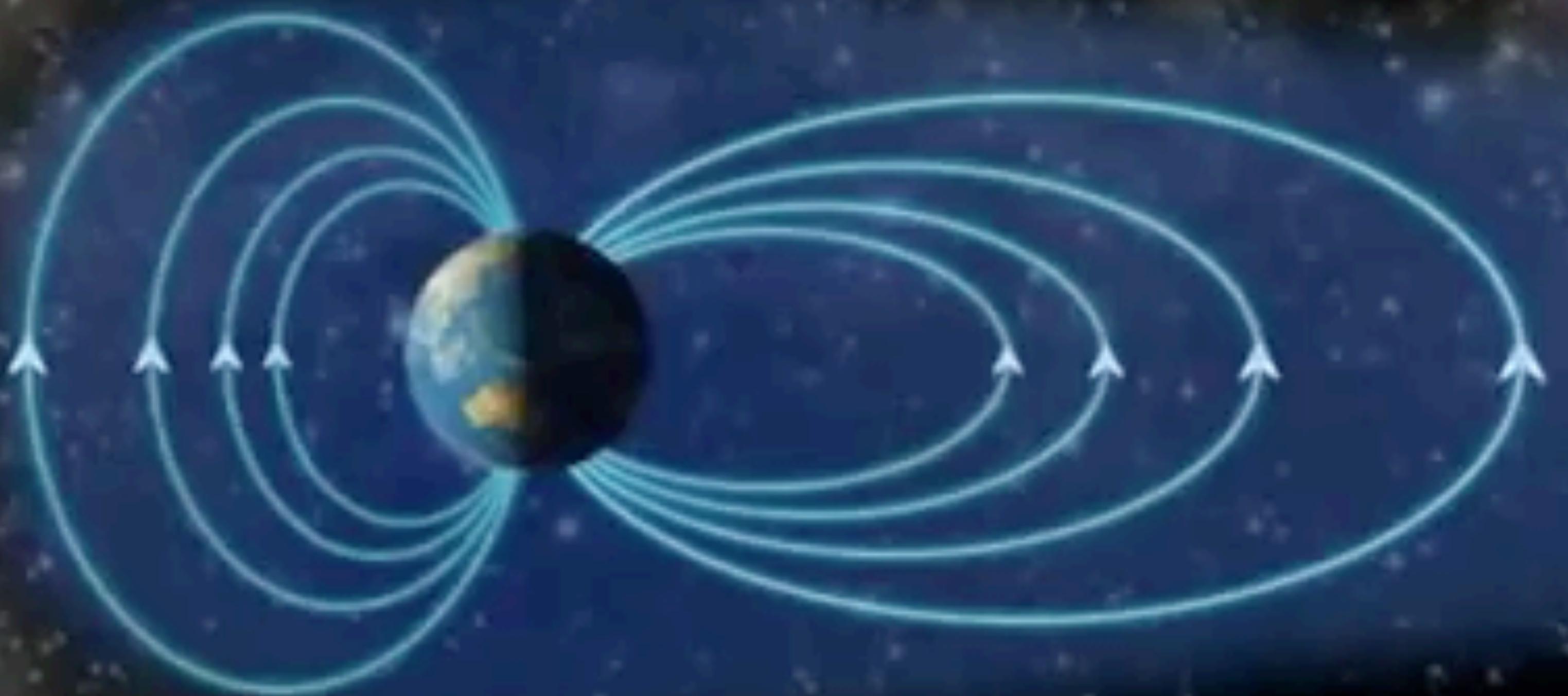




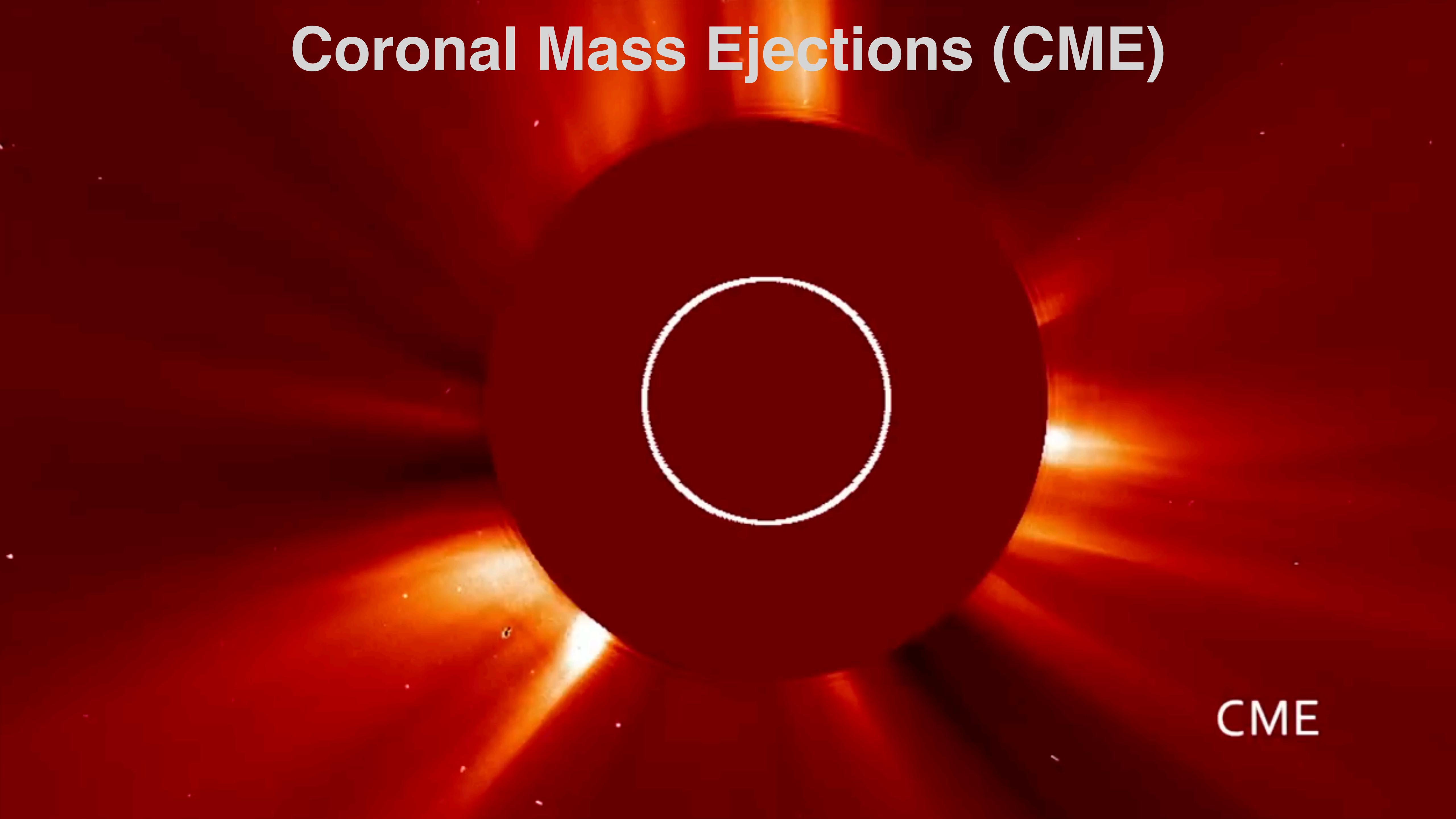


MACIEJ WINIARCZYK ©2014

Creation of Aurorae

