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Impact of the Pre-Supernova Stellar Compactness in Gravitational-Wave Populations
MACIEJ DABROWNY, DAVIDE GEROSA, NICOLA GIACOBBO, Univ of Birmingham — Detections of gravitational waves have revolutionized the understanding of black-hole binaries and double neutron stars, as well as their coalescence. These detections have provided a new way to test our best predictions for the evolution of binary stars which ultimately merge as black-hole or neutron-star binaries. However, the evolution of compact-object binaries is still riddled with enigmas such as the effect of different supernova-explosion prescriptions. Specifically, modern supernova models predict that the outcome of the explosion is set by the compactness (not just the mass!) of the stellar core. We present the first implementation of such advances in the state-of-the-art population-synthesis code MOBSE. We test how different possible physics of the supernova mechanisms impact the key gravitational-wave observables. How does the core-collapse explosion mechanism affect the resulting remnant? How does the pre-supernova compactness affect the mass spectrum of gravitational-wave sources?

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