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Measuring the effective spin of binary black holes KEN K. Y. NG, SALVATORE VITALE, Massachusetts Institute of Technology, AARON ZIMMERMAN, CARL-JOHAN HASTER, KATERINA CHATZIIOANNOU, Canadian Institute for Theoretical Astrophysics, DAVIDE GEROSA, California Institute of Technology — Gravitational waves emitted by coalescing compact objects carry information about the spin of the individual bodies. However, what can be measured best is the projection of the total spin along the orbital angular momentum, known as effective spin χ_{eff}. This quantity, is also conserved up the the 2nd post-newtonian order. Various authors have proposed methods to use the measured χ_{eff} distribution to infer the underlying formation channels. However, care need to be exercised when drawing conclusions. In this talk we will show that a) the bayesian priors used can significantly affect the measurements of χ_{eff} b) even if the true astrophysical distribution of χ_{eff} were to be perfectly symmetric, the distribution of detectable χ_{eff} need not be; and c) the posterior distribution of χ_{eff} for individual events should not be treated as a gaussian. In particular, we find that the posterior distributions for χ_{eff} systematically show fatter tails toward larger positive values. Finally, we show that the uncertainties of the measured effective spins are as much as 8 times larger when the spin is negative than when it is positive, where the amount of additional uncertainty depends on the mass and magnitude of χ_{eff}.

Kwan-Yeung Ng
Massachusetts Inst of Tech-MIT

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