

Astro-COLIBRI: The coincidence library for real-time inquiry for multi-messenger astrophysics

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Flares of known astronomical sources and new transient phenomena occur on different timescales, from sub-seconds to several days or weeks. The discovery potential of both serendipitous observations and multi-messenger and multi-wavelength follow-up observations could be maximized with a tool which allows for quickly acquiring an overview over both persistent sources as well as transient events in the relevant phase space. We here present COincidence LIBrary for Real-time Inquiry (Astro-COLIBRI), a novel and comprehensive tool for this task.

Astro-COLIBRI's architecture comprises a RESTful API, a real-time database, a cloud-based alert system and a website as well as apps for iOS and Android as clients for users. The structure of Astro-COLIBRI is optimized for performance and reliability and exploits concepts such as multi-index database queries, a global content delivery network (CDN), and direct data streams from the database to the clients to allow for a seamless user experience. Astro-COLIBRI evaluates incoming VOEvent messages of astronomical observations in real time, filters them by user specified criteria and puts them into their MWL and MM context. The clients provide a graphical representation with an easy to grasp summary of the relevant data to allow for fast identification of interesting phenomena and provides an assessment of observing conditions at a large selection of observatories around the world.

In this contribution, the key features of Astro-COLIBRI are presented. We'll outline the architecture, summarize the used data resources and provide examples for applications and use cases. Focussing on the high-energy domain, we'll for example illustrate the search for high-energy gamma-ray counterparts to high-energy neutrinos, gamma-ray bursts and gravitational waves.

Keywords

software; multi-messenger; real-time; alerts; transients; GRB; neutrinos; gamma-rays; smartphone

Collaboration

other Collaboration

Subcategory

Experimental Methods & Instrumentation

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