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PyGRB: A matched filtering triggered gravitational-wave search pipeline

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(pdf version attached)

Ever since the observation of GW170817 provided evidence for binary neutron star mergers as sources of gravitational waves and other transient emissions such as short gamma-ray bursts, the development of electromagnetically informed gravitational-wave analysis pipelines has gained relevance in the astrophysics community [2, 1, 3, 4]. In this talk, I will illustrate the most recent implementation of PyGRB, a coherent gravitational-wave search that uses matched filtering and targets the time and sky locations of electromagnetic transients, typically short gamma-ray bursts. The coherent matched filtering implementation for a multidetector network will be shown in detail, highlighting differences with respect to typical all-sky coincident searches. Finally, performance measurements and test runs will be shown as proof of concept for its usage.

References

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- [3] A. R. Williamson, C. Biwer, S. Fairhurst, I. W. Harry, E. Macdonald, D. Macleod, and V. Predoi. Improved methods for detecting gravitational waves associated with short gamma-ray bursts. *Phys. Rev. D*, 90(12):122004, 2014.
- [4] Andrew Robert Williamson. Gravitational waves with gamma-ray bursts. PhD thesis, Cardiff U., Cardiff University, 2016.

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