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DANIEL K. INOUYE SOLAR TELESCOPE
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Daniel K. Inouye Solar Telescope

AURA

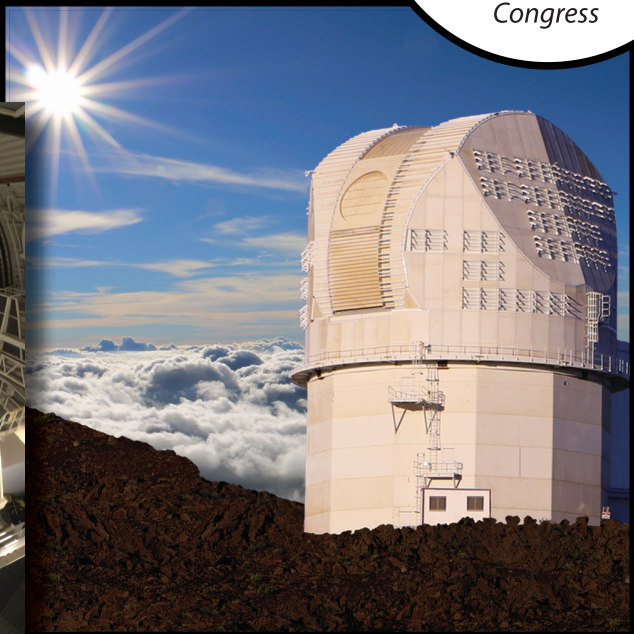
NSO
National Solar Observatory

DKIST

The National Science Foundation's (NSF) Daniel K. Inouye Solar Telescope is a four-meter solar telescope on Haleakalā on the island of Maui. It's currently the largest solar telescope in the world.

With a focus on understanding the Sun's explosive behavior, observations of magnetic fields are at the forefront of this innovative telescope. A combination of an off-axis design, to reduce scattered light, and cutting edge polarimetery make it the first to produce ongoing measurements of the magnetic fields in the Sun's corona.

DKIST produces the same amount of data in one day as found in the entire Library of Congress

