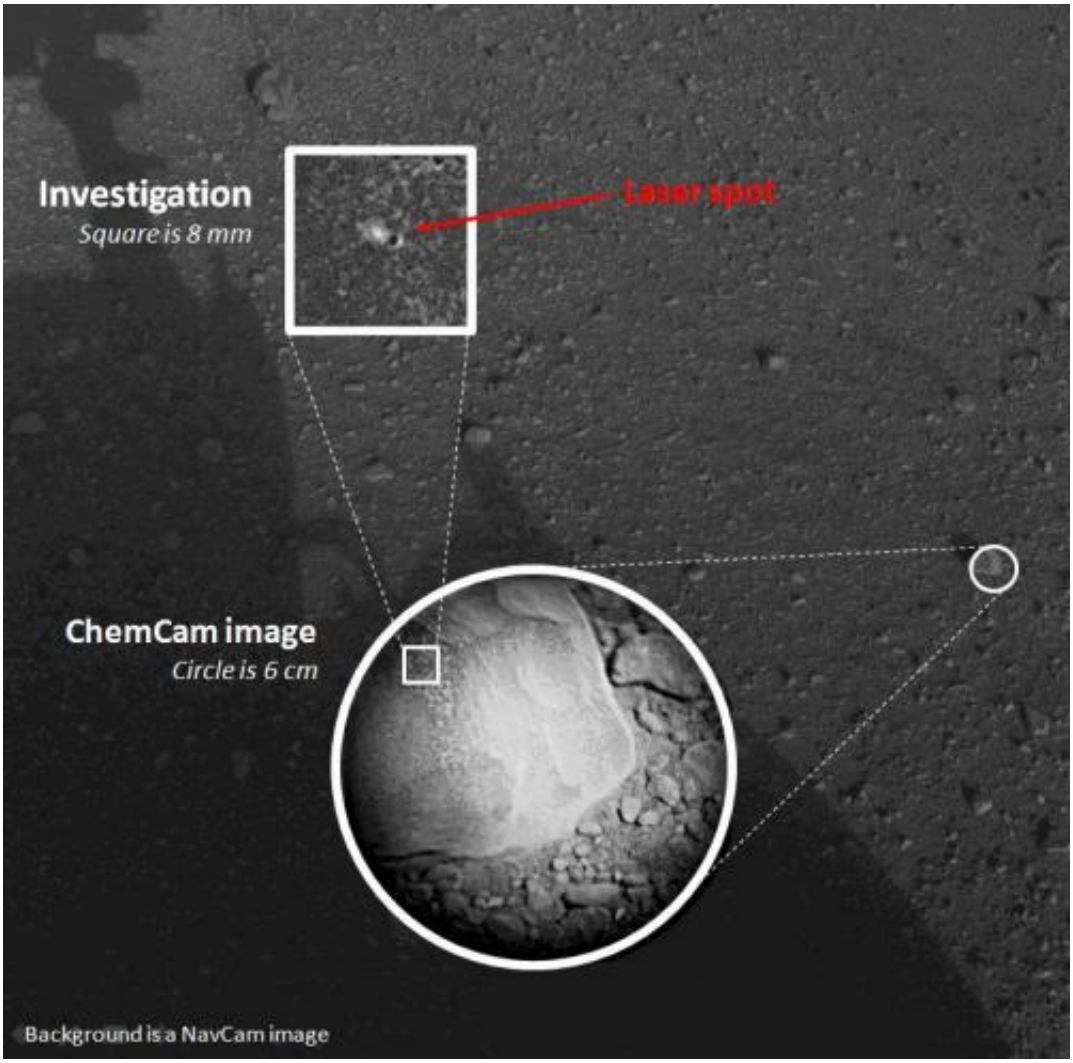
# Curiosity rover's laser instrument zaps first martian rock

