

# Gravitational Wave Other Variables Guide

## Note

As noted in the parameter guide, extrinsic parameters like sky location, distance, and orbital orientation are absorbed into amplitude and phase. These quantities are automatically maximized, so the amplitude and phase sliders are fixed and cannot be adjusted.

## Amplitude

- ▶ The strain amplitude of a gravitational wave represents the relative stretching and squeezing of spacetime as measured by the detector.
- ▶ This quantifies how much the distance between the detector's arms changes due to the passing wave. Typical gravitational wave strains are extremely small, on the order of  $10^{-21}$ .

## Phase

- ▶ The coalescence phase represents the phase of the gravitational wave signal at the moment when the two compact objects (such as black holes or neutron stars) merge.
- ▶ This determines the waveform's overall timing and shape at merger and is important for accurately modeling and matching the observed signal with theoretical templates.

## SNR ( $\rho$ )

- ▶ The signal-to-noise ratio (SNR), denoted  $\rho$  on the slider, quantifies how strongly the gravitational-wave signal from a merger stands out relative to the detector's background noise.
- ▶ The SNR is roughly maximized when the waveform parameters match the reference values, indicating the best fit between the model and the observed signal.