

Search for continuous gravitational waves

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Observing sources of, almost monochromatic, continuous gravitational waves (CWs) represents one of the next major goals in gravitational-wave astronomy. The primary source would be rapidly-rotating neutron stars (NSs) in our Galaxy, either isolated or in binary systems, which are characterized by a time-varying quadrupole deformation due to an asymmetry in their mass distribution. Due to the expected small degree of asymmetry of a NS, the search for this kind of signal is extremely challenging, and can be very computationally expensive when the source parameters are not known or not well constrained. CW detection from a spinning NS will allow us to characterize its structure and properties, making this source an unparalleled laboratory for studying several key issues in fundamental physics and relativistic astrophysics, in conditions that cannot be reproduced on Earth.

In this talk we will give the motivation for, and describe, some searches for continuous gravitational waves using LIGO and Virgo data from the third observing run.

Presenter(s) : Prof. SINTES, Alicia (University of the Balearic Islands (UIB))