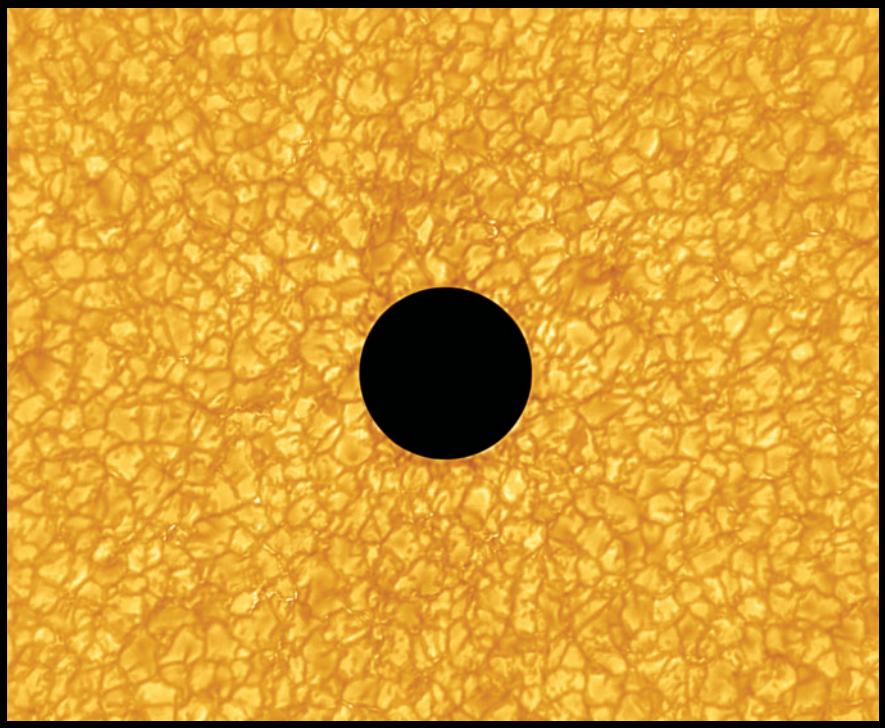
IN CONCLUSION



Atmospheric Imaging Assembly (AIA) image captured by the ultraviolet imaging telescope on board NASA's Solar Dynamics Observatory (SDO) is courtesy of the NASA/SDO AIA science teams.

MERCURY ON THE MOVE

On May 9, astronomers across the globe took to their telescopes to observe a rare planetary event known as the Transit of Mercury, in which the planet—seen as a tiny, dark disk—crept steadily across the Sun over the course of seven-and-a-half hours.

This passage, which occurs just over a dozen times a century, is visible from Earth only when Mercury is positioned directly between Earth and the Sun and the two planets' orbits are directly aligned. Mercury's next crossing will take place in 2019, but then not again until 2032.

For those who missed it, NJIT has compiled a time-lapse video (youtu.be/MHhuyEzxv-U) composed of extremely high-resolution images of the transit taken from the university's New Solar Telescope (NST) at Big Bear Solar Observatory (BBSO) and from NASA's Solar Dynamics Observatory (SDO) in space, a joint mission with the Harvard-Smithsonian Center for Astrophysics (CfA).

The 1.6-meter NST at Big Bear has captured the highest-ever spatial resolution images of Mercury crossing the Sun. The movie – with observations taken every 12 seconds – begins with images of the Sun as viewed from NASA's SDO in extreme ultraviolet light from space. Midway through Mercury's transit, the Sun became visible at NST's location in California.

"What we see is the dark side of Mercury, a rocky planet, blocking the light of the Sun," said Bin Chen, an assistant professor of physics at NJIT and former astrophysicist at the CfA who focuses on solar flares and coronal mass ejections, the Sun's massive explosions. He added, "SDO gives a breathtaking view of the solar corona behind the transiting Mercury, while NST provides the finest resolution images of the disk and the ever-changing granules on the solar photosphere, which result from convection motions from deeper within the Sun."

For solar physicists, the transit is an opportunity to gather revealing spectrum data as the light from the Sun is modified by Mercury's exosphere.

"Transits of Mercury are important because they provide one of the few opportunities to observe the exosphere, the unbound atmosphere around Mercury, including the polar regions. In spite of the four years that the spacecraft MESSENGER spent in orbit around Mercury observing, there remain fundamental questions about the planet's high-latitude exosphere," said Dale Gary, the director of Solar Observatories at NJIT, who teamed with scientists Kevin Reardon of the National Solar Observatory (NSO) and Jay Pasachoff of Williams College to observe the transit from Big Bear.

"Scientists will be analyzing the spectral data in great detail to measure the extremely tenuous exosphere of Mercury and compare it with data taken during the 2003 and 2006 transits," Gary said.

The NST is currently the highest-resolution solar telescope in the world. The telescope's adaptive optics system was able to improve the clarity of the images by locking onto the dark disk of Mercury and correcting for turbulence in the Earth's atmosphere.

Author: Tracey L. Regan is an NJIT Magazine *contributing writer.*

physics.njit.edu