# Gemini north observes comet 3I/ATLAS, the third-known interstellar object

July 16 2025, by Josie Fenske

Interstellar objects are visitors from solar systems beyond our own, and the third ever such object, known as 3I/ATLAS, has just been discovered. Using the Gemini North telescope, astronomers have captured 3I/ATLAS as it makes its temporary passage through our cosmic neighborhood. These observations will help scientists study the characteristics of this rare object's origin, orbit, and composition. Credit: NSF NOIRLab

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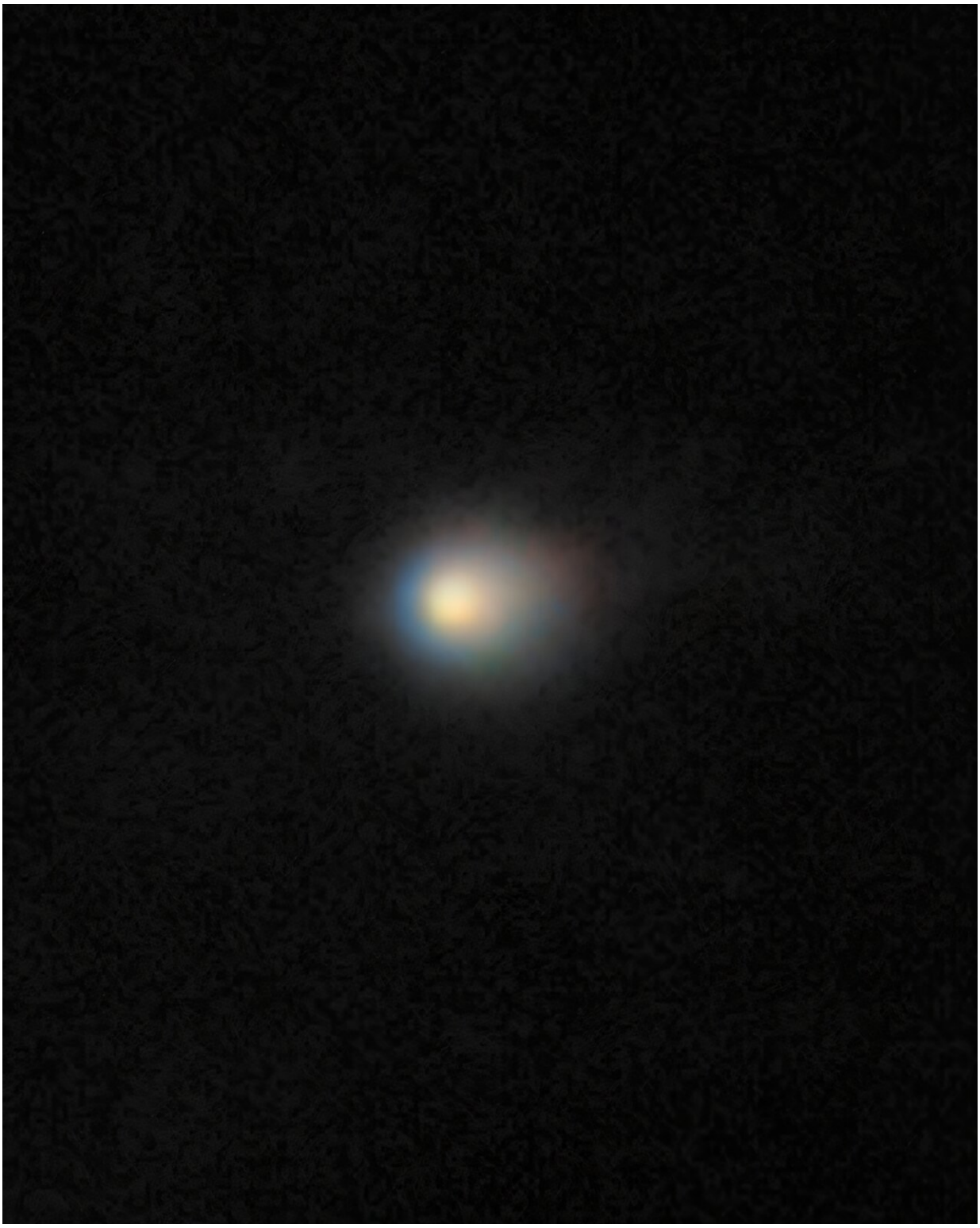
Using the Gemini North telescope in Hawai'i, a team of astronomers led by Karen Meech (Institute for Astronomy/University of Hawai'i) has captured an image of comet 3I/ATLAS, an interstellar object that was first detected on 1 July 2025 by ATLAS (Asteroid Terrestrial-impact Last Alert System).

