SAGE mission to Venus

June 11, 2010

Top scientists aim for Venus planetary lander project

LOS ALAMOS, New Mexico, June 11, 2010—Los Alamos National Laboratory scientists have developed instruments for Earth, the Moon, the Sun, Mars, Saturn, interstellar space, and the driving solar wind that flies between the planets. Now they're setting their sights on the planet Venus. As part of a proposed NASA mission called the Surface and Atmosphere Geochemical Explorer (SAGE), Los Alamos researchers are planning a laser tool that will rapidly measure the surface, and beneath the surface, of the planet whose hostile environment will likely destroy the lander after a few hours of operation.

As part of the NASA New Frontiers competition, NASA funded the University of Colorado at Boulder for a one-year concept study of a Venus lander mission. SAGE is designed to study the history of Venus's atmosphere, climate, and surface to compare to Earth. SAGE would tell scientists about the history of Venus, why Venus is so

different from Earth, and what this can tell us about Earth's fate. The Los Alamos-led instrument aboard SAGE would integrate two spectroscopic analysis techniques, both using a laser, to identify chemical compounds by the light spectra they emit. Raman spectroscopy and Laser-Induced Breakdown Spectroscopy will both be used on the SAGE lander, providing multiple measurements of the planet's surface and subsurface.

Since the planet's atmosphere is visually impenetrable, little is known about the Venus geology. Upon landing near a recently active volcano, SAGE would go to work analyzing the landing site with a suite of instruments in addition to the Raman-LIBS device, and send this information back to Earth before being overcome by the hot, hostile environment. Unique aspects of the LANL device on SAGE include the many measurements to be made on the Venus surface and subsurface near the lander as well as the ability to identify minerals that are contained in the rocks at the landing site.

While Venus and Earth were similar a birth, Venus has since turned into "Earth's evil twin." "The Venus atmosphere suffers from global warming due to the runaway greenhouse gases. One of the goals of the Raman–LIBS instrument is to explore how the Venus geology has contributed to this global warming." said Sam Clegg, principal investigator for the Los Alamos instrument.

The LIBS component of the device is similar to another Los Alamos space-bound instrument, the ChemCam LIBS package aboard the Mars Science Laboratory rover Curiosity that is due for launch to Mars in the fall of 2011.

The Raman-LIBS instrument is an international collaboration between Los Alamos National Laboratory, Centre d'Etude Spatiale des Rayonnements (CESR), Jet Propulsion Laboratory (JPL), University of Hawaii, Honolulu, Washington University in St. Louis, the Lunar and Planetary Institute and Mt. Holyoke College. The overall SAGE team is led by University of Colorado's Laboratory for Atmospheric and Space Physics (LASP), and is partnered with NASA's Jet Propulsion Laboratory (JPL), and Lockheed Martin in Denver, Colorado. The principal investigator is Dr. Larry Esposito, professor of astrophysical and planetary sciences.

Los Alamos National Laboratory **www.lanl.gov** **(505) 667-7000** **Los Alamos, NM**

Operated by Los Alamos National Security, LLC for the Department of Energy's NNSA