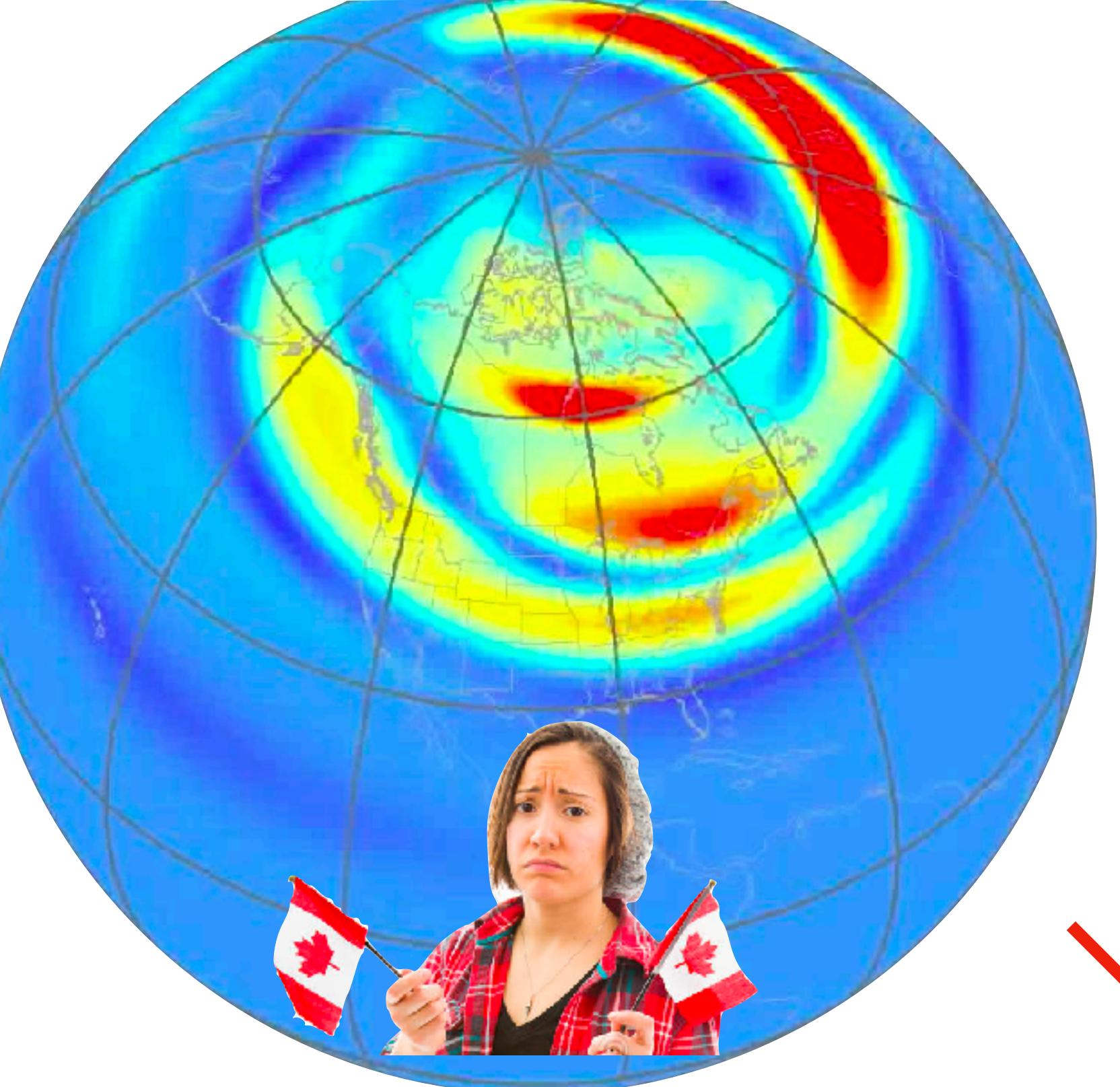


Coronal Mass Ejections (CME)



CME

Often dangerous



1989



1972



2022

BUT ALWAYS INTERESTING!

