If it flares, 'blaze star' T Corona Borealis will be clearly visible

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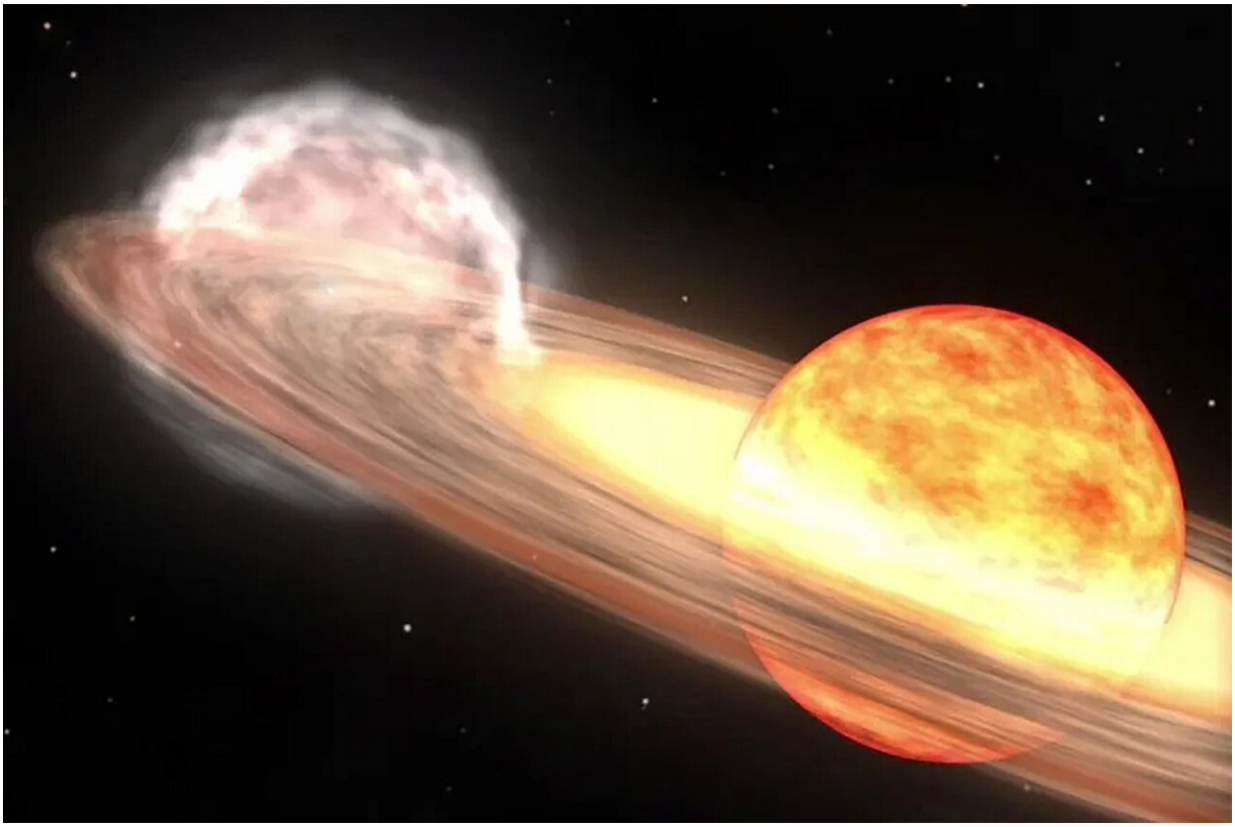

A red giant is transferring hydrogen to an orbiting white dwarf star. When there is enough hydrogen, it ignites into a conflagration visible on Earth. Credit: NASA Illustration

Skywatchers may soon have a new phenomenon at which to look. Or not.

T Corona Borealis, commonly known as the "blaze star," may flare up and be visible to the naked eye on Earth for the first time in about 80 years. T Corona Borealis is in the constellation of Corona Borealis, known as the "Northern Crown."

To find it, locate the Big Dipper and follow the three stars of the dipper's handle to the bright star Arcturus. Near Arcturus is the small constellation of Corona Borealis, the Northern Crown, that looks like a half-circle of stars. T Corona Borealis is very close to the brightest star in Coronoa Borealis.

The blaze star is actually two bodies that appear from afar as one.

"We've got two stars orbiting one another," said Ed Murphy, a professor in the University of Virginia's astronomy department. "One is a white dwarf—the dead core of a star. The other one is a red giant star. The red giant has gotten big enough that its outer layers have gotten close enough to the white dwarf that they're being drawn down onto the white dwarf."

As the red giant sheds hydrogen onto the very dense white dwarf, the hydrogen gets hotter and hotter.

"Eventually it gets hot enough to undergo nuclear fusion and, when it undergoes nuclear fusion, all that hydrogen that's built up on the surface goes through a conflagration," Murphy said. "It all ignites at one time, and we get this tremendous burst in brightness that lasts typically a few days to a week before it starts fading away."

But while astronomers know "where," the issue of "when" is up in the air. The phenomenon was first recorded in 1866, when astronomers looking at Corona Borealis saw two bright stars instead of one. It was labeled a "nova," or a new star, but then it faded.

About a year before the 1946 flare-up, the combined light from the two stars dimmed. The star began to dim again in the spring of 2023, leading several astronomers to predict it would flare in 2024. But Murphy is skeptical.

"We've only ever seen that happen once in the lifetime of the star, and we don't know whether it's related to the star going nova," Murphy said. "No one's produced, in my opinion, a plausible mechanism that would explain why it would get dimmer before it would go nova. So, I'm not convinced that this is actually predicting an imminent nova."

The time frame is also unreliable.

"There's 80 years between those (previous) appearances, and so people were predicting that it would go off sometime around 2026," Murphy said. "I think this is highly suspect for a couple reasons. We've only seen it go off twice before and just because the interval was 80 years does not mean it's going to operate like a clock and go off every 80 years. It could be the kind of thing that sometimes it takes 70 years, sometimes it takes 100 years, but it averages around 80 years."

The distance compounds the uncertainty, because astronomers are not seeing it in real time. The blaze star is 2,500 to 3,000 light-years away, meaning they are now seeing what happened thousands of years ago.

"This is just an image that is now reaching us," Murphy said. "If it's 2,500 light years away, the definition of a light year is the distance that light travels in a year, so it takes 2,500 years to get to us, so this would have happened several times already, and the signals just haven't reached us.

"What we're about to see could have happened 30 or 40 more times, and all those signals are still racing toward us, and we won't see them until

the light arrives here."

While an infrequent phenomenon, Murphy said the blaze star can still teach astronomers about the lives of the stars.

"They were two stars," Murphy said. "They were born together, and they lived out their lives together and, as stars do, the more massive star has a shorter life and that's the one that became the white dwarf. And now its companion is dying, puffed up into a red giant. It will someday become a white dwarf as well. But usually, it takes hundreds of millions to a billion years for the star to die."

Provided by University of Virginia

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