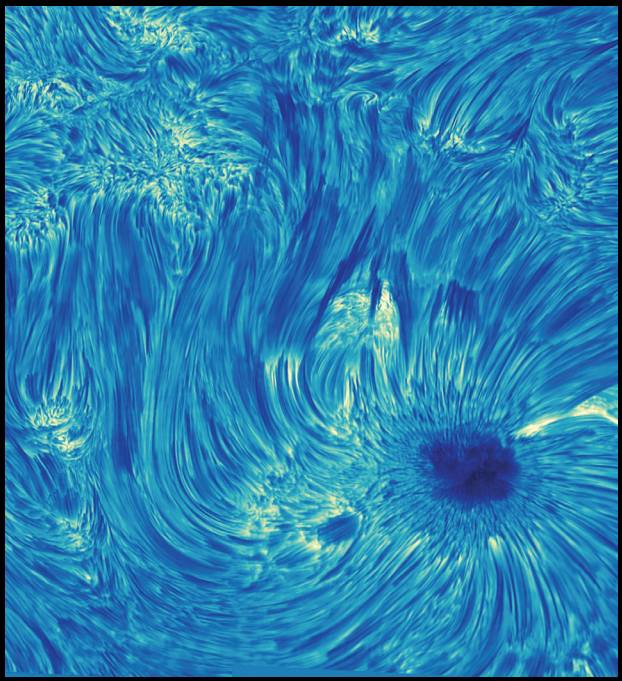


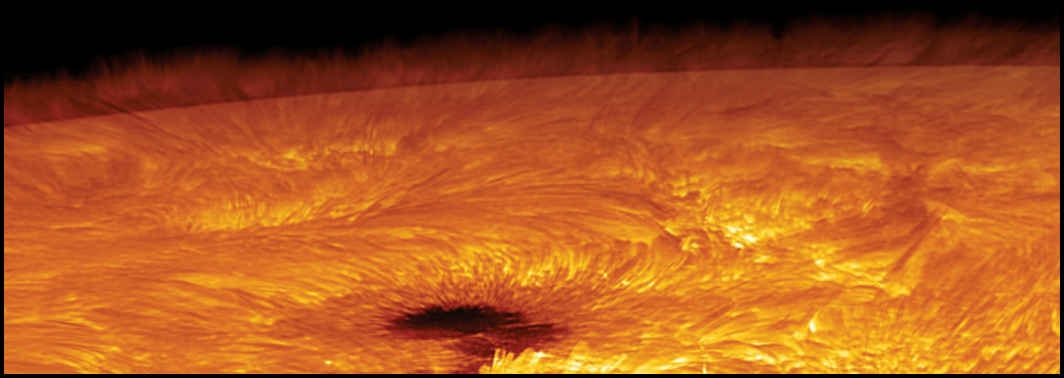
A microscope for the Sun

DKIST's 4-meter mirror provides views of the solar atmosphere like we've never seen before. Focusing on small observing changes, DKIST's instruments gather unprecedented images from the Sun's surface to the lower solar atmosphere.

DKIST reveals features three times smaller than anything we could see on the Sun before it, and does so multiple times a second.

Not only do the world-class instruments and optical assembly allow spectacular imagery, but they also have incredible spectroscopic capabilities. Observing the specific fingerprints of hundreds of atoms and ions throughout the solar surface and atmosphere helps us explain the dynamic nature of the Sun's behavior.

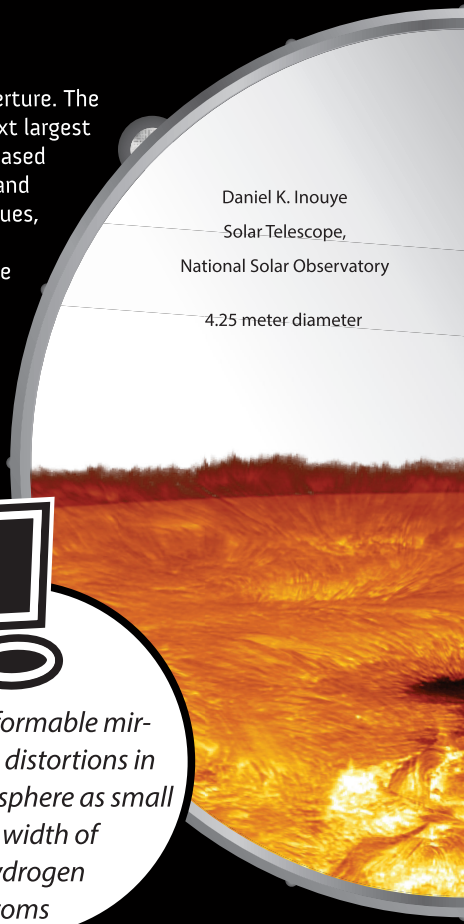




What Makes

It's the most powerful...

DKIST has a 4.25-meter diameter mirror with a 4-meter clear aperture. The telescope collects more than seven times more light than the next largest solar telescope, which has a 1.6-meter diameter mirror. The increased capacity to collect solar light means we can see smaller, deeper and farther than ever before. Using advanced adaptive optics techniques, scientists can observe features as small as 20 kilometers on the surface of the Sun! That's like being able to see a jumbo jet on the Moon from Earth.