August 20 2012




This composite image, with magnified insets, depicts the first laser test by the Chemistry and Camera, or ChemCam, instrument aboard NASA's Curiosity Mars rover. The composite incorporates a Navigation Camera image taken prior to the test, with insets taken by the camera in ChemCam. The circular insert

highlights the rock before the laser test. The square inset is further magnified and processed to show the difference between images taken before and after the laser interrogation of the rock. The test took place on Aug. 19, 2012. In the composite, the fist-sized rock, called "Coronation," is highlighted. Coronation is the first rock on any extraterrestrial planet to be investigated with such a laser test. The widest context view in this composite comes from Curiosity's Navigation Camera. The magnified views in the insets come from ChemCam's camera, the Remote Micro-Imager. The area shown in the circular inset is 6 centimeters (2.4 inches) in diameter. It was taken before the rock was hit with the laser. The area covered in the further-magnified square inset is 8 millimeters (about one-third of an inch) across. It combines information from images taken before and after the test, subtracting the "before" image from the "after" image to make the changes in the rock visible. Curiosity's Chemistry and Camera instrument (ChemCam) inaugurated use of its laser when it used the beam to investigate Coronation during Curiosity's 13th day after landing. ChemCam hit Coronation with 30 pulses of its laser during a 10-second period. Each pulse delivered more than a million watts of power for about five one-billionths of a second. The energy from the laser excited atoms in the rock into an ionized, glowing plasma. ChemCam also caught the light from that spark with a telescope and analyzed it with three spectrometers for information about what elements are in the target. This initial use of the laser on Mars served as target practice for characterizing the instrument but may provide additional value. Researchers will check whether the composition changed as the pulses progressed. If it did change, that could indicate dust or other surface material being penetrated to reveal different composition beneath the surface. Image credit: NASA/JPL-Caltech/LANL/CNES/IRAP

(Phys.org) -- Today, NASA's Mars rover Curiosity fired its laser for the first time on Mars, using the beam from a science instrument to interrogate a fist-size rock called "Coronation."

The mission's Chemistry and Camera instrument, or ChemCam, hit the fist-sized rock with 30 pulses of its laser during a 10-second period.

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The energy from the laser excites atoms in the rock into an ionized, glowing plasma. ChemCam catches the light from that spark with a telescope and analyzes it with three spectrometers for information about what elements are in the target.

"We got a great spectrum of Coronation -- lots of signal," said ChemCam Principal Investigator Roger Wiens of Los Alamos National Laboratory, N.M. "Our team is both thrilled and working hard, looking at the results. After eight years building the instrument, it's payoff time!"

ChemCam recorded spectra from the laser-induced spark at each of the 30 pulses. The goal of this initial use of the laser on Mars was to serve as target practice for characterizing the instrument, but the activity may provide additional value. Researchers will check whether the composition changed as the pulses progressed. If it did change, that could indicate dust or other surface material being penetrated to reveal different composition beneath the surface. The spectrometers record intensity at 6,144 different wavelengths of ultraviolet, visible and infrared light.

"It's surprising that the data are even better than we ever had during tests on Earth, in signal-to-noise ratio," said ChemCam Deputy Project Scientist Sylvestre Maurice of the Institut de Recherche en Astrophysique et Planetologie (IRAP) in Toulouse, France. "It's so rich, we can expect great science from investigating what might be thousands of targets with ChemCam in the next two years."

The technique used by ChemCam, called laser-induced breakdown spectroscopy, has been used to determine composition of targets in other extreme environments, such as inside nuclear reactors and on the sea

floor, and has had experimental applications in environmental monitoring and cancer detection. Today's investigation of Coronation is the first use of the technique in interplanetary exploration.

Curiosity landed on Mars two weeks ago, beginning a two-year mission using 10 instruments to assess whether a carefully chosen study area inside Gale Crater has ever offered environmental conditions favorable for microbial life.

ChemCam was developed, built and tested by the U.S. Department of Energy's Los Alamos National Laboratory in partnership with scientists and engineers funded by the French national space agency, Centre National d'Etudes Spatiales (CNES) and research agency, Centre National de la Recherche Scientifique (CNRS).

Provided by JPL/NASA