Flare found on ultra-fast rotating star puzzles astronomers

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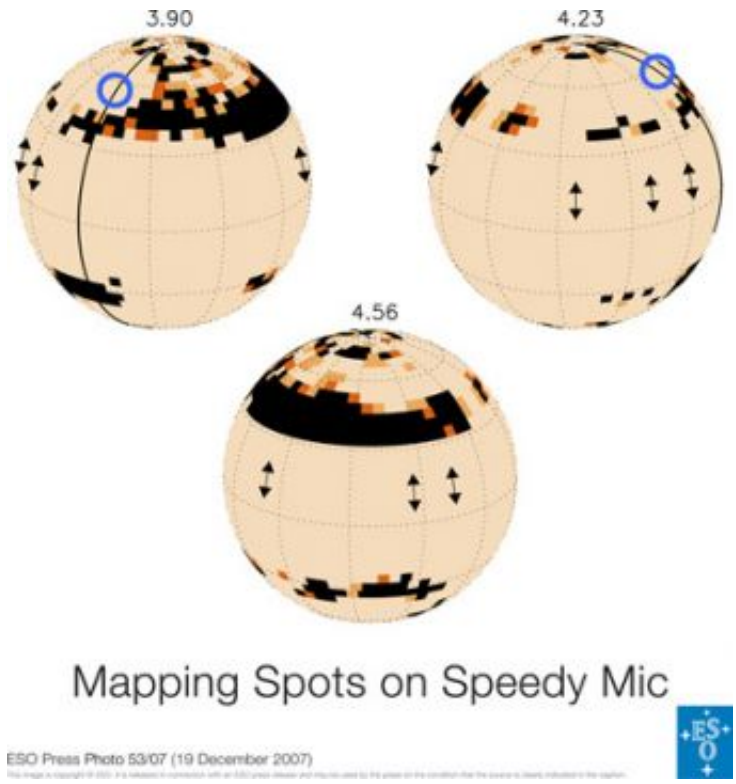

Doppler maps of the highly active star BO Mic ('Speedy Mic') at different rotation phases (indicated on top of the maps). Spot coverage is rendered as black, dark and light orange areas, representing 100%, 67% and 33% spot coverage, respectively. A few spots are near the visible pole, while most spots are asymmetrically distributed at mid-latitudes. The blue circle indicates the flare observed in October 2006 using ESO's VLT and ESA's XMM-Newton satellite. Grid lines mark latitudes and longitudes in 30 degrees steps. Credit: ESO

Using observations from ESO's VLT, astronomers were able for the first time to reconstruct the site of a flare on a solar-like star located 150 light years away. The study of this young star, nicknamed 'Speedy Mic' because of its fast rotation, will help scientists better understand the youth of our Sun.

The astronomers observed the star BO Microscopii during two consecutive nights in October 2006, simultaneously with the UVES spectrograph on ESO's Very Large Telescope and ESA's XMM-Newton X-ray satellite.

Using a technique called 'Doppler imaging', the astronomers reconstructed images of the surface of the star, detecting the presence of several spots. A few are near the visible pole, while most spots are asymmetrically distributed at mid-latitudes.

"The image we could secure of Speedy Mic is, given its distance, a real prowess, that allows us to localise for the first time ever the source of a flare and its surrounding," says Uwe Wolter, lead author of the paper relating the discovery.

The X-ray observations indeed identified several flares, which are sudden and vast releases of energy. For one of them, the astronomers could pinpoint its origin on the surface of the star. The flare, lasting about 4 hours, was a hundred times more energetic than a large solar flare and considerably larger than solar coronal loops.

The surprising finding, the team says, was the location of the flare. Contrary to our Sun, the site of the observed flare does not correspond to the detected spots.

"Interestingly, the flare occurs on a rather inconspicuous portion of the star's surface, away from the main concentration of activity in terms of

dark spots," explains Wolter.

Speedy Mic is a very young star: with an age of only about 30 million years, it is roughly 150 times younger than the Sun. "It is very likely that our young Sun was such a fast rotator as well," says Wolter. "Studying Speedy Mic is thus like observing our own host star while still in its infancy and so, better understand how the eruptions on the young Sun affected the planets. These studies may also contribute to the understanding of current solar eruptions which can cause havoc in our telecommunications and power distributions."

The team reports their results in the journal *Astronomy and Astrophysics* ("Doppler imaging an X-ray flare on the ultrafast rotator BO Mic - A contemporaneous multiwavelength study using XMM-Newton and VLT", by. U. Wolter et al.).

Source: ESO

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