Gemini North is one half of the International Gemini Observatory, partly funded by the U.S. National Science Foundation and operated by NSF NOIRLab. The incredible sensitivity of Gemini North's Multi-Object Spectrograph (GMOS-N) reveals the comet's compact coma—a cloud of gas and dust surrounding its icy nucleus.

Interstellar objects are objects that originate outside of, and are observed passing through, our solar system. Ranging from tens of meters to a few kilometers in size, these objects are pieces of cosmic debris left over from the formation of their host star's planetary systems. As these remnants orbit their star, the gravity of nearby larger planets and passing nearby stars can launch them out of their home systems and into interstellar space, where they can cross paths with other solar systems.



Comet 3I/ATLAS is captured in this image by the Gemini North telescope. The incredible sensitivity of Gemini North's Multi-Object Spectrograph (GMOS-N)

reveals the comet's compact coma — a cloud of gas and dust surrounding its icy nucleus. Credit: International Gemini Observatory/NOIRLab/NSF/AURA/K. Meech (IfA/U. Hawaii) Image Processing: Jen Miller & Mahdi Zamani (NSF NOIRLab)

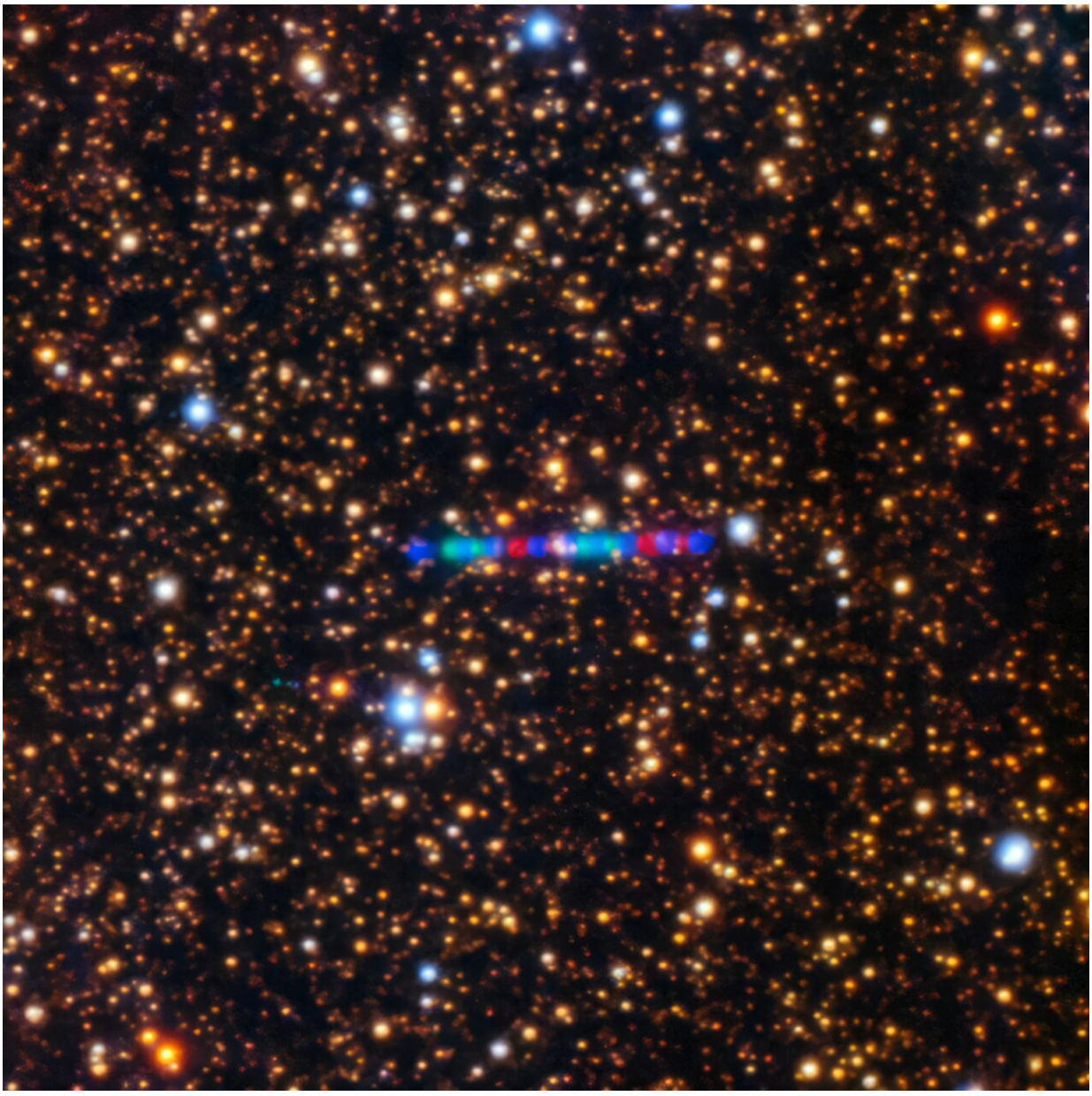
"The sensitivity and scheduling agility of the International Gemini Observatory has provided critical early characterization of this interstellar wanderer," says Martin Still, NSF program director for the International Gemini Observatory. "We look forward to a bounty of new data and insights as this object warms itself on sunlight before continuing its cold, dark journey between the stars."

