

Exploring Short-Term Stellar Activity in dM Stars

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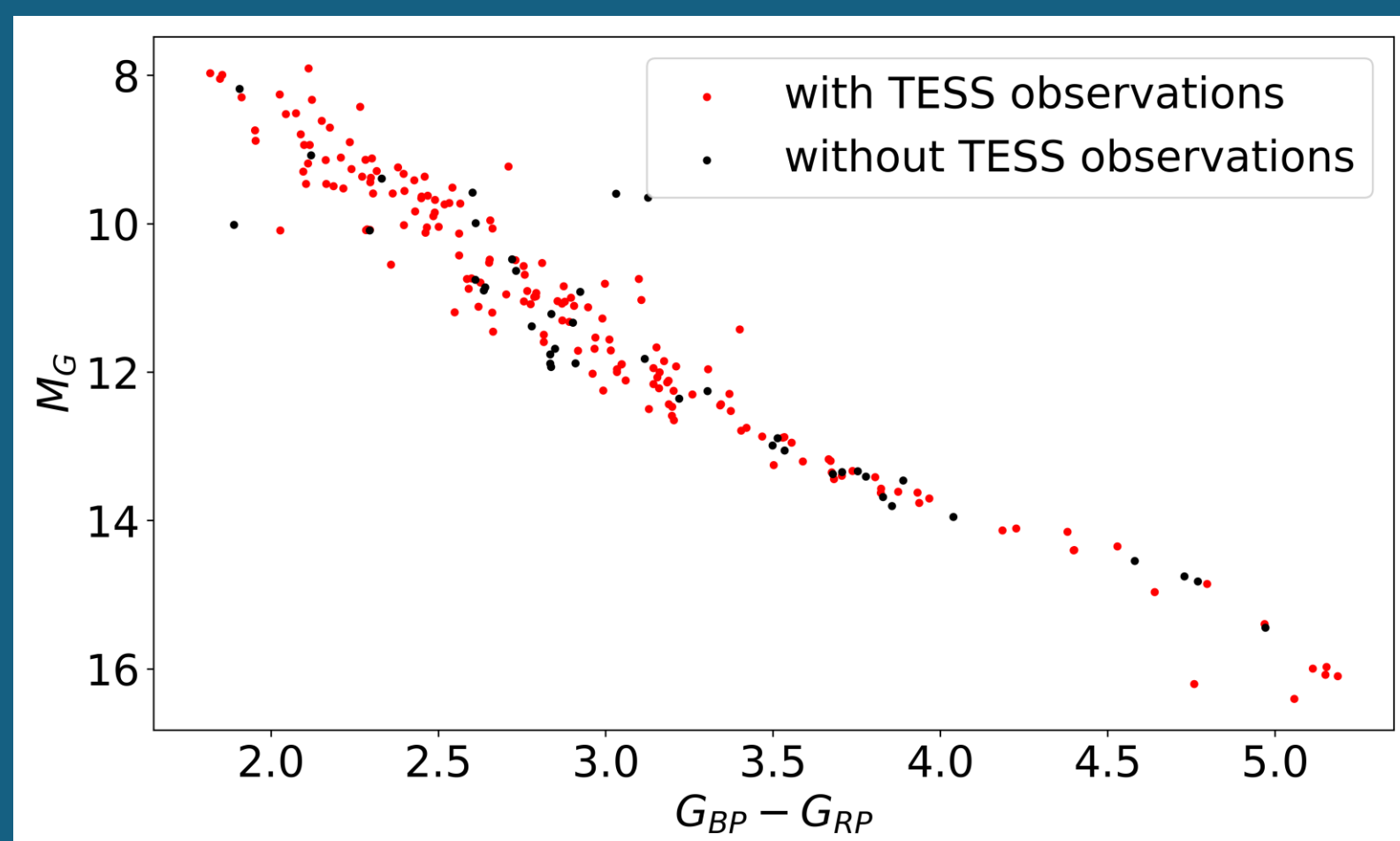
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Goal

The **objective** of this work is to define the flaring properties of an unbiased, volume-limited sample of M-type stars. Using the Transiting Exoplanet Survey Satellite (TESS), we aim to characterize the frequency, energy distribution, and temporal properties of flares in nearby stars.

Method

Sample: 173 M stars within 10 pc of the Sun from the Gaia with a TESS counterpart (751 TESS sectors).



