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A weakly-modeled search for compact binary coalescences in the Einstein Telescope

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With a sensitivity ~10 times that of current-generation gravitational wave (GW) detectors, the Einstein Telescope (ET) should be able to observe thousands of compact binary coalescence (CBC) signals per day, up to a redshift z=20. However, the high rate of signals calls into question whether existing data-analysis methods are directly applicable to ET data. Mock data challenges (MDCs) are generated to investigate these issues in the context of ET. Here we present the results of the first published comprehensive analysis of a recent ET MDC. Using a weakly modeled search algorithm, we recover a significant fraction (38%) of the binary black hole signals injected into the MDC, as well as ~3 binary neutron stars per day, for which we are able to estimate the chirp mass with a precision of 1%, with modest off-the-shelf computing resources. We then describe the generation of a template bank to be used by a state-of-the-art matched filtering search, aimed at covering the same search space currently explored by LIGO and Virgo, and discuss its performance and implications in terms of computing cost.

Primary author: MACQUET, Adrian

Co-authors: REGIMBAU, Tania (LAPP/CNRS); Mr DAL CANTON, Tito (IJCLab/CNRS)

Presenter: MACQUET, Adrian

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