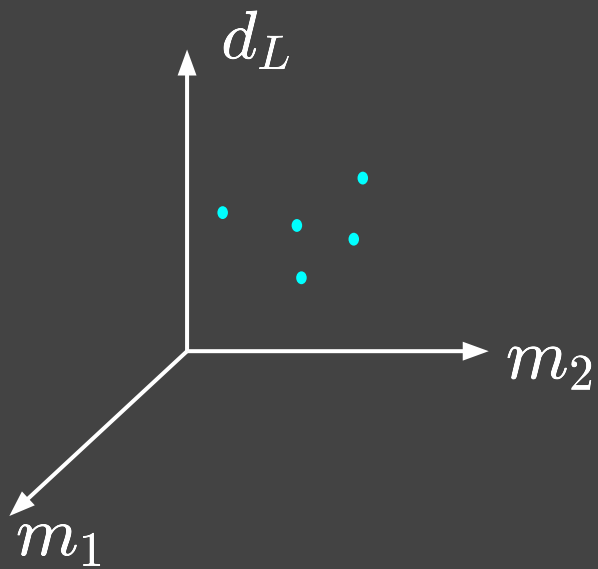
Parameter
Estimation

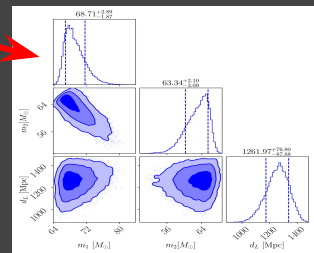
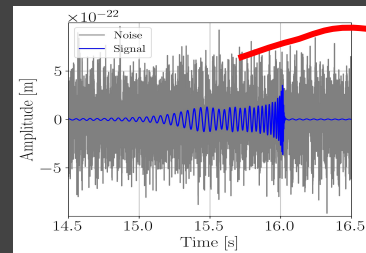
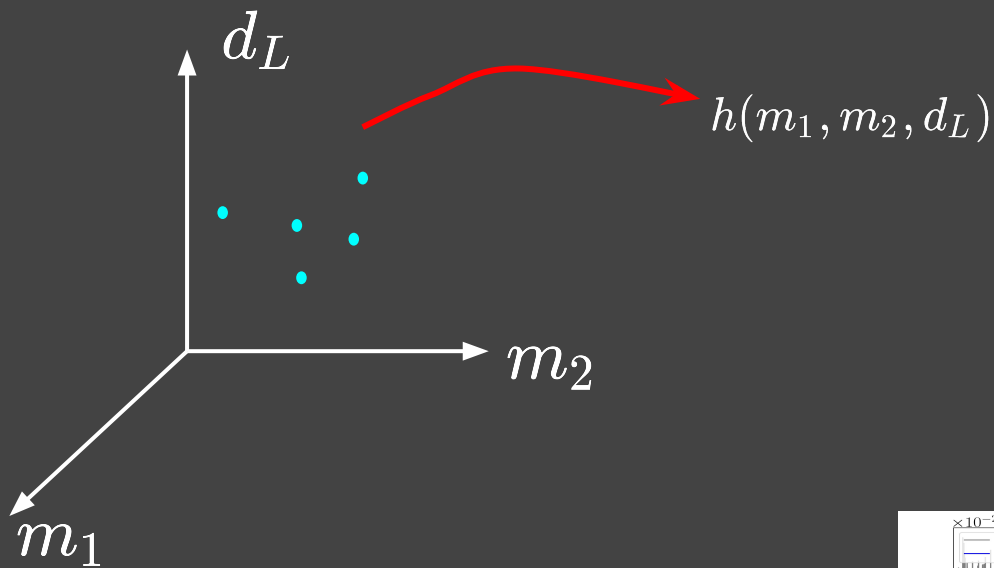
Relative
Binning

