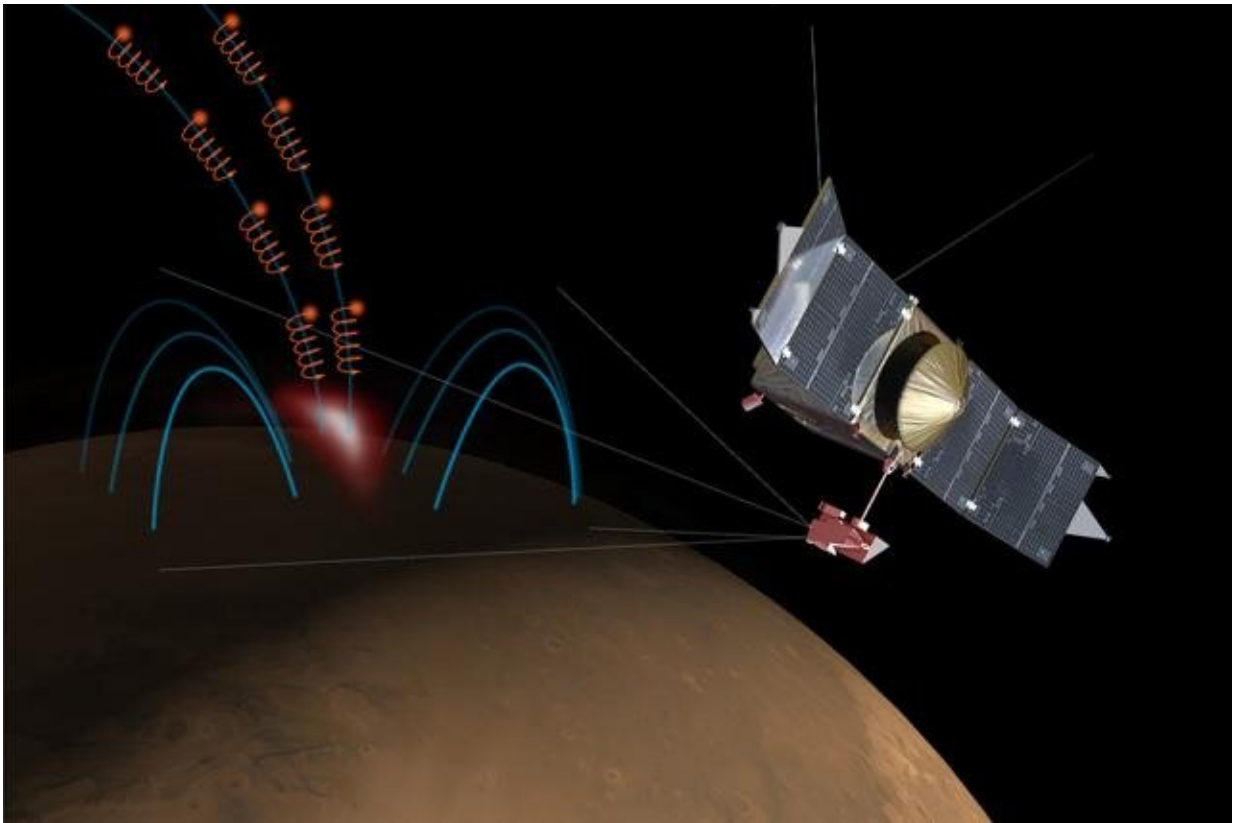


Physicists explain how type of aurora on Mars is formed

May 18 2022, by Richard C. Lewis



Researchers led by the University of Iowa have learned how a type of aurora on Mars is formed. In a new study, the physicists report discrete aurora form through the interaction of the solar wind and the crust at Mars' southern hemisphere. Credit: CU/LASP.

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aurora on Mars is formed.

In a new study, the physicists studied discrete aurora, a light-in-the-sky display that occurs mostly during the night in the red planet's southern hemisphere. While scientists have known about discrete aurora on Mars—which also occur on Earth—they did not know how they formed. That's because Mars does not have a global [magnetic field](#) like Earth, which is a main trigger for aurora, also called the northern and southern lights on our planet.

Instead, the physicists report, discrete aurora on Mars are governed by the interaction between the solar wind—the constant jet of charged particles from the sun—and magnetic fields generated by the crust at southern latitudes on Mars. It's the nature of this localized interaction between the solar wind and the crustal magnetic fields that lead to discrete aurora, the scientists find.

"We have the first detailed study looking at how solar wind conditions affect aurora on Mars," says Zachary Girazian, associate research scientist in the Department of Physics and Astronomy and the study's corresponding author. "Our main finding is that inside the strong crustal field region, the aurora occurrence rate depends mostly on the orientation of the solar wind magnetic field, while outside the strong crustal field region, the occurrence rate depends mostly on the [solar wind](#) dynamic pressure."

The findings come from more than 200 observations of discrete aurora on Mars by the NASA-led Mars Atmosphere and Volatile Evolution (MAVEN) spacecraft. One of the instruments used to make the observations, the Solar Wind Ion Analyzer, is led by Jasper Halekas, associate professor in the Department of Physics and Astronomy and a co-author on the study.

"Now is a very fruitful and exciting time for researching aurora at Mars. The database of discrete aurora observations we have from MAVEN is the first of its kind, allowing us to understand basic features of the [aurora](#) for the first time," Girazian says.

The study, "Discrete Aurora at Mars: Dependence on Upstream Solar Wind Conditions," was published online March 27 in the *Journal of Geophysical Research: Space Physics*.

More information: Z. Girazian et al, Discrete Aurora at Mars: Dependence on Upstream Solar Wind Conditions, *Journal of Geophysical Research: Space Physics* (2022). [DOI: 10.1029/2021JA030238](#)

Provided by University of Iowa

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