These visitors from faraway regions of the cosmos are valuable objects to study since they offer a tangible connection to other star systems. They carry information about the chemical elements that were present when and where they formed, which gives scientists insight into how planetary systems form at distant stars throughout our galaxy's history—including stars that have since died out.

3I/ATLAS, formally designated Comet C/2025 N1 (ATLAS), is only the third interstellar object ever discovered after 1I/'Oumuamua in 2017 and the comet 2I/Borisov in 2019. While astronomers think many interstellar objects exist, and likely pass through our solar system on a regular basis, they are exceptionally difficult to capture since they are only visible when they're close enough to see and when our telescopes are pointing in the right place at the right time.

Multiple teams of astronomers around the globe are using a wide variety of telescopes to observe 3I/ATLAS during its temporary visit to our solar system, allowing them to collectively determine some of the comet's key characteristics. Although much remains unknown, it is

already clear that 3I/ATLAS is unique compared to the two other known interstellar objects.



Comet 3I/ATLAS streaks across a dense star field in this image captured by the Gemini North telescope's Gemini Multi-Object Spectrograph (GMOS-N). The left panel captures the comet’s colorful trail as it moves through the Solar System. The image was composed of exposures taken through three filters,

shown here as red, green, and blue. Credit: International Gemini Observatory/NOIRLab/NSF/AURA/K. Meech (IfA/U. Hawaii). Image Processing: Jen Miller & Mahdi Zamani (NSF NOIRLab)

Observations so far suggest that 3I/ATLAS has an approximate diameter of at most 20 kilometers (12 miles), compared to 'Oumuamua's diameter of 200 meters and Borisov's of less than one kilometer. 3I/ATLAS's larger size makes it a better target for scientists to study.

The comet also has an exceptionally eccentric orbit, where eccentricity describes how much an object's orbital pathway is "stretched out." An eccentricity of 0 is a perfectly circular orbit, while an eccentricity of 0.999 is a very stretched-out ellipse. An object with an eccentricity above 1 is on a path that does not loop back around the sun, implying it comes from—and will return to—interstellar space.

3I/ATLAS has an eccentricity of 6.2, which is highly hyperbolic and ensures its classification as an interstellar object. In comparison, 'Oumuamua had an eccentricity of about 1.2, and Borisov about 3.6.

Right now, 3I/ATLAS is within Jupiter's orbit at a distance of about 465 million kilometers (290 million miles) from Earth and 600 million kilometers (370 million miles) from the sun. The closest 3I/ATLAS will come to Earth is approximately 270 million kilometers (170 million miles) on 19 December, though it will pose no threat to the planet. It will reach its closest approach to the sun around 30 October at a distance of 210 million kilometers (130 million miles)—just inside the orbit of Mars. During this close approach, it will be traveling almost 25,000 kilometers (15,500 miles) per hour.

Although 3I/ATLAS is only the third interstellar object ever discovered,

the astronomical community expects many more to soon come into focus once NSF–DOE Vera C. Rubin Observatory begins its decade-long Legacy Survey of Space and Time (LSST). By repeatedly scanning the entire southern hemisphere sky every few nights, NSF–DOE Rubin will capture millions of objects moving throughout our solar system, including an unpredictable number of never-before-seen interstellar objects.

Provided by NSF NOIRLab

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