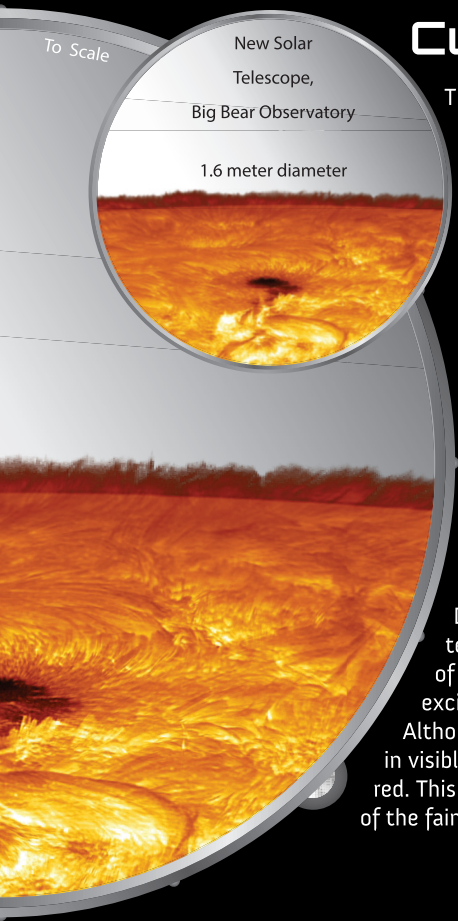
Technological advancement

Focusing the Sun's brilliant light with a 4.25-meter diameter mirror presents significant thermal challenges. The primary mirror focuses 13 kilowatts of power onto the heatstop, located at the secondary mirror. This is the equivalent to 10 hair driers simultaneously concentrating their heat onto one place. Decreasing this immense energy requires clever processes to dissipate the heat including liquid coolants, special air flow systems, and a heat stop at the secondary mirror. This specially designed assembly absorbs nearly 90 percent of the heat from the light path. The amount of light and energy remaining at this stage is still strong enough to give you sunburn within a few minutes.

DKIST's deformable mirror corrects distortions in Earth's atmosphere as small as the width of 40 hydrogen atoms

DKIST Unique

Cutting edge science...



The Sun's magnetic field is the source of its dynamic behavior. We cannot observe magnetic fields directly. We can only observe their effects on light and matter. Using a technique called spectropolarimetry, pioneered by the NSO and the world's leading solar scientists, we can indirectly measure magnetic fields in the corona for the first time.

New observing techniques

DKIST is the largest telescope dedicated to solar physics and has an innovative off-axis design. The primary benefit of an off-axis design is eliminating any objects in the light path, thus reducing scattered light. This facilitates high-quality observations of the faint solar corona.

DKIST's instruments detect light emitted in the visible and infrared part of the spectrum. This is particularly exciting for coronal observations. Although the background sky is bright in visible light, it appears dark in infrared. This enables high-contrast images of the faint corona to be taken.

If the DKIST mirror was scaled to the same diameter as the continental USA, the biggest bump on its surface would be less than the thickness of a dime!

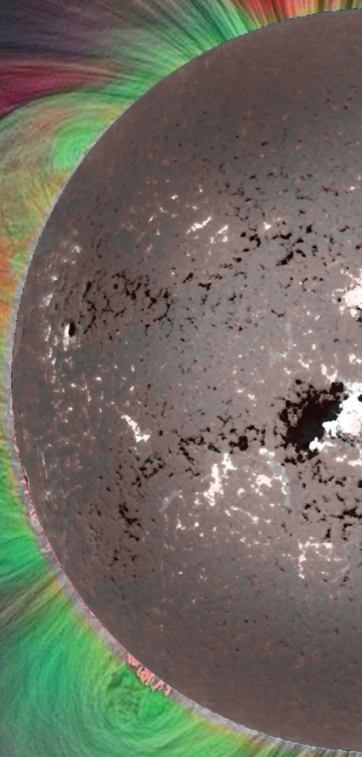
The Magnetic Sun

Magnetic fields that originate in the Sun's interior, drive much of the Sun's activity and dynamic nature visible above its surface in a region known as the corona.

Little is known about the corona's magnetic field. The corona is the region of the Sun's atmosphere that streches above its surface out into space.

DKIST is the first observatory to measure the magnetic field strength of the solar corona on a regular basis.

DKIST focuses on obtaining extremely high-resolution observations over small areas of the Sun. Combining this information with other instruments provides context allowing scientists to delve even deeper into discovering what makes the Sun tick.



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