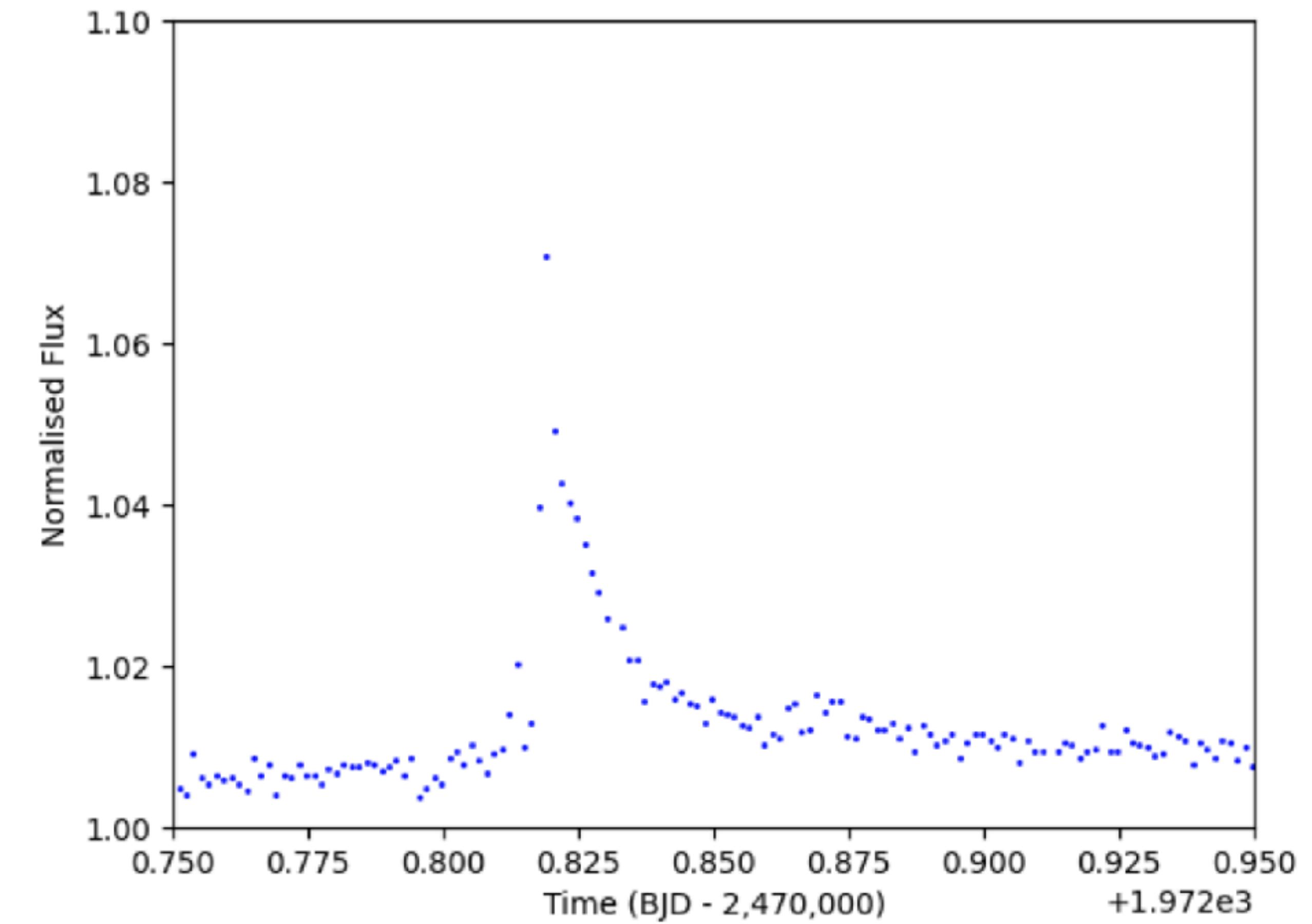
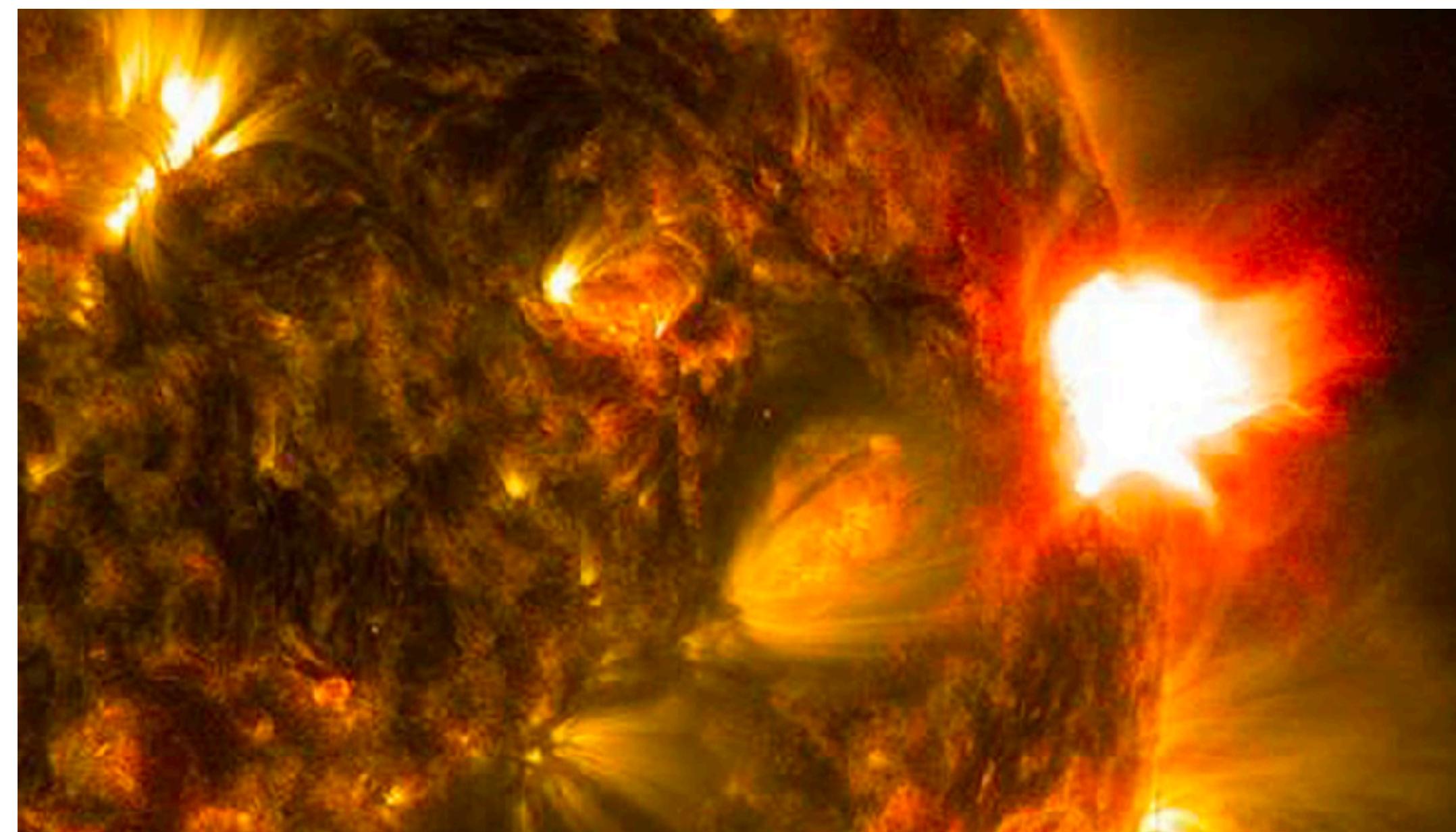
Flares vs Coronal Mass Ejections (CMEs)

