

Photometric Science Alerts from Gaia

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1 Abstract

Gaia is a European Space Agency (ESA) astrometry space mission, and a successor to the ESA Hipparcos mission. The main goal of the Gaia mission is to collect high-precision astrometric data (i.e. positions, parallaxes, and proper motions) for the brightest one billion objects in the sky. This data, complemented with G band, multi-epoch photometric and low resolution (lowers) spectroscopic data collected from the same observing platform, will allow astronomers to reconstruct the formation history, structure, and evolution of the Galaxy.

In addition, the Gaia satellite is an excellent transient discovery instrument, covering the whole sky (including the Galactic plane) for the next 5 years, at high spatial resolution (50 to 100 mas, similar to the Hubble space telescope (HST)) with precise photometry (1% at G=19) and milliarcsecond astrometry (down to ~ 20 mas). Thus, Gaia provides a unique opportunity for the discovery of large numbers of transient and anomalous events, e.g. supernovae, black hole binaries and tidal disruption events. We discuss the validation of the alerts stream for the first six months of the Gaia observations, in particular noting how a significant ground based campaign involving photometric and spectroscopic followup of early Gaia alerts is now in place. We discuss the validation approach, and highlight in more detail the specific case of Type Ia supernova (SNe Ia) to be discovered by Gaia. The intense initial ground based validation campaign will ensure that the Gaia alerts stream for the remainder of the Gaia mission, are well classified.

2 What is a Photometric Science Alert?

A photometric science alert is the appearance of a new source, or a change in flux, which suggests we could learn something from prompt ground-based follow-up. This