

**BBC** *SEE SATURN'S RINGS BEFORE THEY TILT AWAY*

#219 AUGUST 2023

# Sky at Night

THE UK'S BEST-SELLING ASTRONOMY MAGAZINE

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**10 SIGHTS TO MAKE YOU  
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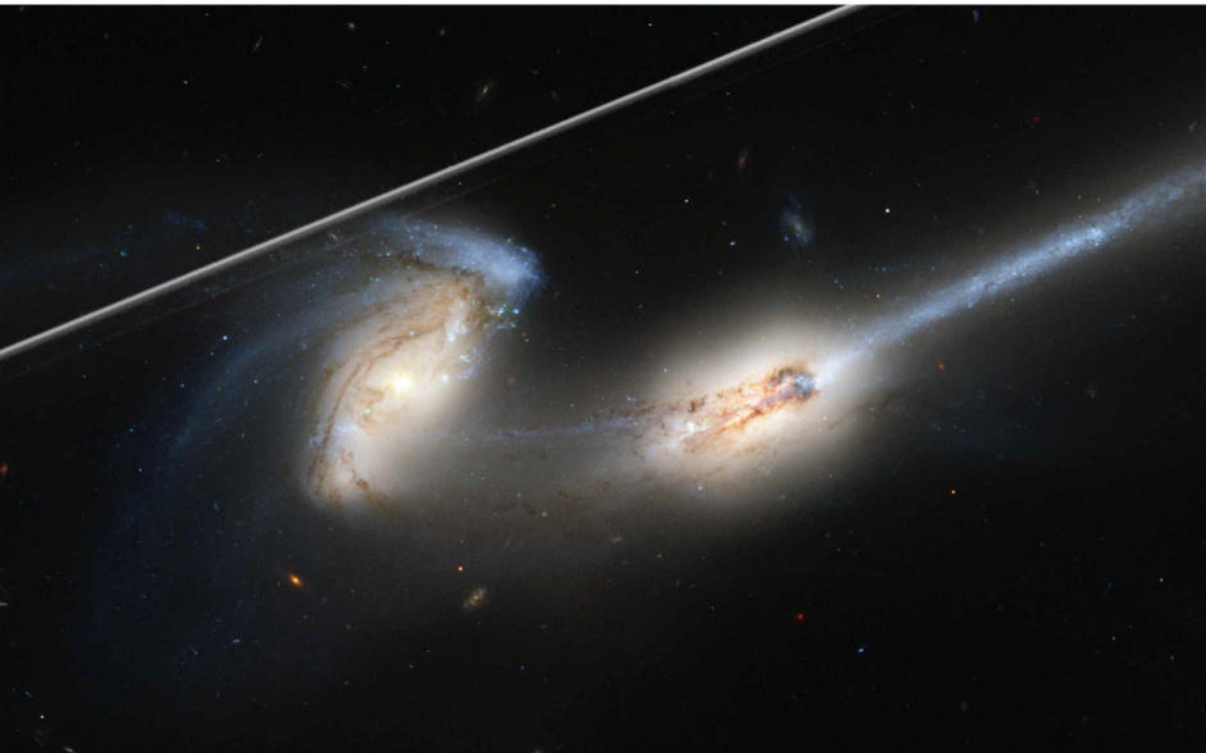
**GET READY FOR THE  
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**ACTIVITY ON THE SUN: IS  
THE BEST YET TO COME?**

**IOPTRON'S COMPACT  
GO-TO MOUNT ON TEST**

# BULLETIN



## Comment by Chris Lintott

It's great news that tools are being developed to help Hubble deal with satellite trails. But don't take from this that the menace of large satellite constellations is under control.

The truth is, while you can remove satellite streaks from the images, you can never get back the view of the sky hidden behind them. That data is lost forever. For Hubble, which mostly spends its time on long exposures of individual objects, that's not too big a deal. But ground-based telescopes, particularly those carrying out survey work, scanning the sky for objects like near-Earth asteroids, will still be badly affected, as we highlight in this month's *Sky at Night* episode (see [page 5](#)). Software will help, but it can't on its own save the sky.

**Chris Lintott**  
co-presents  
*The Sky at Night*

▲ Satellites like this one photobombing the Mice Galaxies NGC 4676 will be spotted and erased more easily

## Hubble edits out satellite interference

New software will remove satellite streaks from the telescope's images

**The Hubble Space** Telescope has been fighting an increasingly difficult battle in recent years against satellites leaving bright trails across its images, but a new piece of software could provide a valuable weapon in efforts to remove them.

When Hubble launched in 1990, there were only around 470 satellites in orbit. Today there are close to 8,000 and the number is rising fast. As the telescope sits in low-Earth orbit, many of these satellites pass above it, crossing its field of view and leaving bright streaks across its images. In 2022, around 10 per cent of Hubble images were affected by such interlopers. Fortunately, the problem only affects a small part of each image's field.

"The average width I measured for satellites was 5 to 10 pixels," says Dave Stark from the Space Telescope Science Institute. "Hubble's Advanced Camera for Surveys' widest view is 4,000 pixels across, so a typical trail will affect less than 0.5 per cent of a single exposure."

The remaining 99.5 per cent of the frame is still useable scientific data. Hubble's images are created like many other astrophotos, with multiple exposures which are then stacked together. Not only does this allow astronomers to identify satellite streaks, as they will only appear on one exposure, it also means the marks can be masked out on affected frames, so as not to affect the final images. However, some trails are very faint, meaning they're missed by current techniques.

Stark's team created a new program that uses a method called the Radon Transform, which sums the light along every straight path across an image. This makes the linear streaks of satellites clearly 'pop-out', allowing twice as many to be identified.

"We have a toolbox of things that people use to clean Hubble data and calibrate it," said Stark. "And our new application is another tool that will help us make the best out of every Hubble exposure."

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