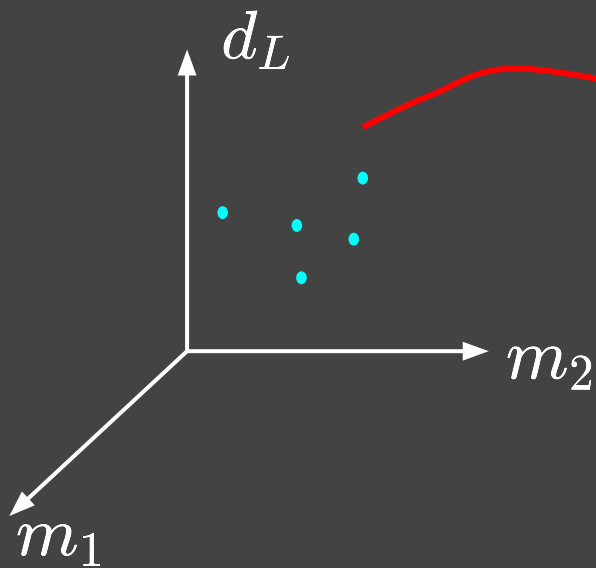
Overlapping
Signals



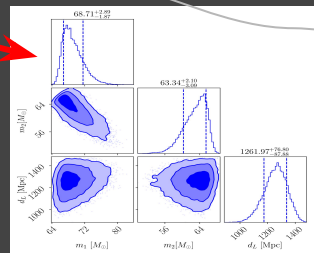
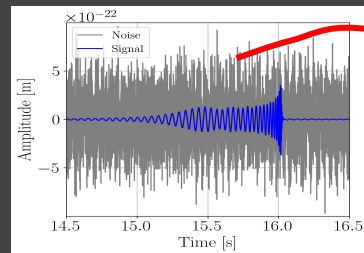
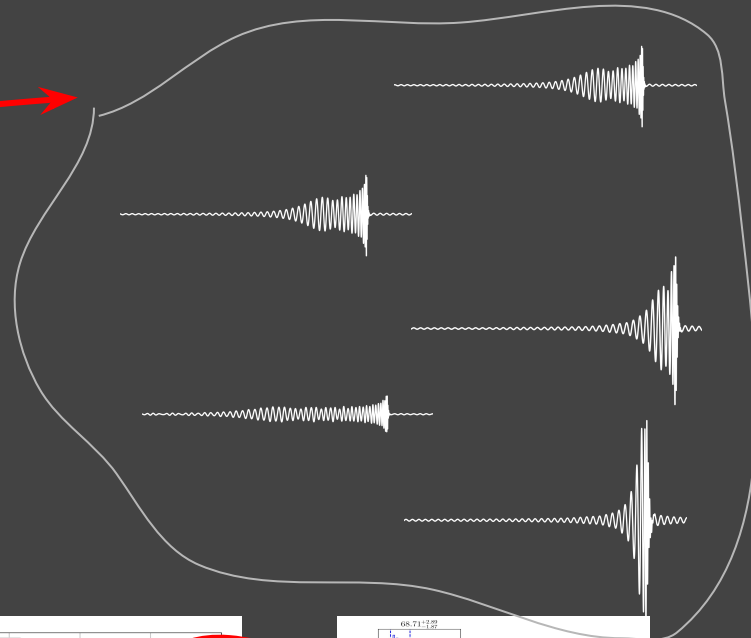


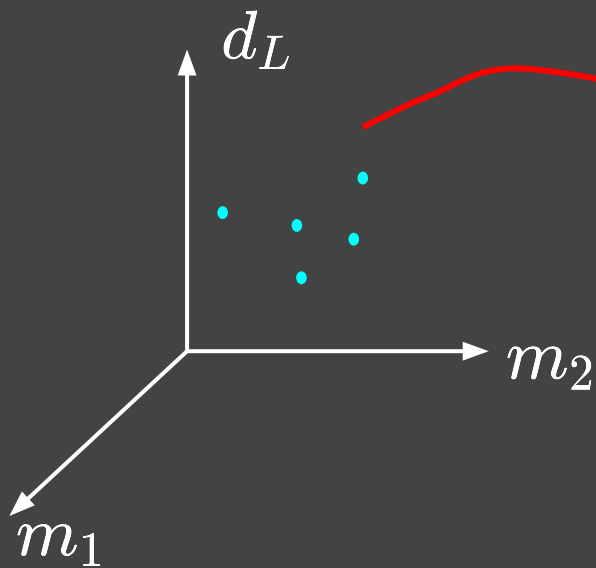




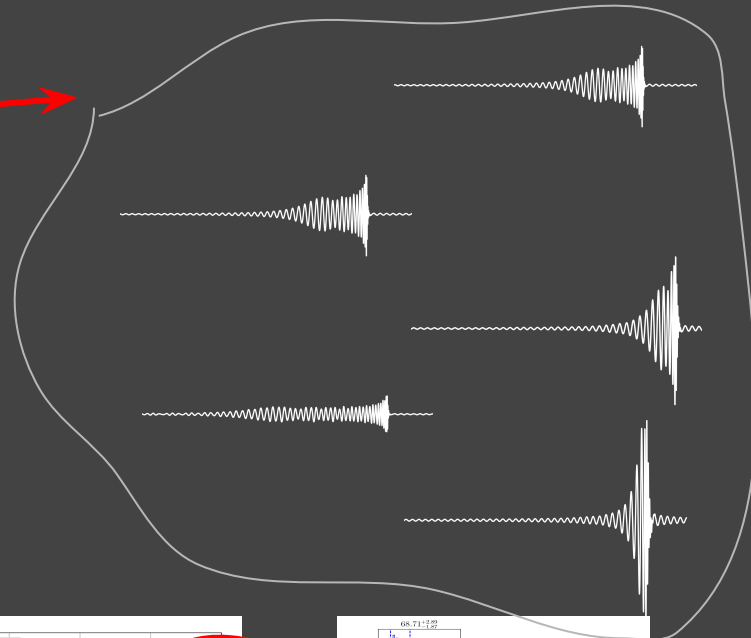


$$h(m_1, m_2, d_L)$$



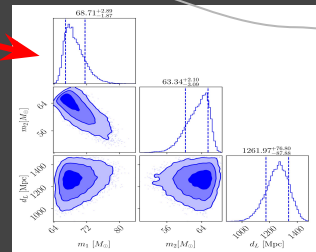
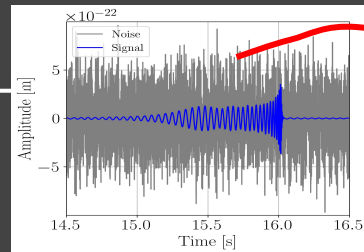


