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INTEGRAL follow-up of the gravitational wave events

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We exploit observations of the INTErnational Gamma-Ray Astrophysics Laboratory (INTEGRAL) to search for gamma-ray and hard X-ray emission associated with the gravitational wave events discovered during scientific runs of Advanced LIGO and Advanced Virgo. The highly eccentric orbit of INTEGRAL ensures high duty cycle, long-term stable background, and unobstructed view of the nearly entire sky. This enables us to use a combination of INTEGRAL instruments (SPI-ACS, IBIS/Veto, and IBIS) to constrain the fraction of energy emitted in the hard X-ray electromagnetic component for the full high-probability sky region of almost every single LIGO trigger.
For binary black-hole mergers, the fraction of the energy promptly released in gamma-rays in 75 keV–2 MeV energy range in the direction of the observer is constrained to be less than one millionth of the gravitational wave energy, in the majority of the localization region. Moreover, in the case of a favorable orientation, INTEGRAL high-energy imaging instruments, IBIS, SPI, and JEM-X, provide the unique opportunity to search also for long-lasting electromagnetic counterparts over 3 decades in energy, from 5 keV to 8 MeV.
The historical detection of GRB170817a/GW170817 demonstrated the INTEGRAL potential to detect gamma-rays from a binary neutron star merger. Besides serendipitous observations, for the third observing run, we plan to perform a very rapid follow up in case of electromagnetic loud event.

Topic

Multi-messenger and transient astronomy

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