

The impact of local noise recorded at the ET candidate sites on the signal to noise ratio of CBC gravitational wave signals for the ET triangle configuration

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We present an evaluation of how site dependent noise can affect the signal to noise ratio (SNR) of compact binary coalescence (CBC) signals in the future 3rd generation gravitational wave (GW) detector Einstein Telescope (ET). The design of ET is currently pushing the scientific community to study its scientific potential with respect to known, and possibly unexpected, GW signals using its design sensitivity curves. However, local ambient noise may have an impact on the ET sensitivity at low frequency and therefore affect the SNR of CBC signals at low frequency. Therefore, we study the impact of ambient noise on the ET sensitivity curve at the two sites candidate to host ET - Sardinia, in Italy, and the Euregio Meuse-Rhine (EMR) at the Netherlands-Belgium border - and infer the impact on the ET sensitivity curve and how the SNR of CBC signals at low frequencies is affected. We find that Sardinia shows results which are on par, if not better, than the design case. On the other hand, ambient noise for the current EMR sensitivity curve in Terziet causes a higher degradation of the SNR performances.

Presenters: ROZZA, Davide (University of Milano-Bicocca & INFN-MIB); DI GIOVANNI, Matteo (La Sapienza Università di Roma - INFN Roma)

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