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Core-collapse supernova gravitational-wave physical inference - estimating the time of the Ledoux convection

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Core-collapse supernova in the Milky Way will be one of the most interesting astronomical events of the century. As the massive core suddenly collapses a huge number of neutrinos is produced. Around a hundred milliseconds after the collapse the asymmetry of a supernova evolves through a Ledoux convection. It is believed that it marks the beginning of an efficient emission of gravitational waves. In our work, we develop a method to determine the beginning of the Ledoux convection from simulated gravitational-wave strains. We use the model-independent coherent WaveBurst (cWB) search pipeline and the most recent core-collapse supernova multidimensional simulations for testing the method. We apply the timing information from the neutrino observations. Finally, the code is then optimised to a low-latency cWB operation.

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