Solar magnetism twists braids of superheated gas

Camera's images could help to explain why the Sun's corona is so hot.

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A rocket-borne camera has provided some of the sharpest images yet of the Sun's corona, the hot layer of gas that extends more than a million kilometres above the solar surface. The corona is millions of degrees hotter than the layer of gas beneath it, but nobody knows precisely why.

"It's counter-intuitive for us here on Earth because as you go up in altitude, the temperature decreases," says Jonathan Cirtain, an astrophysicist at NASA's Marshall Space Flight Center in Huntsville, Alabama.

Nature podcast
Geoff Brumfiel hears from researcher Jonathan Cirtain why the Sun's atmosphere is hotter than its surface.
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For decades, researchers have suspected that powerful magnetic fields are heating the corona. "The Sun's atmosphere is just jam-packed full of magnetic field," says Cirtain. As the lines of those fields cross and twirl, the theory went, they push and pull the charged gas in the corona, giving it the energy that heats it up.

A closer look

The problem is that nobody has been able to see the magnetic fields in close-up until now. Cirtain and his team have developed the High-resolution Coronal Imager (Hi-C), a camera capable of taking pictures of the Sun's corona in fine detail. The imager was placed on board a research rocket at the White Sands Missile Range in New Mexico and flown to the edge of space. It took several minutes to fall to Earth, during which time it took a series of pictures of the Sun (see video).

A team member started analysing the data on the drive back from the missile range, and immediately saw evidence of braids in the twists of coronal gas. "We slammed on the brakes and swerved off to the side of the road," says Cirtain. "We knew immediately that we had discovered something fantastic." The team publishes its results today in *Nature*[1].

The group now hopes to put the Hi-C on a next-generation spacecraft that will monitor the Sun for longer periods of time.

References

1. Cirtain, J. W. *et al*. *Nature* **493**, 501–503 (2013).