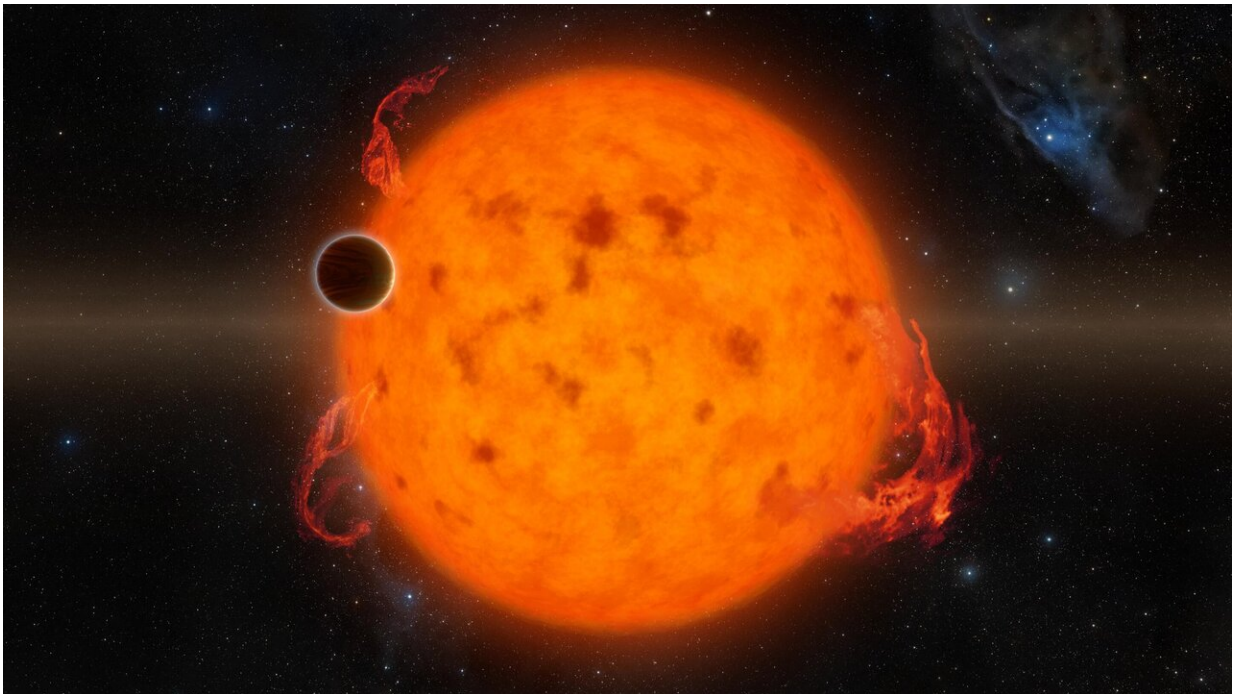


Researchers discover exoplanets can be made less habitable by stars' flares

December 15 2019



K2-33b, shown in this illustration, is one of the youngest exoplanets detected to date using NASA Kepler Space Telescope. It makes a complete orbit around its star in about five days. These two characteristics combined provide exciting new directions for planet-formation theories. K2-33b could have formed on a farther out orbit and quickly migrated inward. Alternatively, it could have formed in situ, or in place. Credit: NASA/JPL-Caltech

The discovery of terrestrial exoplanets, planets that orbit stars outside the

solar system, has been one of the most significant developments in modern astronomy. Several exoplanets lie in the "habitable zones" of stars, where planets are thought to be able to maintain liquid water on their surface, and have the potential to host life. However, an exoplanet that is too close to its host star is highly sensitive to radiation bursts from the star, also known as flares.

In this new study, NYUAD Center for Space Science Research Scientist Dimitra Atri found that not all exoplanets in [habitable zones](#) will be able to maintain hospitable conditions for life. Exoplanets in [close proximity](#) to stars are subject to radiation bursts which can disrupt habitable conditions unless the exoplanet has significant atmospheric or [magnetic shielding](#).

In the study, published in the journal *Monthly Notices of the Royal Astronomical Society: Letters*, Atri explores how flares from stars affect a planet's surface radiation dose, and if that can disrupt the planet's ability to host life. The role of a planet's [magnetic field strength](#) and its atmosphere in providing shielding from these bursts was also examined. The factors measured include flare strength and spectrum, as well as the planetary atmospheric density and magnetic field strength. To calculate the surface radiation dose, particle spectra from 70 major flare emitting events (observed between 1956 and 2012) were used as proxy, and the GEANT4 Monte Carlo model was used to simulate [flare](#) interaction with exoplanetary atmospheres.

From this study it was concluded that flares can abruptly increase the radiation level on planetary surfaces and have the capability to disrupt potentially habitable conditions on planets. It was also found that the atmospheric depth (column density) and planetary magnetic field are major factors in protecting planets from flares and maintaining a substantial planetary atmosphere.

"As we continue to explore the planets of the solar system and beyond, discovering if these planets have the ability to support life continues to be of immense importance," said Atri. "More progress in this area will improve our understanding of the relationship between extreme solar events, radiation dose, and planetary habitability."

Provided by New York University

Citation: Researchers discover exoplanets can be made less habitable by stars' flares (2019, December 15) retrieved 7 September 2024 from <https://phys.org/news/2019-12-exoplanets-habitable-stars-flares.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.