$$h(m_1, m_2, d_L)$$

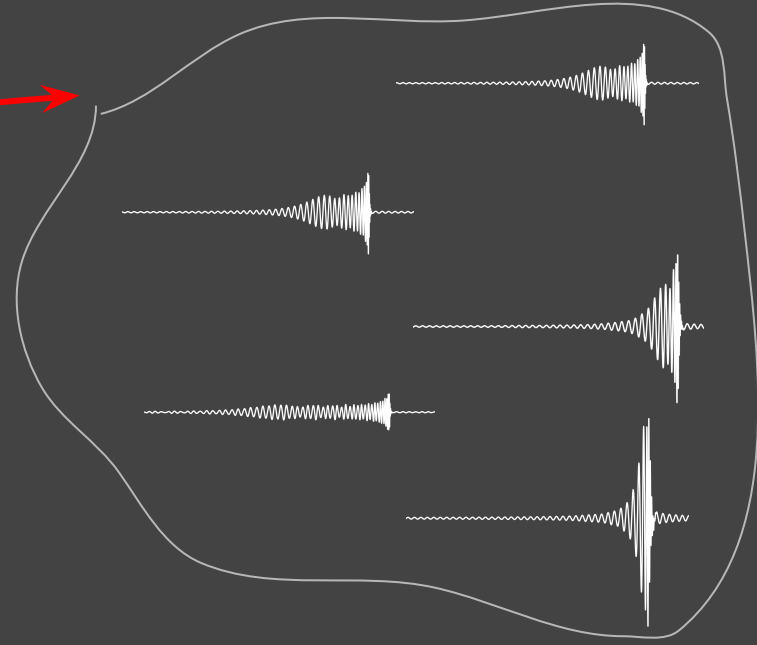


If the noise is Gaussian and stationary...

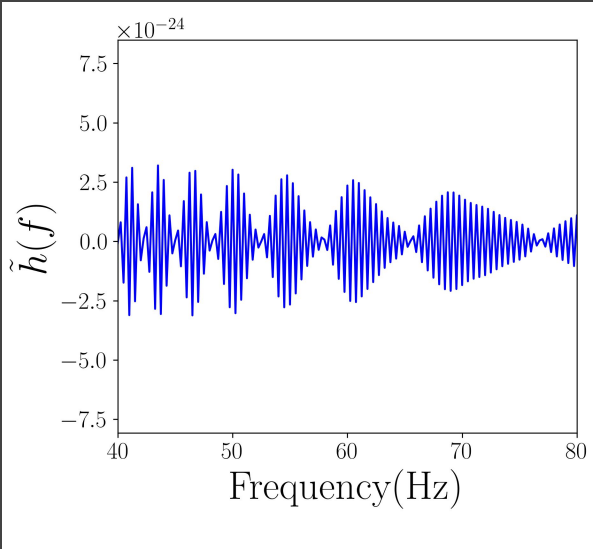
$$p[\mathbf{n}] \propto e^{-\frac{1}{2} \langle \mathbf{n} | \mathbf{n} \rangle}$$



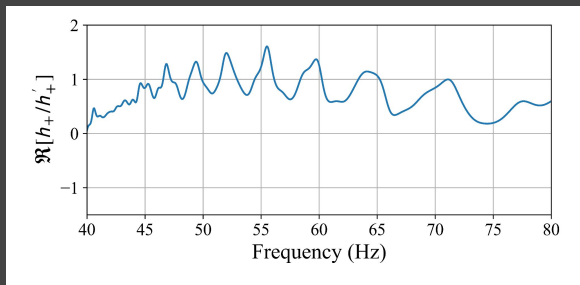
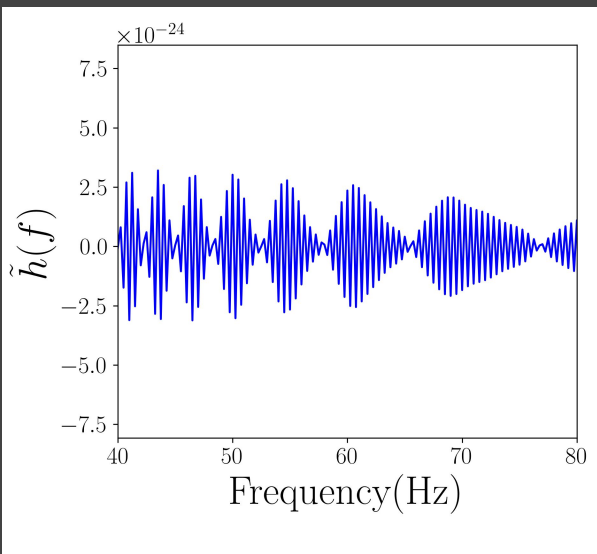
$$h(m_1, m_2, d_L)$$

