ID de Contribution: **1** Type: **Non spécifié**

Early identification of optical tidal disruption events with the Fink broker

jeudi 17 juillet 2025 09:00 (30 minutes)

Detecting Tidal Disruption Events (TDEs) candidates early is essential for follow-up observations at peak brightness, enabling confirmation of their nature and a deeper understanding of their complex multi-wavelength behavior. TDEs are rare events, and their detection is one of the key goals of large ground optical facilities, such as the Zwicky Transient Facility (ZTF) and the upcoming Vera C. Rubin Observatory. However, managing their vast alert streams requires automated pipelines that identify the nature of the detected events. We introduce a module developed within the Fink alert broker, designed to enable the early identification of TDEs observed by ZTF.
A first step consists in the automatic selection of light curves compatible with a rising transient scenario. It is followed by a tailored feature extraction based on a multi-band fit of the rising part of the light curves. It enables the computation of physically-motivated features, such as temperature and rise time, which are essential to distinguish TDEs from other long-lasting transients. Finally, a machine learning classifiers trained on a sample of high quality TDEs to distinguish similar events, with and without additional features related to the distance to host galaxy. Despite the challenge offered by the sparse and highly imbalanced training dataset, the classifiers provides reasonably completeness and purity metrics.

The talk describes the training of the classifier on archival data, implementation of the module inside Fink broker that reports the candidates in nearly real time, and presents several promising candidates identified during the development, as well as the perspectives of adaptation of this approach for the upcoming Rubin Observatory' Legacy Survey of Space and Time data stream.

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Classification de Session: Science