Bolometric luminosity computed using the tool VOSA (Virtual Observatory SED Analyzer) (Rodrigo et al. 2020).

Method based on Colombo et al. (2022):

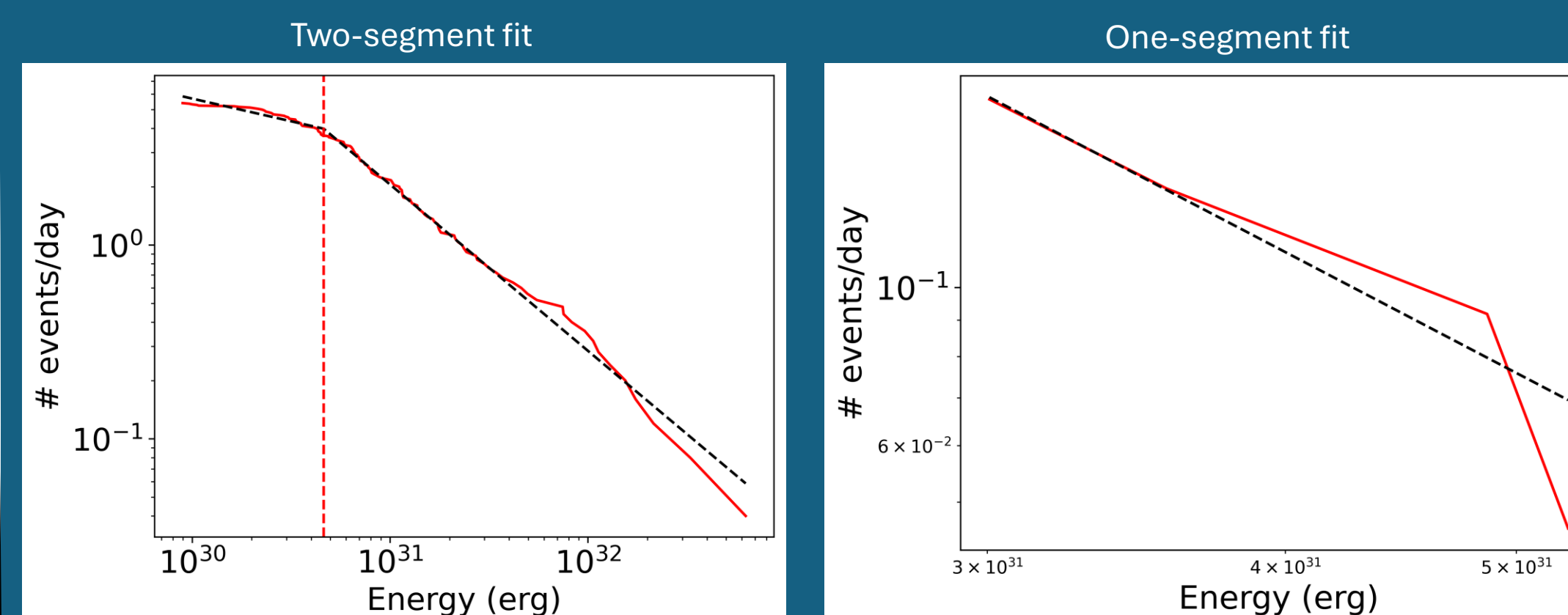
- Identify and remove the contributions of long-term stellar variability on the lightcurve.
- Recognize impulsive events having properties typical of flares.
- Calculate amplitudes, time scales, and amounts of energy emitted.