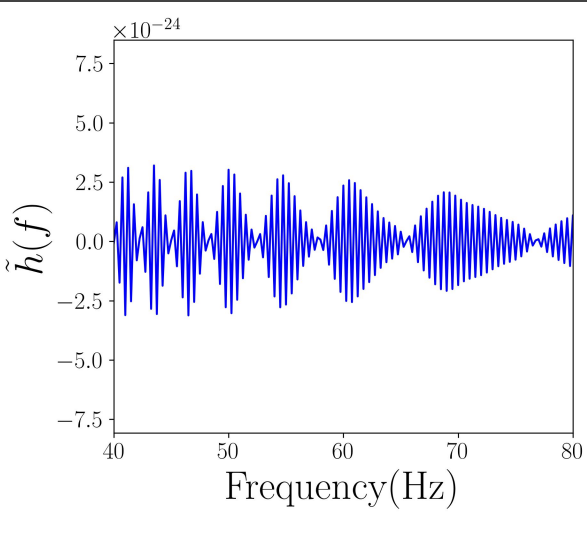


$$h(m_1, m_2, d_L)$$

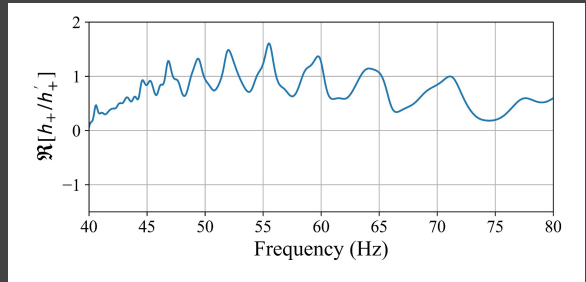
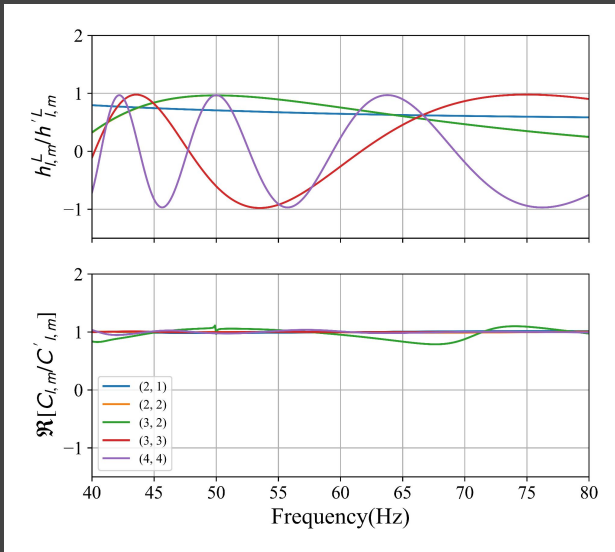
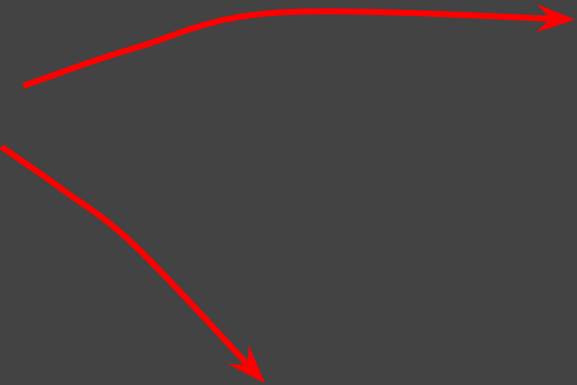


