

A new state of Venus's ionosphere

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Venus. Photo courtesy of NASA

Observations from NASA's Pioneer Venus orbiter, which reached Venus in 1978, suggested that Venus's ionosphere had two states: a magnetized state with a large-scale horizontal magnetic field and an unmagnetized state with no large-scale magnetic field but with numerous small-scale thin magnetic structures known as flux ropes. Venus's ionosphere was observed to be in the unmagnetized state most of the time, but strong solar wind pressure shifted it to the magnetized state.

Now, using magnetic field observations made in 2008 and 2009 from the [European Space Agency](#)'s Venus Express, Zhang et al. report a third state: a magnetized state with giant flux ropes. The giant flux ropes,

which form quite often, have strong magnetic fields and diameters of hundreds of kilometers.

They are considerably larger and have stronger magnetic fields than the flux ropes that were seen during the unmagnetized state. Although giant flux ropes have previously been seen in Venus's magnetotail, the authors believe this is the first observation of the phenomenon in Venus's [ionosphere](#). It is not yet known how the giant flux ropes form.

More information: "Giant Flux Ropes Observed in the Magnetized Ionosphere at Venus" *Geophysical Research Letters*, [doi:10.1029/2012GL054236](https://doi.org/10.1029/2012GL054236) , 2012

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