Stellar flares with PLATO

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Abstract

Stellar flares are powerful localized eruptions caused by magnetic reconnection events in a star's magnetosphere that can be seen across the entire electromagnetic spectrum. Over short timescales of minutes to a few hours, they emit energies up to 10^38 erg.
Flares are important diagnostics for our understanding of coronal physics as well as the evolution of planetary atmospheres. While flares with energies > 10^34 erg can lead to an erosion of the ozone layer of the planet's atmosphere when they occur frequently enough, a minimum flare frequency and energy might be required to trigger chemical reactions that are necessary for the development of life.
The PLATO mission with its unprecedented precision, short cadence and long observational baseline, is ideally suited to study stellar white-light flares in up to now unrivaled detail. Flares will be identified
within the PLATO pipeline MSAP1 with a code developed by the PLATO WP 123 700 ("Stellar flares") both in order to remove stellar variability from the light curves and to extract astrophysically important information. The first prototype of the code was already delivered to the PDC.
In this talk I provide a brief summary of the work carried out in the PLATO WP and I will show examples of applications of the flare detection algorithm we develop for MSAP1 to selected stellar samples, e.g. the 10pc M dwarf sample or the Kepler Superflare sample. Furthermore, I will show how the derived flare properties help to estimate the effects of flaring on the habitability of exoplanets.

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