$$h(m_1, m_2, d_L)$$



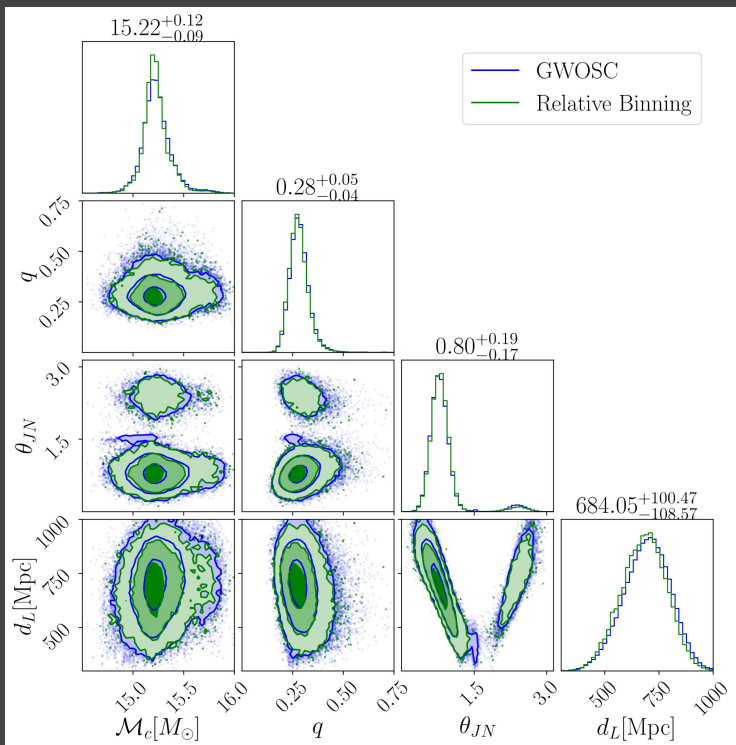


$$h(m_1, m_2, d_L)$$

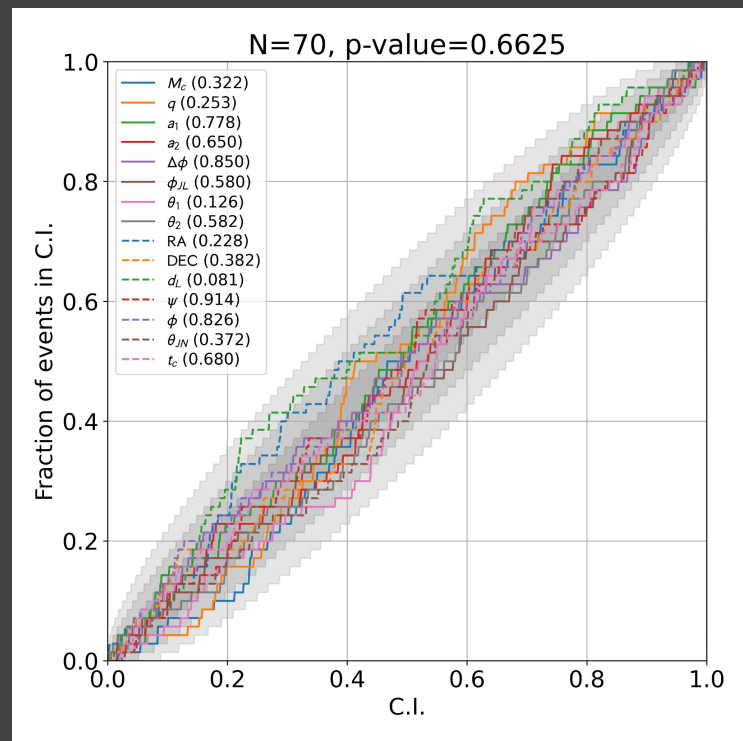


Result 1

GW190412



Injections



Parameter
Estimation

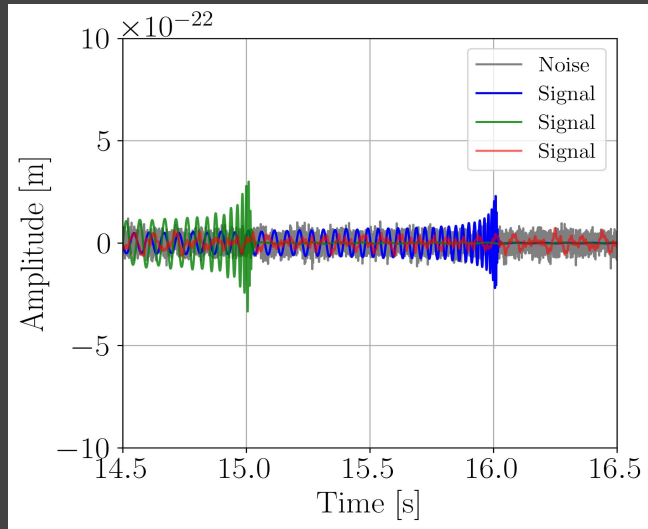
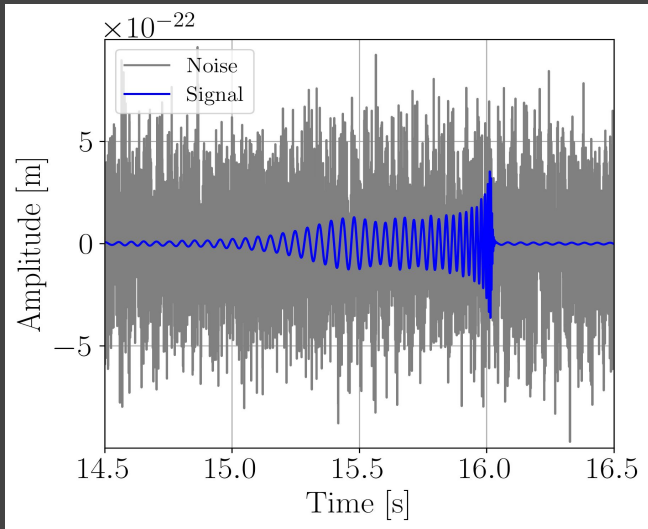
Relative
Binning

