

"Long before it's in the papers"

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Oxygen molecules “confirmed” in space

Aug. 2, 2011
Courtesy of NASA
and World Science staff

Astronomers say they have confirmed for the first time that there are oxygen molecules in outer space. But how they got there is not so certain.

Individual oxygen atoms are common in space, but it has proven far harder to find oxygen in molecular form, as it exists in the air we breathe. Molecular oxygen consists of two oxygen atoms joined together and makes up about 20 percent of the air.

“Oxygen gas was discovered in the 1770s, but it’s taken us more than 230 years to finally say with certainty that this very simple molecule exists in space,” said Paul Goldsmith, NASA’s Herschel project scientist at the agency’s Jet Propulsion Laboratory in Pasadena, Calif. Goldsmith is lead author of a recent paper describing the findings in *The Astrophysical Journal*.

The finding was made using the Herschel Space Observatory, a European Space Agency-led mission with NASA contributions.

Astronomers searched for the elusive molecules in space for decades using balloons, as well as ground- and space-based telescopes. The Swedish Odin telescope spotted the molecule in 2007, but the sighting could not be confirmed.

Goldsmith and his colleagues propose that oxygen is locked up in water ice that coats tiny dust grains. They think the oxygen detected by Herschel in an area called the Orion Nebula—in the direction of the constellation Orion—was formed after starlight warmed the icy grains. Part of this released water was converted into oxygen molecules.

“This explains where some of the oxygen might be hiding,” said Goldsmith. “But we didn’t find large amounts of it, and still don’t understand what is so special about the spots where we find it. The universe still holds many secrets.” The researchers plan to continue their hunt for oxygen molecules in other star-forming regions.

“Oxygen is the third most common element in the universe and its molecular form must be abundant in space,” said Bill Danchi, Herschel program scientist at NASA Headquarters in Washington. “Herschel is proving a powerful tool to probe this unsolved mystery.”