# Astronomers uncover risks to planets that could host life

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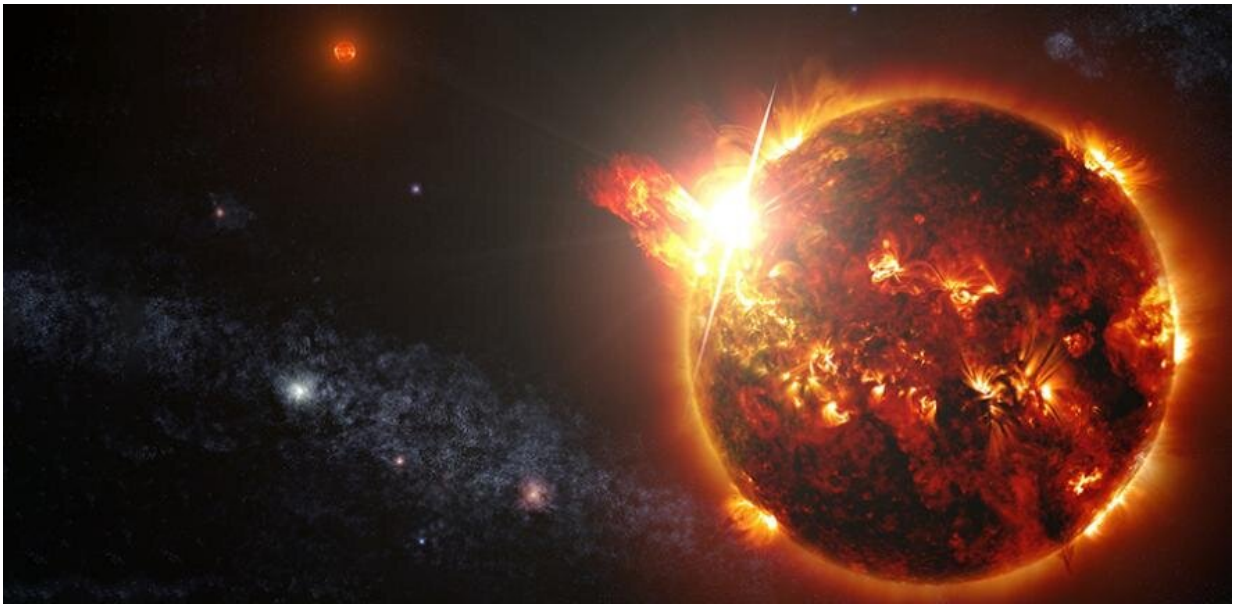


A red dwarf star unleashes a series of powerful flares. Credit: Scott Wiessinger/NASA

Astronomers have discovered that red dwarf stars can produce stellar flares that carry far-ultraviolet (far-UV) radiation levels much higher than previously believed.

The discovery suggests that the intense UV radiation from these flares could significantly impact whether planets around red dwarf stars can be