Overlapping
Signals

Parameter
Estimation

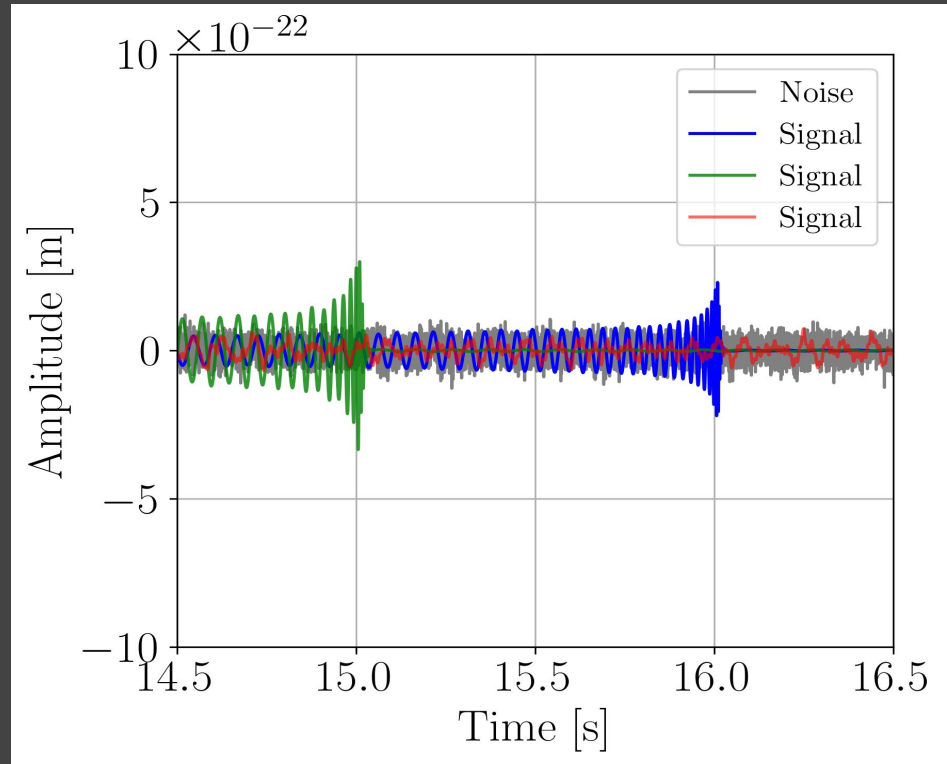
Relative
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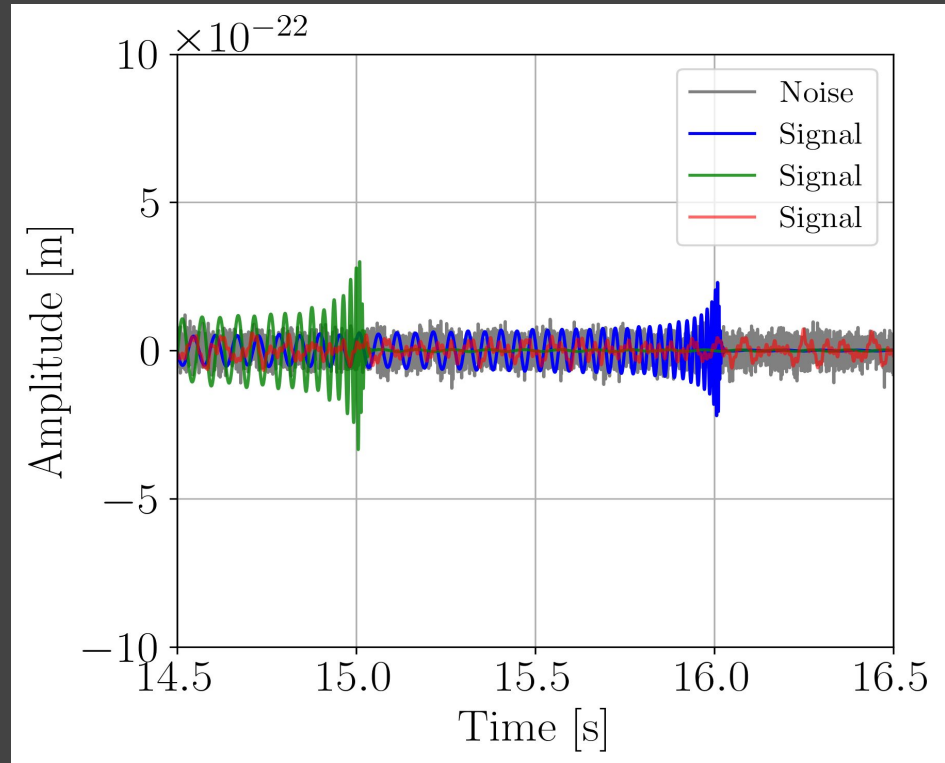
Overlapping
Signals