Results

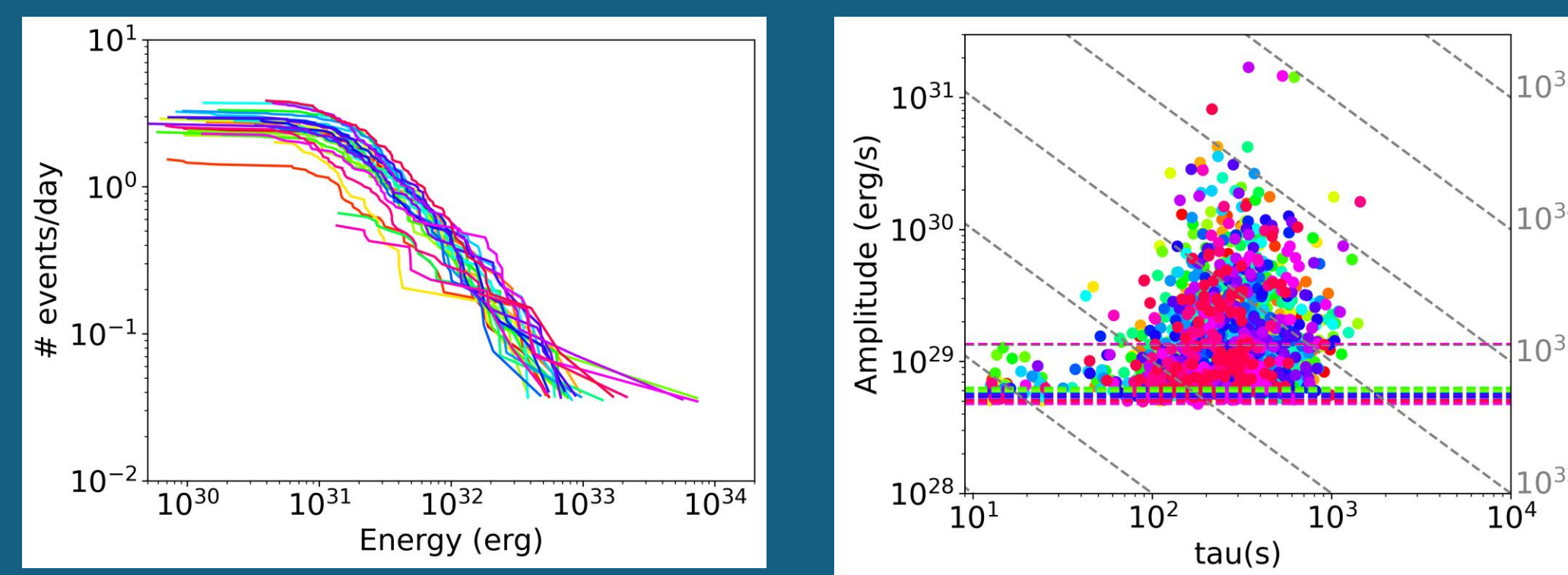
We detect 17229 flares.

For each star, we produced a cumulative flare energy distribution.

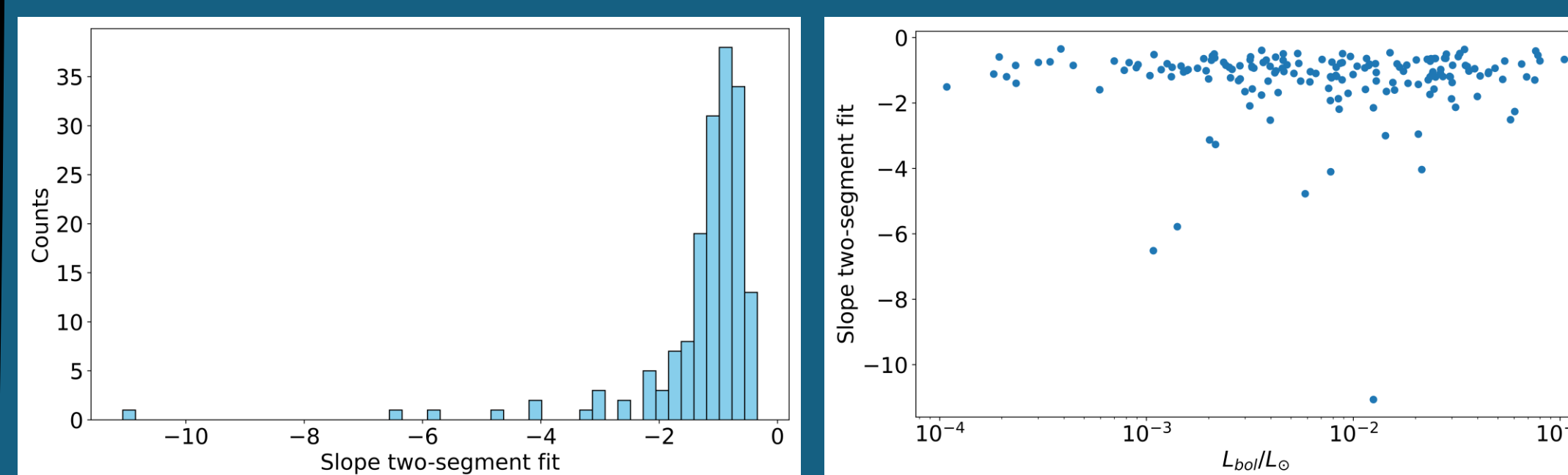
Our tool determines the slopes and the energy break of the cumulative curves.