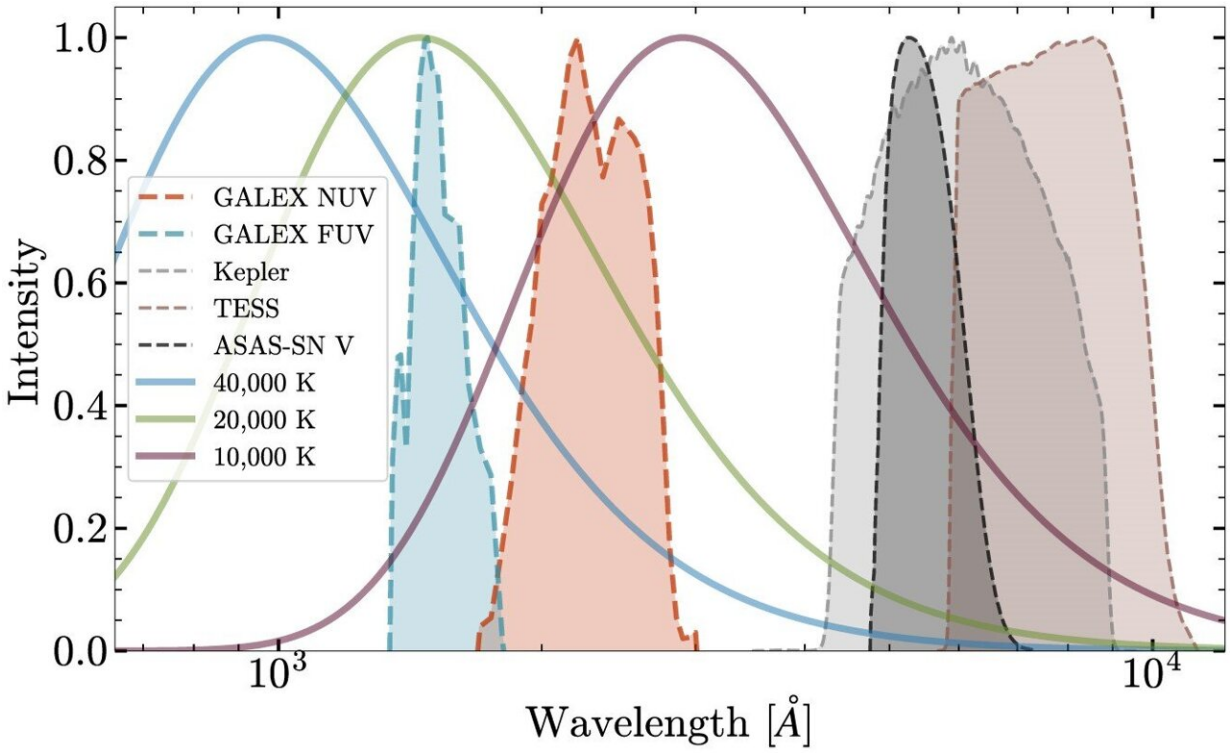
habitable.

"Few stars have been thought to generate enough UV radiation through flares to impact planet habitability. Our findings show that many more stars may have this capability," said first author Vera Berger, who led the research while based at the University of Hawai'i and who is now based at the University of Cambridge.

Berger and her team used archival data from the GALEX space telescope to search for flares among 300,000 nearby stars. GALEX is a now-decommissioned NASA mission that simultaneously observed most of the sky at near-and far-UV wavelengths from 2003 to 2013. Using new computational techniques, the team mined insights from the data.

"Combining modern computer power with gigabytes of decades-old observations allowed us to search for flares on thousands and thousands of nearby stars," said co-author Dr. Michael Tucker from Ohio State University.

According to researchers, UV radiation from stellar flares can either erode planetary atmospheres, threatening their potential to support life, or contribute to the formation of RNA building blocks, which are essential for the creation of life.




Normalized blackbody curves (solid lines) spanning a range of observed temperatures plotted against filter response functions (dashed lines) for telescopes commonly used for flare studies. Credit: *Monthly Notices of the Royal Astronomical Society* (2024). DOI: 10.1093/mnras/stae1648

The study, published in the *Monthly Notices of the Royal Astronomical Society*, challenges existing models of stellar flares and exoplanet habitability, showing that far-UV emission from flares is on average three times more energetic than typically assumed, and can reach up to twelve times the expected energy levels.

"A change of three is the same as the difference in UV in the summer from Anchorage, Alaska to Honolulu, where unprotected skin can get a sunburn in less than 10 minutes," said co-author Benjamin J. Shappee from the University of Hawai'i.

The exact cause of this stronger far-UV emission remains unclear. The team believes it might be that flare radiation is concentrated at specific wavelengths, indicating the presence of atoms like carbon and nitrogen.

"This study has changed the picture of the environments around stars less massive than our sun, which emit very little UV light outside of flares," said co-author Jason Hinkle.

According to Berger, now a Churchill Scholar at Cambridge, more data from space telescopes is needed to study the UV light from stars, which is crucial for understanding the source of this emission.

"Our work puts a spotlight on the need for further exploration into the effects of stellar flares on exoplanetary environments," said Berger. "Using space telescopes to obtain UV spectra of stars will be crucial for better understanding the origins of this emission."

**More information:** Vera L Berger et al, Stellar flares are far-ultraviolet luminous, *Monthly Notices of the Royal Astronomical Society* (2024). DOI: 10.1093/mnras/stae1648

Provided by University of Cambridge