Flares vs Coronal Mass Ejections (CMEs)

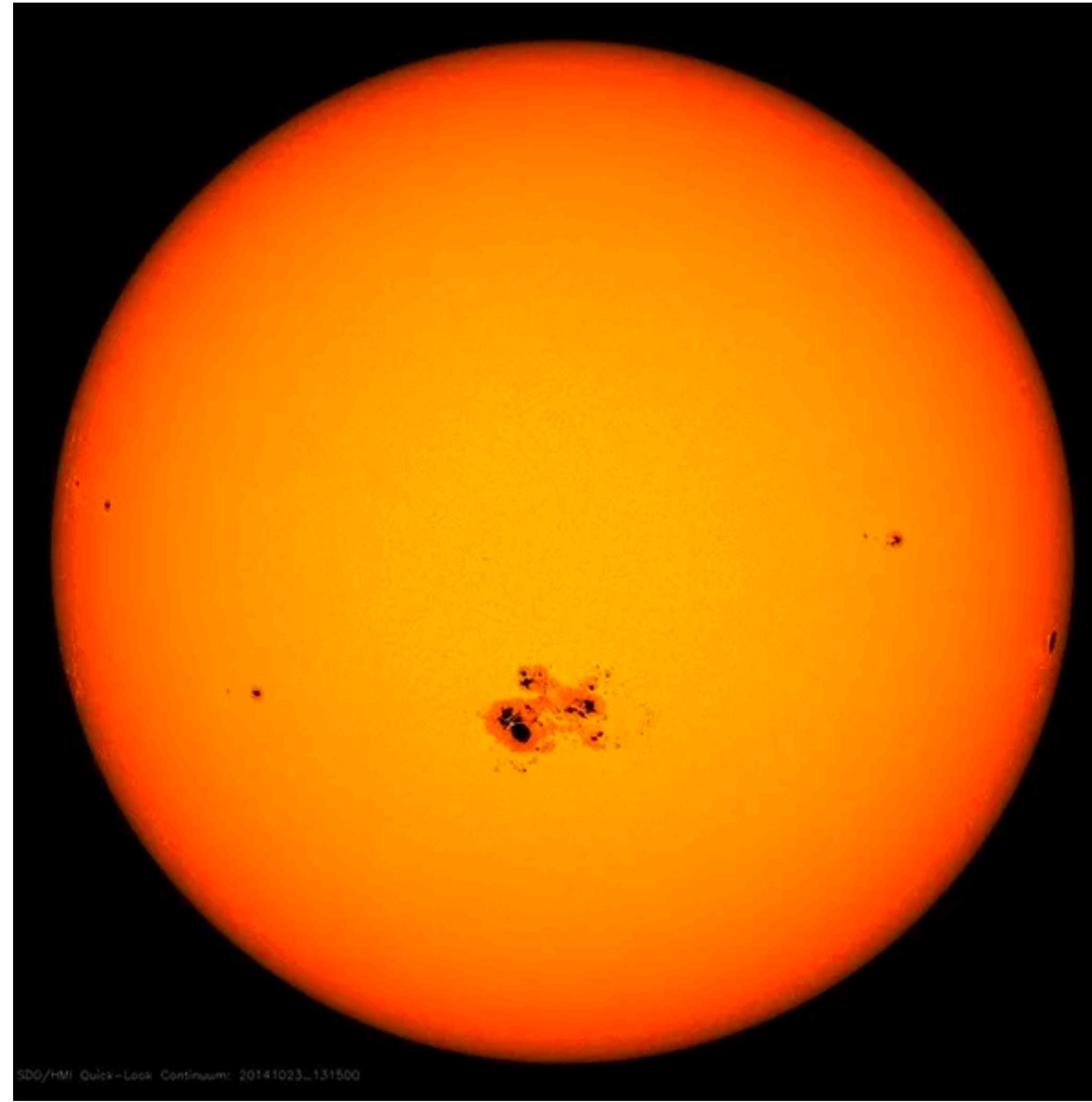


Flare

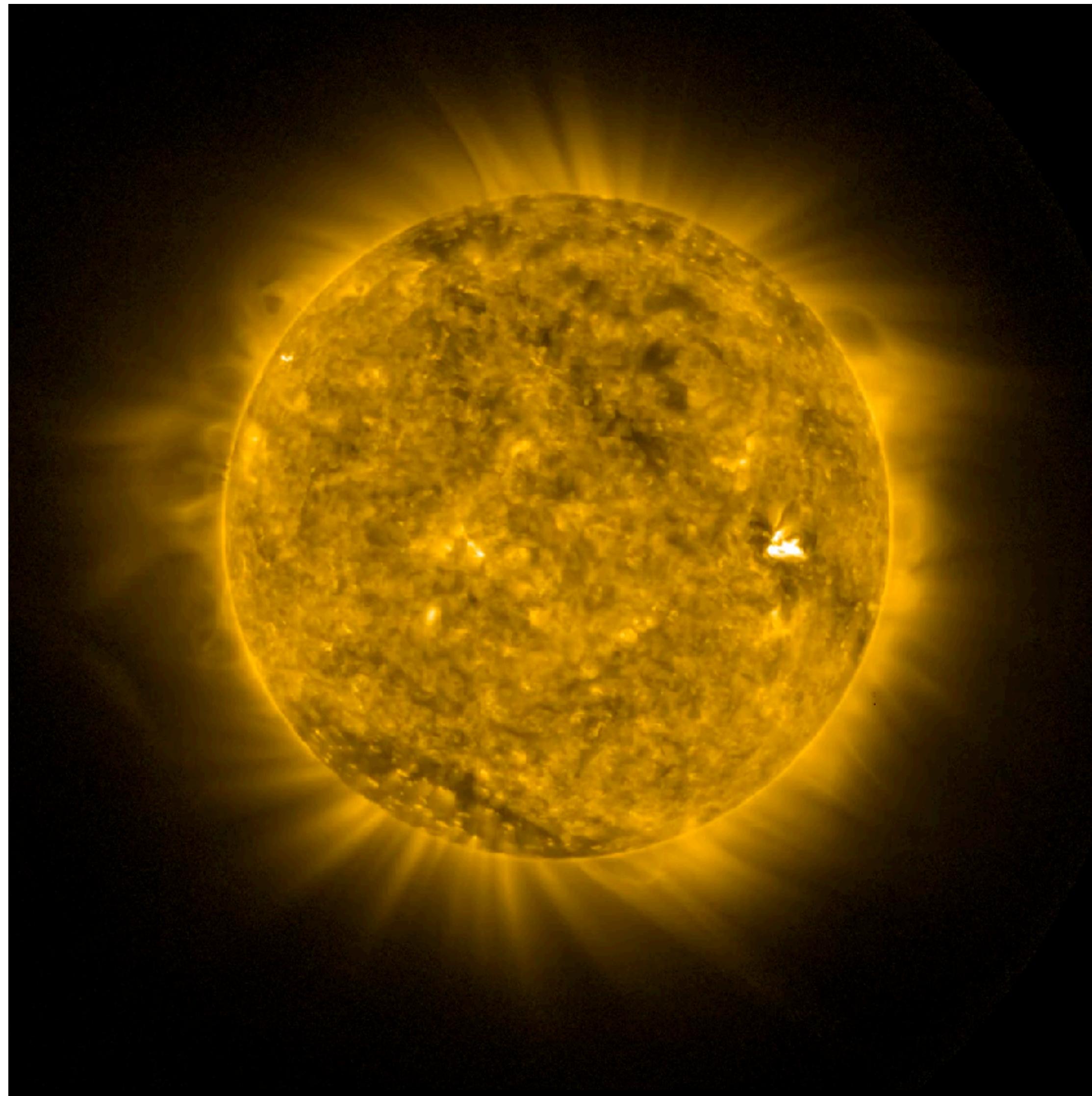