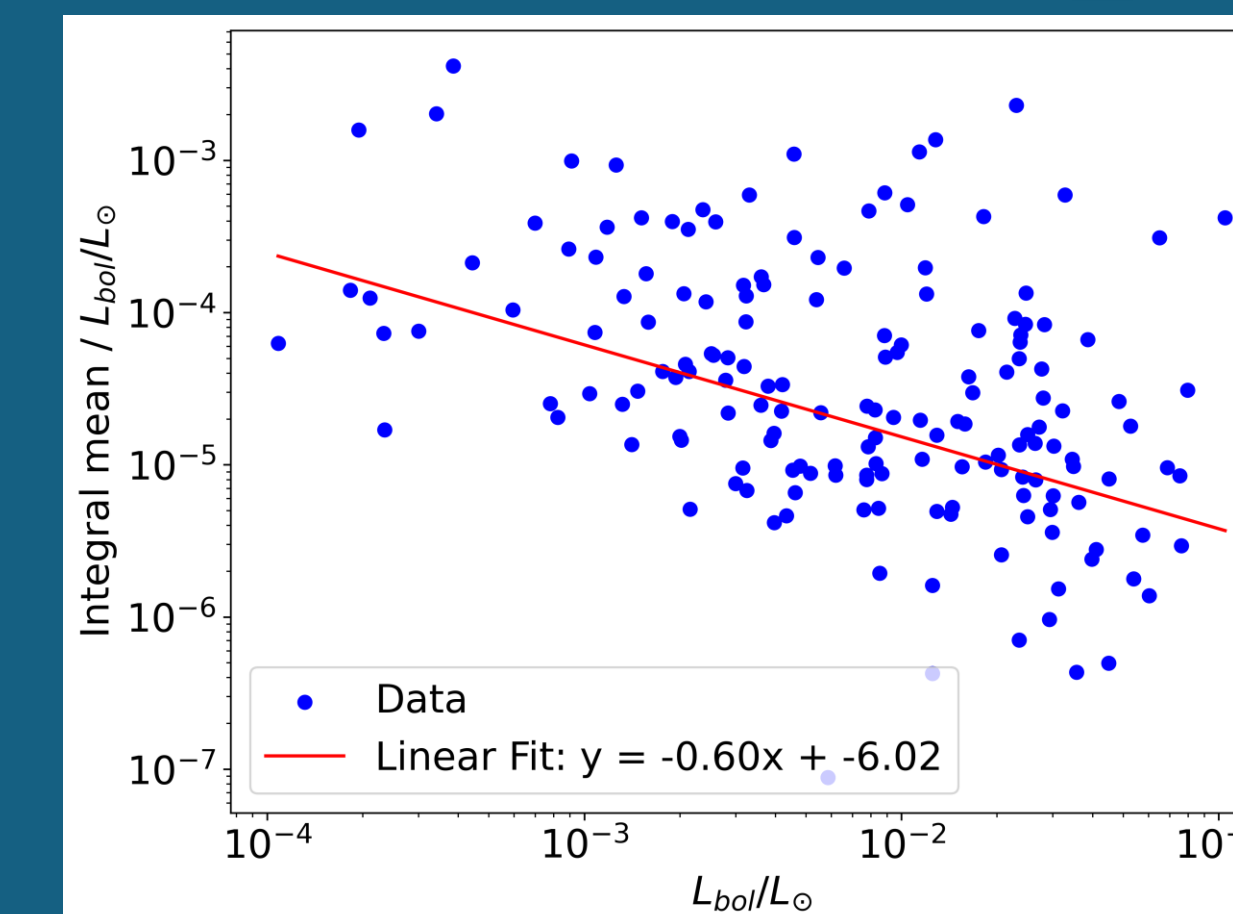
Cumulative Frequency Energy distribution



