Title: Distance-inclination angle measurements for non-optimally oriented binary black holes
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Abstract: With about a dozen compact binary detections, data-analysis pipelines have demonstrated their capabilities both in detecting gravitational wave signals and in making accurate measurements of the properties of detected sources. However, waveforms that are used in these analyses do not yet include effects, which, depending on the nature of the observed source, if neglected, can induce systematic biases in the measurement of source parameters or worse can even lead to non-detection of expected signals. One such effect is related to the presence of non-quadrupole modes in an observed signal from compact binary systems which are asymmetric (unequal mass components) and/or whose orbital planes are not optimally inclined towards the Earth (face-off binaries). In particular, the presence of non-quadrupole moments in observed signals breaks the degeneracies between parameters such as distance, inclination angle and mass parameters and leads to improved parameter estimates. This motivates us to investigate the improvements in inferring the parameters of observed signals in a parameter estimation exercise with a focus on distance and inclination angle measurements by employing recently developed waveforms of Mehta et al. (2017) that include models for non-quadrupole modes. In this presentation we shall discuss results of our analysis for an astrophysical population of BBH mergers.

Reference: Mehta et al., Physical Review D 96, 124010 (2017).