We can observe flares with photometry!



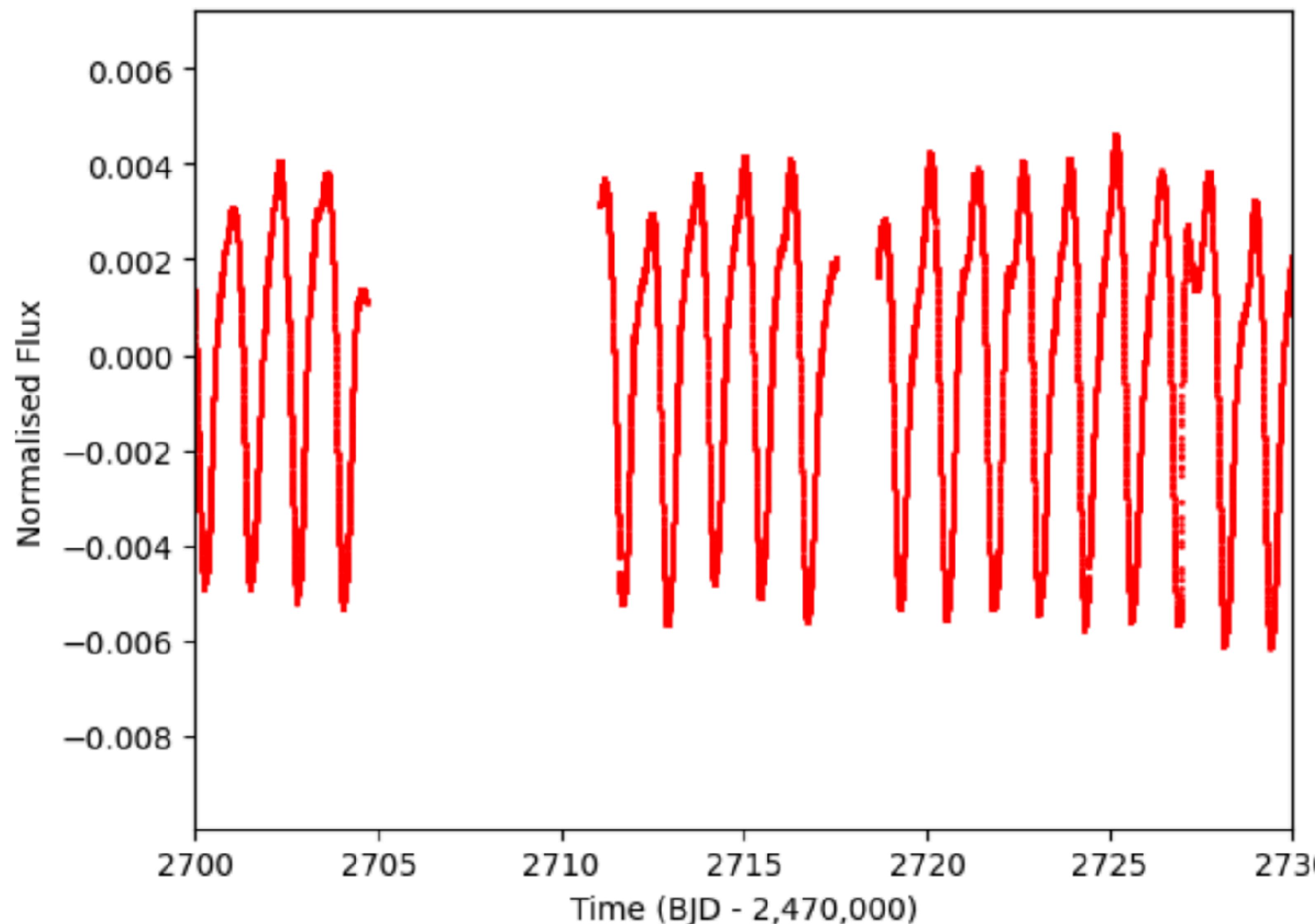
Another sign of stellar activity is star spots



