

Third Gravi-Gamma Workshop: The multimessenger view of the black hole life cycle



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A Bayesian approach to pulsar timing and its applications to multi-messenger astrophysics

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The Fermi Large Area Telescope is enabling a revolution in pulsar physics, having detected almost 300 gamma-ray pulsars. Many Fermi pulsars show glitches, and one of them, the radio-quiet PSR J2021+4026, is variable on a time scale of a few years. Pulsar glitches are considered as possible sources of detectable gravitational waves and probes of neutron star interiors. Therefore, multi-messenger astrophysics could benefit of a monitoring infrastructure and a systematic study of glitches in Fermi-LAT pulsars. We will report on GLIMPSE, a Python toolkit for the analysis of gamma-ray pulsar glitches. Our analysis pipeline consists in a Bayesian search for a periodic signal in the presence of a glitch, and it has the goal of estimating the parameters of a pulsar timing model. The product of this pipeline will be a table containing parameters for all detected events, which will be periodically updated. For each glitch we will include the amplitude of the expected gravitational wave signal, which will be inferred starting from models for neutron star interiors. Results will be available on a web application and could be used to plan targeted searches for gravitational-wave transients. Here we will present some preliminary results obtained using this infrastructure, and we will discuss its future applications to multi-messenger astrophysics.

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Session Classification: Stellar and Intermediate black holes