Transient alert processing, analysis and distribution using AMPEL

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Abstract

Multi-messenger astronomy and new high-throughput wide-field surveys require flexible tools for the selection and study of astrophysical transients. We here introduce a streaming data analysis framework named AMPEL (Alert Management, Photometry and Evaluation of Lightcurves). AMPEL's modular design enables user contributed units to run on live data during processing. Units can filter alerts, calculate new transient properties and submit requests for external review or follow-up observations. The embedding framework encourages provenance and records the varying information states that a transient displays. The state concept includes information gathered over time, but also tracks varying data access levels and e.g. improved calibration. AMPEL can ingest information from different alert streams and broker this to a variety of facilities and online resources.

After introducing AMPEL, we will discuss lessons learned from processing the first year of Zwicky Transient Facility (ZTF) optical detections together with LIGO/VIRGO and IceCube real-time alerts. Finally, we will show how anyone can use AMPEL for analysing and reacting to the ZTF alert stream.