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Extending the Fisher matrix formalism towards the edges

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The Fisher information matrix (FIM) formalism is nowadays widely used to forecast the parameter estimation (PE) capabilities of future GW detectors to avoid the high computational cost of Bayesian PE analyses.

Unfortunately, this formalism is known to fail in some regions of the GW parameter space, especially when strong parameter degeneracies are present. One of the best-known examples is the luminosity distance-inclination degeneracy, present for small or vanishing inclination angles. Crucially, this can prevent performing, e.g., cosmology studies involving GW+GRB measurements.

We will present a new approximant that extends to the standard FIM formalism treating the GW likelihood as exact in some parameter subspaces and keeping a low computational cost while allowing to obtain meaningful forecasts. Within this context, we also show how to include the effect of noise fluctuations in this likelihood, which is needed to avoid well-known biases in population analyses.

Primary author: Mr IACOVELLI, Francesco (University of Geneva)

Co-authors: MAGGIORE, Michele; MANCARELLA, Michele (Milan-Bicocca); MUTTONI, Niccolò (University of Geneva); FOFFA, Stefano (University of Geneva)

Presenter: Mr IACOVELLI, Francesco (University of Geneva)

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