

High-altitude NASA balloon will carry sensitive gas sensor

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NASA and a UCF physics professor plan to launch a high-altitude balloon on Sunday to test a high-tech payload that may one day be used to detect life on other planets.

A team led by Robert Peale of the University of Central Florida's Department of Physics is sending an experimental sensor the size of a toaster oven into the stratosphere, about 20 miles above the Earth.

The sensor is designed to detect trace gases at parts per trillion levels – far below what other current technologies are capable of. The Planetary Atmospheres Minor Species Sensor (PAMSS) has the potential for important practical applications both on Earth and off.

Here on Earth, PAMSS technology could be used to detect and analyze climate changing gases that deplete the ozone layer, cause acid rain and worsen air pollution. The sensor could also have applications in the health care industry with breath tests to diagnose disease, and in public safety, where it could prove to be effective at detecting explosives.

But NASA is interested in the sensor's ability to reveal more about the atmospheres of other planets. Signs of methane, even at very low levels, could mean there is life there. Scientists could use it to study runaway greenhouse effects on Venus or the exotic atmosphere of Saturn's moon Titan.

"The purpose of NASA supporting this is to try to increase the technical

readiness level for future space exploration," said Peale, who's been working on the project since 2008.

Most atmospheric probes are unable to quantify concentration of trace vapors or gases. But Peale's [sensor system](#) promises to be exponentially more sensitive, providing scientists with more and better data.

It uses an infrared [quantum cascade laser](#) that's the size of a grain of salt, on a mount the size of the nail on your pinky finger. It's been adapted for use in an intracavity laser absorption spectrometer. The whole apparatus weighs about 24 pounds.

This week, Peale and his team are in Tucson, Ariz., preparing to launch the PAMSS payload aboard a high-altitude balloon operated by a NASA contractor. The launch is planned for Sunday, weather permitting.

If all goes according to plan, the sensor will be aloft for six to eight hours and gather data for at least one hour at its apex, before the payload is cut free and floats back to the ground on a parachute.

The experiment will test the sensor's ability to function in the perilous conditions found in the stratosphere, where the temperature can plummet to -75 degrees Fahrenheit. It's a proving ground that will show the sensor is ready to operate in a range of temperatures and pressures necessary for space flight.

"It's a very harsh environment," Peale said. "We want to see if the instrument can survive."

Provided by University of Central Florida

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