Hierarchical Subtraction

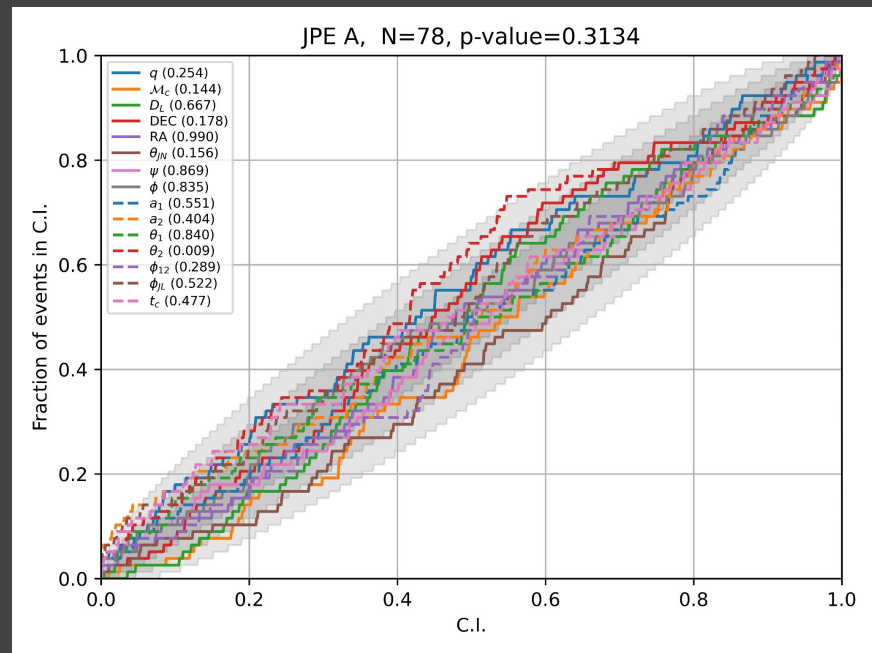
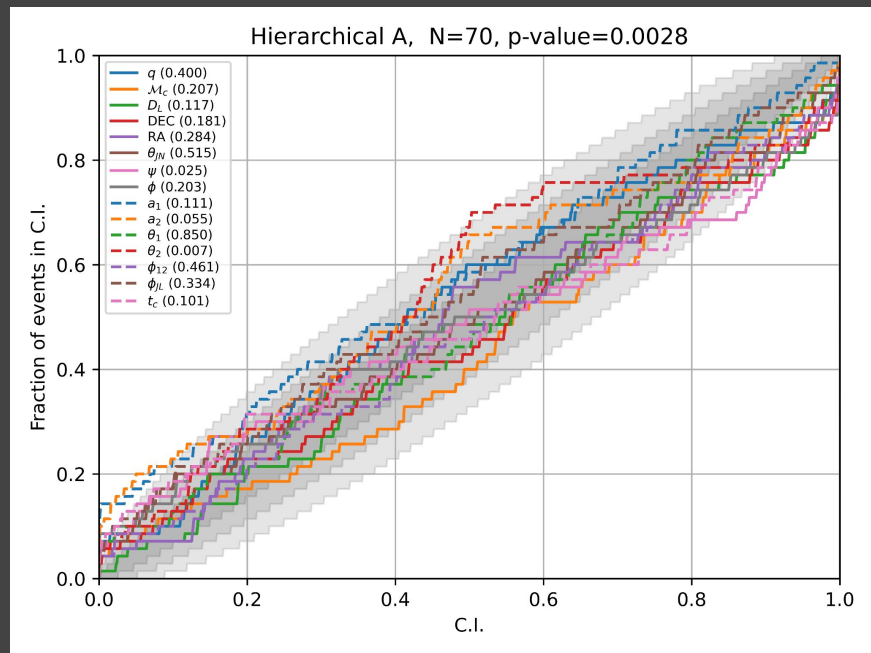


Samajdar (2021), Janquart (2023)

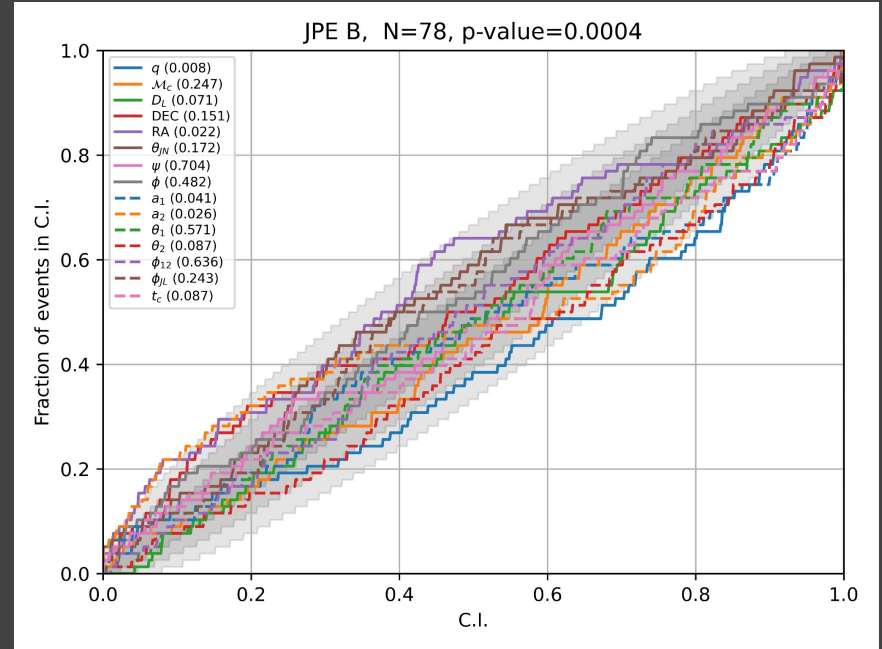
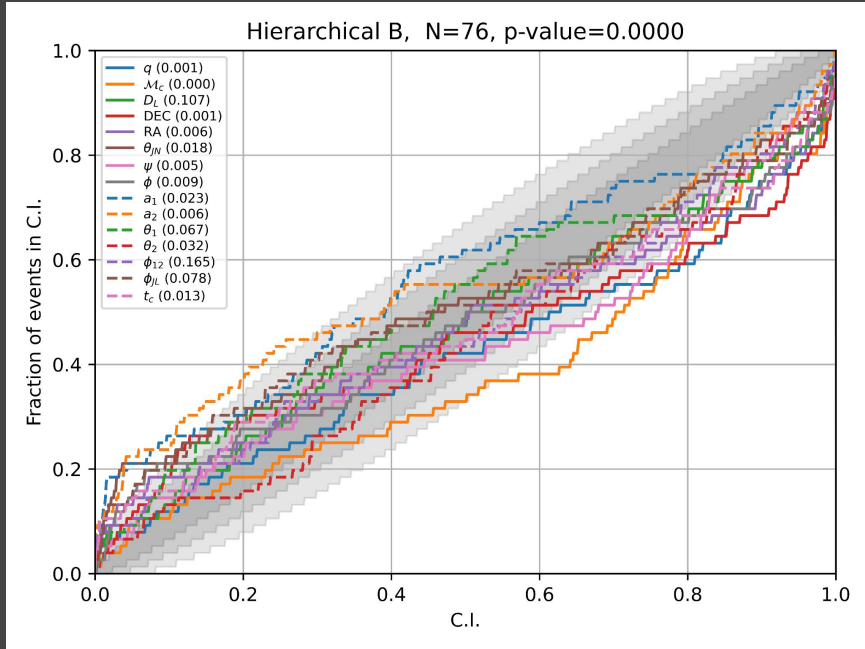
Joint Parameter Estimation