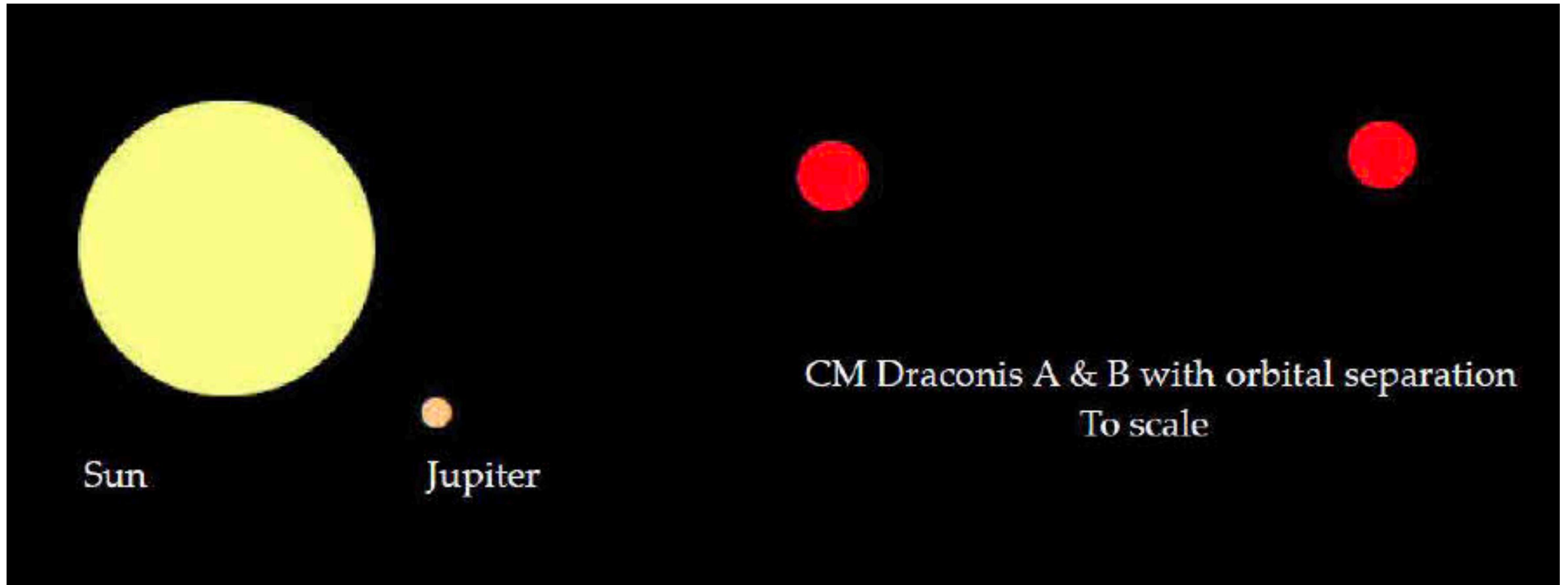
Stars rotate



We can observe spot rotation with photometry!