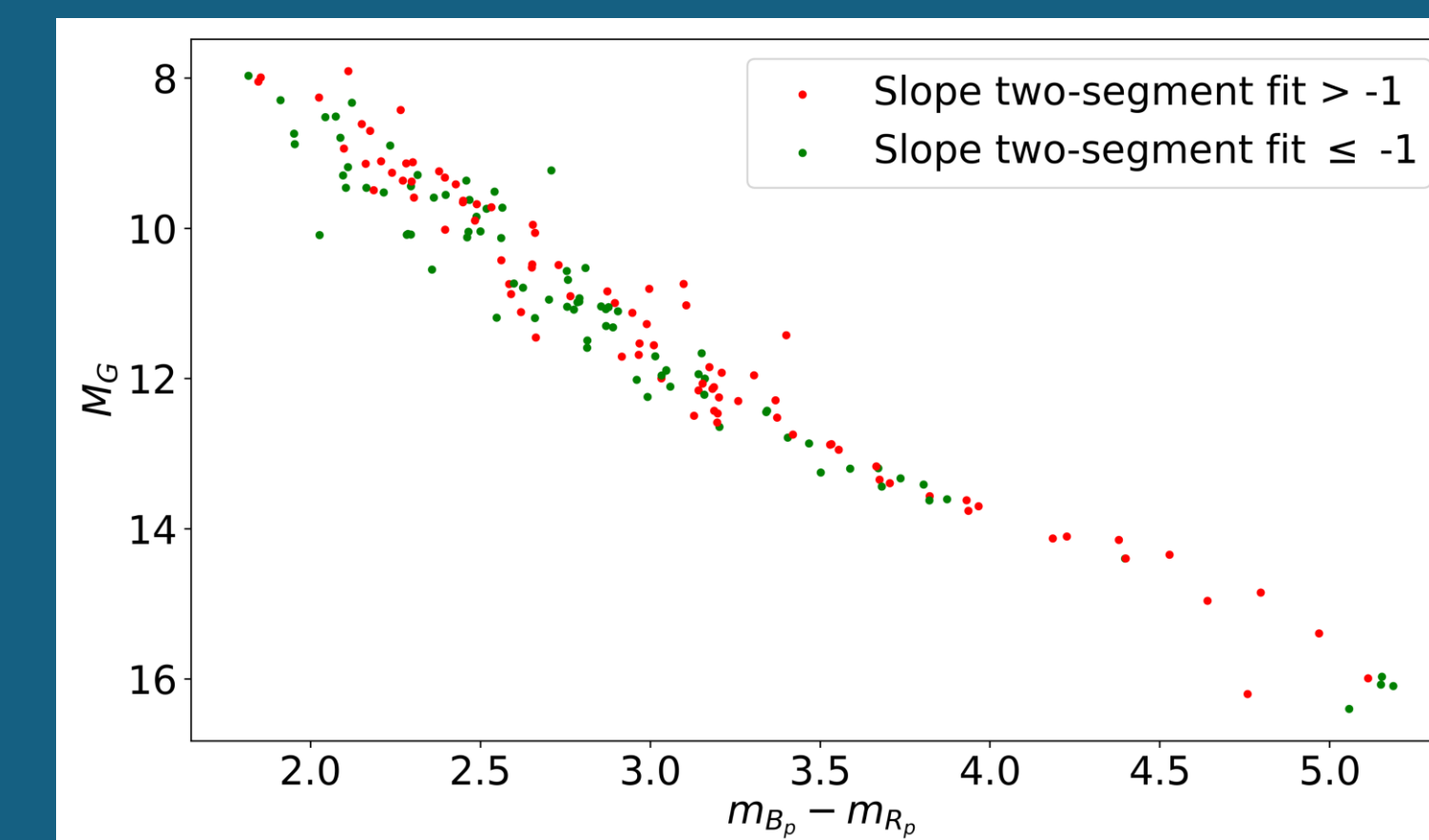
Method	Slopes mean \pm std	# sectors
Two-segment fit	-1.23 ± 1.32	651
One-segment fit	-0.72 ± 0.64	100



Conclusions



Faint stars are dominated by high energy flares (flatter slopes), bright stars are dominated by low energy flares (steeper slopes).



References

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- Ricker, G. R., Vanderspek, R., Winn, J., et al. 2016, in Space Telescopes and In-strumentation 2016: Optical, Infrared, and Millimeter Wave, Vol. 9904, SPIE,767-784
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Acknowledgements

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