

## Sun's Atmosphere Sings



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Astronomers have recorded heavenly music bellowed out by the Sun's atmosphere.

Snagging orchestra seats for this solar symphony would be fruitless, however, as the frequency of the sound waves is below the human hearing threshold. While humans can make out sounds between 20 and 20,000 hertz, the solar sound waves are on the order of milli-hertz--a thousandth of a hertz.

The study, presented this week at the Royal Astronomical Society's National Astronomy Meeting in Lancashire, England, reveals that the looping magnetic fields along the Sun's outer regions, called the corona, carry magnetic sound waves in a similar manner to musical instruments such as guitars or pipe organs.

### Making music

Robertus von Fay-Siebenburgen of the Solar Physics and Space Plasma Research Center at the University of Sheffield and his colleagues combined information gleaned from sun-orbiting satellites with theoretical models of solar processes, such as coronal mass ejections.

They found that explosive events at the Sun's surface appear to trigger acoustic waves that bounce back and forth between both ends of the loops, a phenomenon known as a standing wave.

"These magnetic loops are analogous to a simple guitar string," von Fay-Siebenburgen explained. "If you pluck a guitar string, you will hear the music."

In the cosmic equivalent of a guitar pick, so-called microflares at the base of loops could be plucking the magnetic loops and setting the sound waves in motion, the researchers speculate. While solar flares are the largest explosions in the solar system, microflares are a million times smaller but much more frequent; both phenomena are now thought to funnel heat into the Sun's outer atmosphere.

The acoustic waves can be extremely energetic, reaching heights of tens of miles, and can travel at rapid speeds of 45,000 to 90,000 miles per hour. "These [explosions] release energy equivalent to millions of hydrogen bombs," von Fay-Siebenburgen said.

"These energies are plucking these magnetic strings or standing pipes, which set up standing waves--exactly the same waves you see on a guitar string," von Fay-Siebenburgen told SPACE.com. The "sound booms" decay to silence in less than an hour, dissipating in the hot solar corona.

#### Solar physics

The musical finding could help explain why the Sun's corona is so hot.

While the Sun's surface is a steamy 10,000 degrees Fahrenheit (5,538 degrees Celsius), plasma gas in the corona soars to more than 100 times hotter.

"How can the atmosphere above the surface of the Sun be hotter if nuclear fusion happens inside the Sun?" von Fay-Siebenburgen said. If astronomers can get a clearer picture of what's going on inside these magnetic loops in the Sun's atmosphere, they have a better chance of finding the answer.

Another recent study using images from Hinode's telescope revealed twisted magnetic fields along the Sun's surface, which store huge amounts of energy. The magnetic fields can snap like a rubber band; when they do, they might release energy that could heat up the corona or power solar eruptions and coronal mass ejections, the researchers say.

Video: Sun Storms Images: Solar Flares Twisted Solution to Sun's Mystery Heat

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