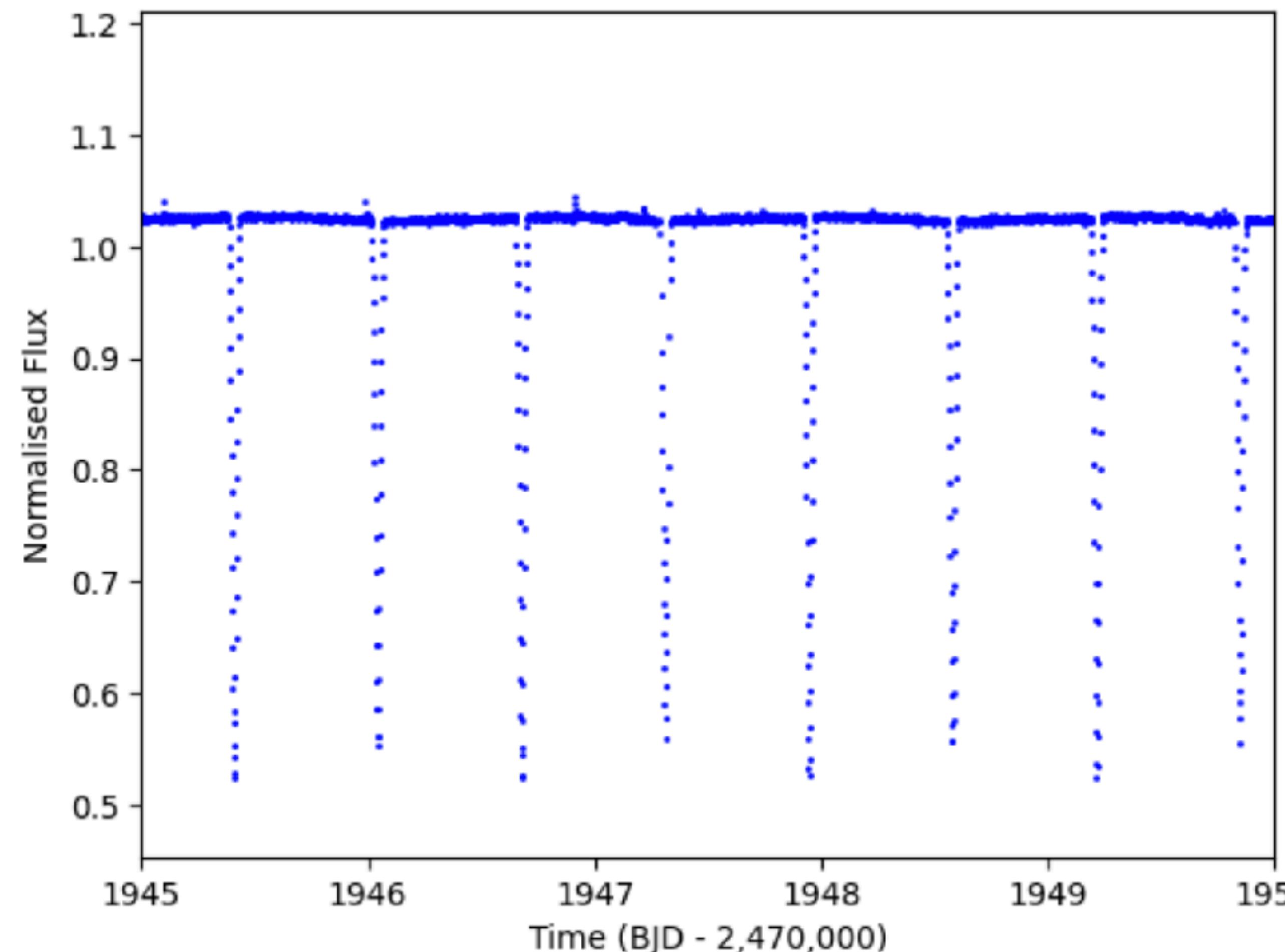


A special eclipsing binary is CM Draconis

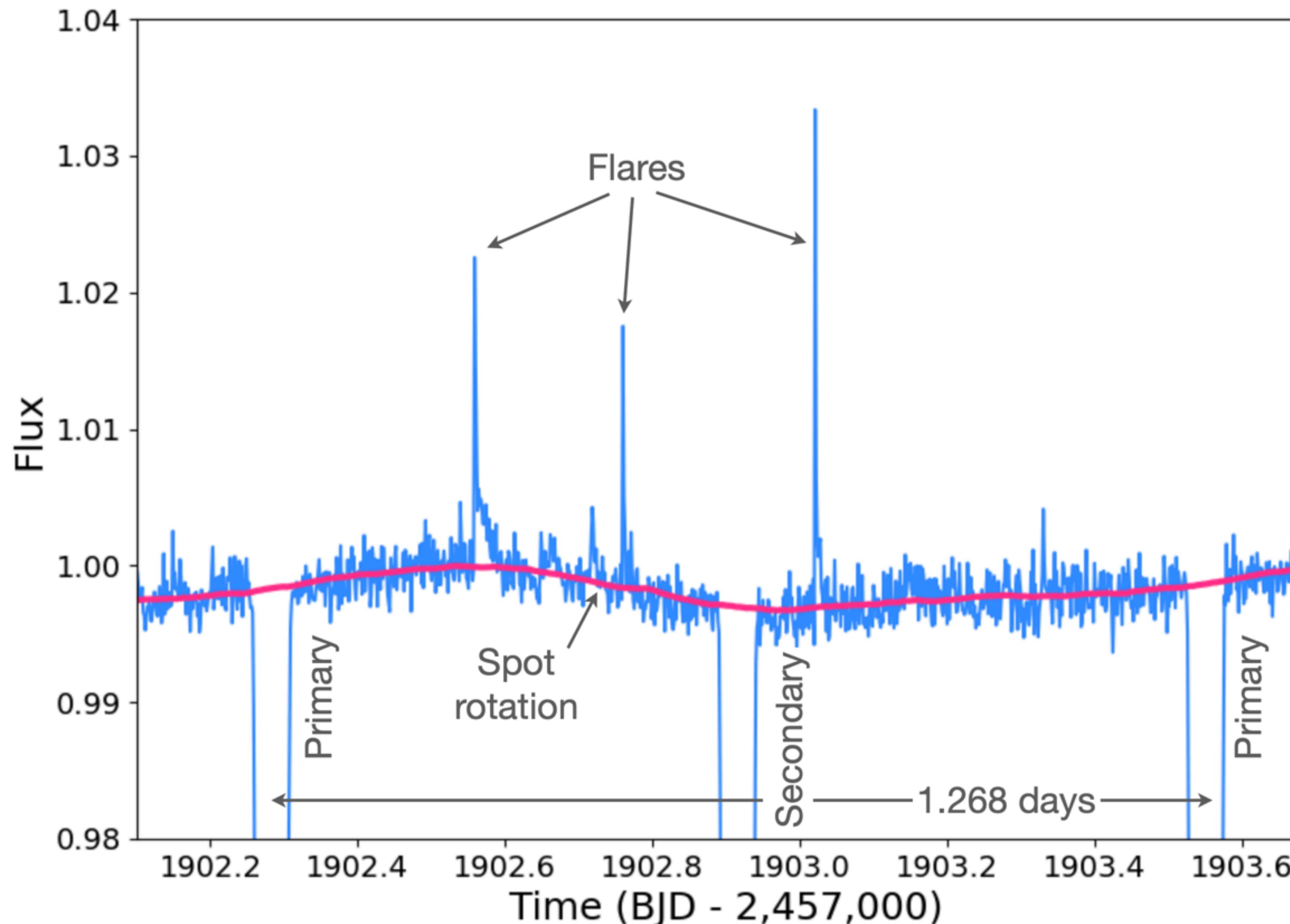


Orbital period of 1.268 days

Almost perfectly edge-on!



Features spots, flares and eclipses!



Your mission, should you choose to accept it

Your mission, should you choose to accept it

And you probably should, given...

Your mission, should you choose to accept it

And you probably should, given...

Grades

Study the relationship between flares and spots

Study the relationship between flares and spots

Reproduce old results published in 2024 paper



MNRAS **528**, 963–975 (2024)
Advance Access publication 2024 January 9



<https://doi.org/10.1093/mnras/stae015>

