

Stellar Flares in Hiding

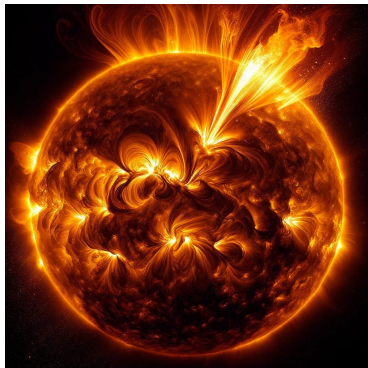
Detecting Stellar Flares from TESS Mission Photometric Data

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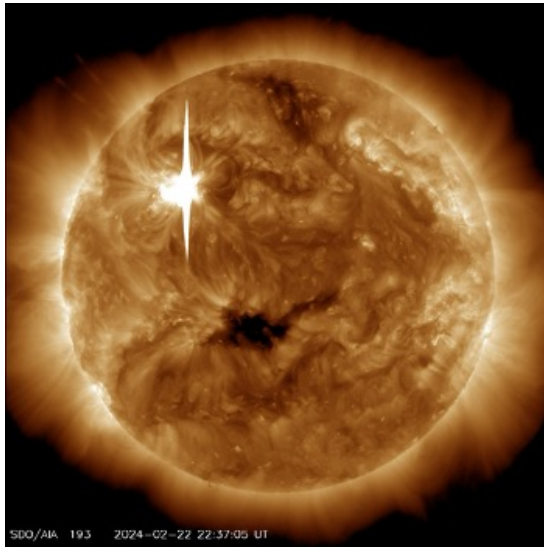
Stellar Flares

Bursts of energy emitted from a star that are thought to be caused by magnetic reconnection.



- Magnetic fields' evolution
- Rotation and mass-loss rates
- Energetic radiation environment

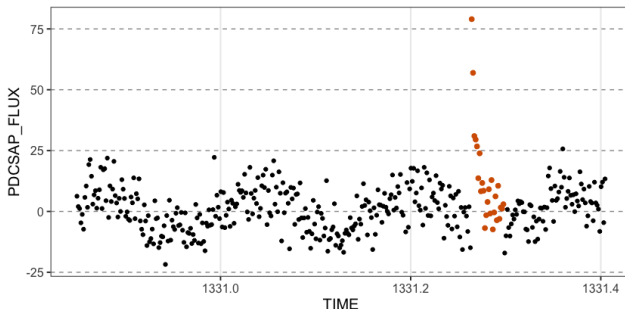
Real Flare



Captured by NASA's Solar Dynamics Observatory

Stellar Flares Detection

Flares are detected in the time series data of a star's brightness measurements, and are usually indicated by sudden increased brightness and followed by an exponential decay.



- Transiting Exoplanet Survey Satellite (TESS)
- We use the Pre-search Data Conditioning Simple Aperture Photometry (PDCSAP) flux
- 2 minutes cadence
- Hundreds of stars available



Flare Detection Challenges

- Most stars exhibit quasi-periodic oscillations in their brightness over time
- Current methods rely on multi-stage data processing?
- Low energy flares may be absorbed by the detrending process
- Significant uncertainty about the duration of the flares?