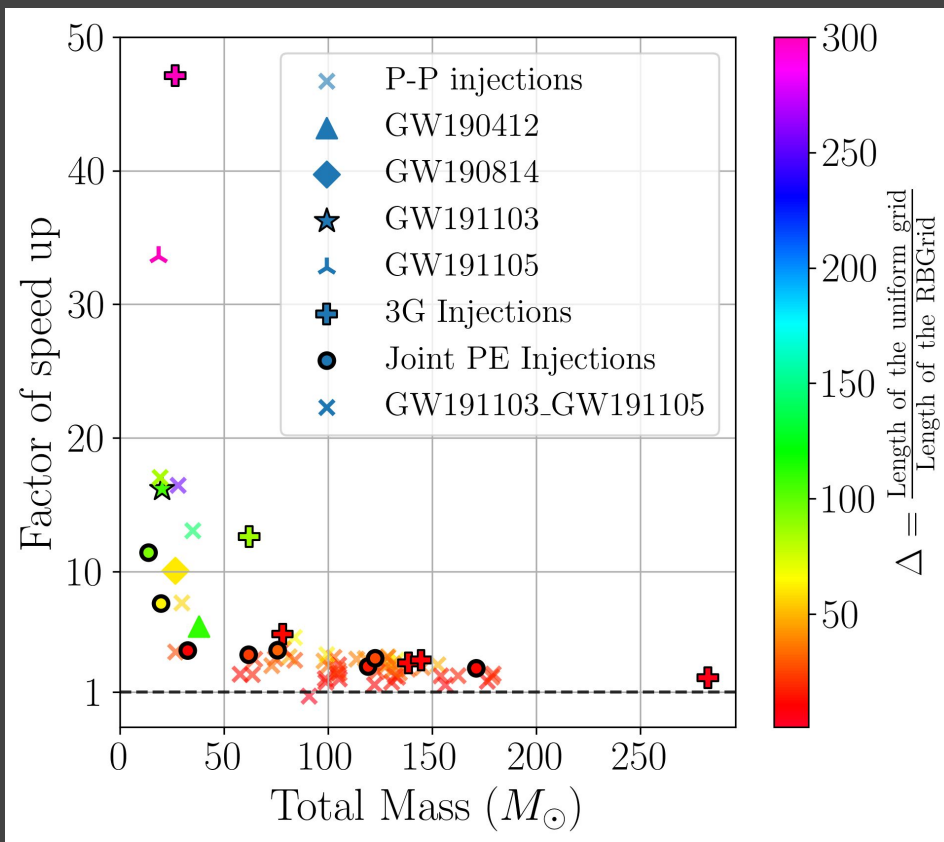
Result 2



Result 3

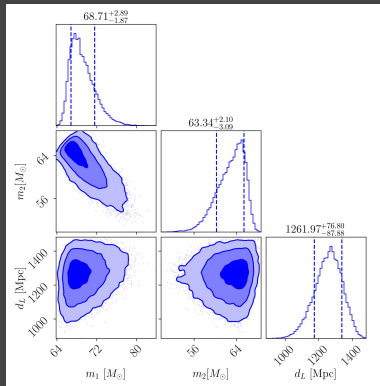


Work in progress....

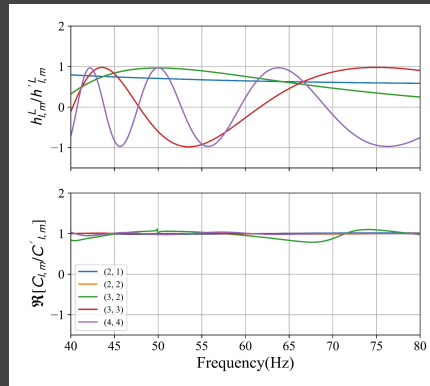


Summary

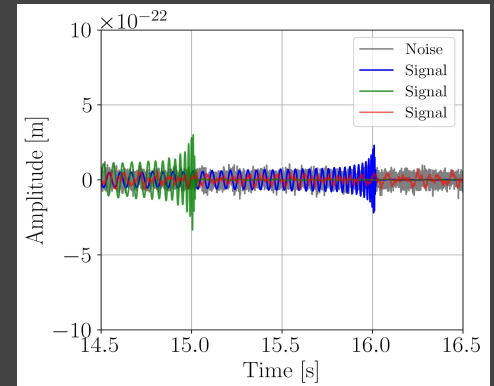
Parameter Estimation



Relative Binning



Overlapping Signals



Thank you