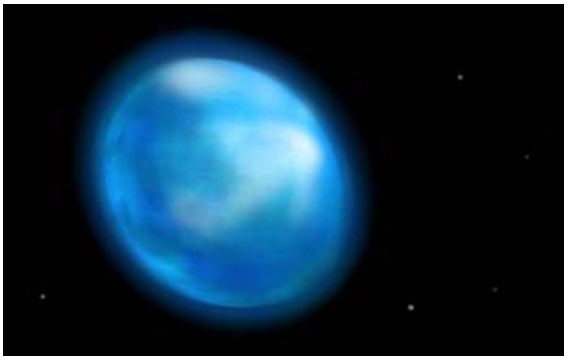
Press Release 07-062

Gazing up at the Man in the Star?

Researchers take picture of the face of Altair, a first for a star like our own



An artist's rendition of Altair, a star that spins so quickly it stretches at its equator.
Credit and Larger Version

May 31, 2007

Using a suite of four telescopes, astronomers have captured an image of Altair, one of the closest stars to our own and a fixture in the summer sky.

While astronomers have recently imaged a few of the enormous, dying, red-giant stars, this is the first time anyone has seen the surface of a relatively tiny hydrogen-burning star like our own sun.

"The galaxy is shaped by the effects of relatively rare but powerful hot, rapidly rotating stars," says John Monnier of the University of Michigan, the lead author on the study that will appear on Science Express on May 31, 2007. "These stars have more in common with Altair than our own sun and understanding Altair will allow us to better understand how these influential stars scattered throughout the galaxy operate."

Monnier was part of an international team of astronomers that captured the image using four of the six telescopes at a facility on Mt. Wilson, Calif., operated by the Center for High Angular Resolution Astronomy (CHARA) at Georgia State University in Atlanta with partial support from the National Science Foundation (NSF).

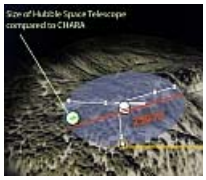
The CHARA telescopes were able to make the breakthrough observation because they were outfitted with a novel system to clean up some of the distortions from Earth's atmosphere, a technology called the Michigan Infrared Combiner, developed with NSF support at the University of Michigan in Ann Arbor. Recent advances in fiber optic telecommunication technology made this new combiner possible.

"For looking at optical or infrared wavelengths of light, the CHARA telescope array has the world's longest spacing between telescopes and therefore the greatest ability to zoom in on the stars," adds Hal McAlister, CHARA director and a professor of astronomy at Georgia State.

Until now, astronomers could gather tremendous amounts of data from stars, but could not capture images of what the stars looked like. Even to the largest telescopes, stars looked like the points of light we all see when we peer up into the night sky.

Using the telescopes as an interferometer--a multi-telescope

The actual image of Altair as captured by the CHARA array.
Credit and Larger Version



CHARA composite image
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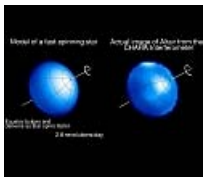

View video
Astronomers have modeled many of the properties of Altair.
Credit and Larger Version

A schematic of the CHARA interferometer.
Credit and Larger Version

system that combines information from small, distantly spaced telescopes to create a picture as if taken from one large telescope--the researchers captured infrared lightwaves as if from a giant telescope 265 meters by 195 meters in dimension (100 times the size of the mirror on NASA's Hubble telescope and roughly 25 times the resolution).

"Without the interferometer, the ability to obtain such detailed images would not be possible with today's existing telescopes--or even the planned 30-meter telescopes," says Julian Christou, one of the NSF officers overseeing the research. "The critical component of the CHARA system is the beam combiner which allows the light from the individual small telescopes to be mixed together, which up to now had only been successfully used with radio telescopes such as the Very Large Array near Socorro, N.M."

The discovery is helping to answer questions about stars while raising others, particularly when researchers compare long-standing models to the new observations.

For example, Altair is a speedily spinning "rapid rotator", just like Vega, one of Altair's partners (with the slow-spinning supergiant Deneb) in the Summer Triangle in the night sky.

Altair spins so quickly, about 300 kilometers per second at its equator, that it's shape is distorted: the star is a full 22 percent wider than it is tall. The new telescope measurements confirmed the oblong shape, yet showed slightly different surface temperature patterns than what models predicted.

Altair is one of the closest stars in our neighborhood, only about 15 light years away, and the researchers hope to image Vega as well as more distant stars in the future.

"Imaging stars is just the start.We are going to next apply this technology to imaging extrasolar planets around nearby stars," said Ming Zhao, an astronomy graduate student at Michigan who carried out the detailed stellar modeling.

NSF supported this research through awards 0606958 and 0352723, along with a number of awards totaling nearly $6.5 million to help construct CHARA.

For additional information, see the press releases at the University of Michigan (http://www.umich.edu/news/) and Georgia State University (http://www2.gsu.edu/~wwwexa/news/).

Additional graphics are available at:
http://www.astro.lsa.umich.edu/~monnier/Local/altair2007.html

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