The benchmark M dwarf eclipsing binary CM Draconis with *TESS*: spots, flares, and ultra-precise parameters

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Study the relationship between flares and spots

Reproduce old results published in 2024 paper

Produce new results for bonus points!

Study the relationship between flares and spots

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Do it as a Jupyter notebook tutorial

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Accompanying public outreach presentation

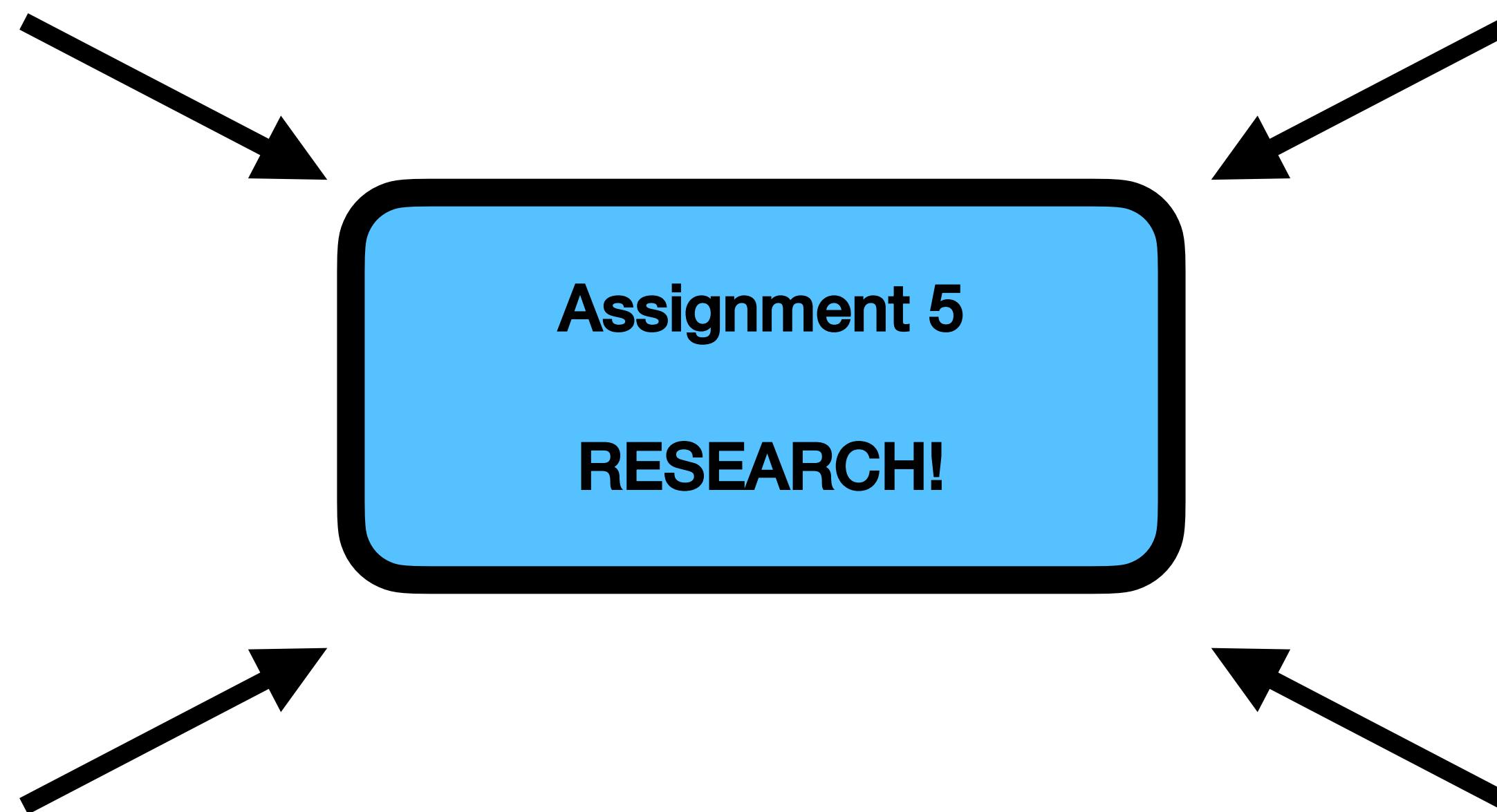
Assignment 1
Plotting

Assignment 3
Stats, Flares & Spots

Assignment 5
RESEARCH!

Assignment 2
Distributions & Binaries

Assignment 4
MCMC, Fitting Data



Questions?