Astronomers Detect Sodium Gas Ejected by Lunar Impact

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This image provided by NASA shows the first image taken of the moon from the Lunar Crater Observation and Sensing Satellite Friday morning Oct. 9, 2009. Two NASA spacecraft are barreling toward the moon at twice the speed of a bullet, about to crash into a lunar crater in a search for ice.

(PhysOrg.com) -- Boston University astronomers announced today observations of a cloud of sodium gas ejected from the Moon's surface as a result of the NASA impact experiment that was part of its Lunar Reconnaissance Orbiter mission (LCROSS). Jeffrey Baumgardner and Jody Wilson, senior research associates in the Center for Space Physics (CSP), conducted the observations from BU's observing facility housed on the grounds of the McDonald Observatory in Ft. Davis, Texas.

"Sodium near the Moon's south pole went from zero to blazing just after

the impact!" Dr. Wilson reported to colleagues back in Boston.

Added Baumgardner: "We took a series of five-minute time exposures before, during and after the event and the detection is unambiguous."

Sodium is a minor component of the lunar regolith (soil), but it can serve as a tracer of more abundant elements because it scatters (or reflects) sunlight very efficiently. The observing strategy of the BU team was to make their measurements at a point approximately 100 km above the lunar impact point, an altitude sufficient for sodium gas to be in sunlight (and therefore visible) and yet far enough away from the bright glare of the Moon's surface.

"Sodium is continuously being ejected and lost from the Moon, creating an always present, but very faint and transient lunar atmosphere," Dr. Wilson explained. "The ways that so-called surface-sputtering occurs on primitive bodies, such as the Moon, the planet Mercury and Jupiter's moon Io, are topics of great interest to astronomers who study how atmospheres can escape from a large celestial body."

Impacting meteors, the solar wind and sunlight are all agents that can eject sodium atoms from the Moon. While such surface-physics processes can be studied in laboratories here on Earth, this was the first successful attempt to conduct a "laboratory in space" experiment where the characteristics of the impactor were so well known.

"The full implications of these results will, of course, require detailed data analysis and modeling," commented Michael Mendillo, professor of Astronomy at Boston University. "At this point, all we do know is that the BU team had a better night than the Red Sox."

Baumgardner added: "The relation between what we saw in sodium and what the main objective of the experiment was --detecting possible

signatures of water -- will require coordinated analyses of all of the observations made on Earth and onboard the NASA spacecraft."

Provided by Boston University