

# Interoperability and automation in searches for Hard X-ray counterparts of multi-messenger transients with INTEGRAL

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INTEGRAL observatory is equipped with a collection of detectors monitoring the entire hard X-ray sky with over 80% duty cycle, and able to re-point to perform deep and sensitive hard X-ray observations of a large selected sky region. This makes INTEGRAL uniquely valuable in searches for elusive, unpredictable, and short-lived hard X-ray and gamma-ray counterparts of multi-messenger transients.

I will review the follow-up and dissemination strategy we have developed in these searches, which have in particular allowed to maximize scientific benefit of the first confident detection of the multi-messenger transient. These strategies continue to form the basis of the INTEGRAL follow-up activity of gravitational wave transients in the ongoing LIGO/Virgo O3 run.

I will outline how semantically-annotated network of real-time services enables the complete workflow starting from parsing of the emerging scientific information in the machine-formatted alerts as well as human-made publications, then proceeding to the inference of new useful scientific conjectures, and concluding with publishing the provenance-enabled ontology-annotated results in outgoing alerts and linked-data online publications.

The core of the platform is built around the mechanisms of workflow introspection and flexible interface-first modular development, allowing the researchers to efficiently contribute to the constant improvement and operations of the platform by leveraging their core competencies in the collaborative research environment. The synergies and interoperability interfaces developed between different tiers of the platform and external collaborators enable its integration into the larger research and discovery process.