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GWitchHunters - Machine Learning and Citizen Science to improve the performance of Gravitational Wave detectors

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Gravitational waves have opened a new window on the Universe and paved the way to a new era of multimessenger observations of cosmic sources. Second-generation ground-based detectors such as Advanced LIGO and Advanced Virgo have been extremely successful in detecting gravitational wave signals from coalescence of black holes and/or neutron stars. However, in order to reach the required sensitivities, the background noise must be investigated and removed. In particular, transient noise events called “glitches” can affect data quality and mimic real astrophysical signals, and it is therefore of paramount importance to characterize them and find their origin, a task that will support the activities of detector characterization of Virgo and other interferometers. Machine learning is one of the most promising approaches to characterize and remove noise glitches in real time, thus improving the sensitivity of interferometers. A key input to the preparation of a training datasets for these machine learning algorithms can originate from citizen science initiatives, where volunteers contribute to classify and analyze signals collected by detectors. We will present GWitchHunters, a new citizen science project focused on the study of gravitational wave noise, that has been developed within the REINFORCE project (a “Science With And For Society” project funded under the EU’s H2020 program). We will present the project, its development and the key tasks that citizens are participating in, as well as its impact on the study of noise in the Advanced Virgo detector.

Collaboration

REINFORCE Consortium

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