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CU-Boulder proposals selected for NASA moon initiative

The University of Colorado at Boulder was awarded two grants totaling \$11 million today from NASA's Lunar Science Institute to probe the cosmos from observatories on the moon and to conduct science and safety investigations on the dusty lunar surface and its atmosphere.

The two CU-Boulder grants from the Lunar Science Institute, which was created by NASA in March 2008, are expected to further the space agency's research agenda regarding future moon missions, a key part of NASA's space exploration goals. A total of seven grants were made nationwide to interdisciplinary science teams by the institute, which is managed by the NASA Ames Research Center in California.

Professor Jack Burns of CU-Boulder's Center for Astrophysical and Space Astronomy is the principal investigator on a winning four-year, \$6 million proposal known as the Lunar University Node for Astrophysical Research, or LUNAR. The goal is to conduct a variety of astronomical observations from the lunar surface, including fundamental studies of gravity and Einstein's general theory of relativity, solar physics -- including explosive eruptions on the sun -- and the development of a new suite of instruments for peering back at the early universe, said Burns.

The second CU-Boulder proposal funded by the institute is a four-year, \$5 million grant led by principal investigator and Professor Mihaly Horanyi of the Laboratory for Atmospheric and Space Physics for the creation of the Colorado Center for Lunar Dust and Atmospheric Studies, or CCLDAS. Horanyi and his team will study the lunar surface and atmosphere, including charged dust particles, ionized gas and dust, impact processes, the evolution of the lunar atmosphere and astronaut safety issues.

The LUNAR team set to probe the cosmos from the moon includes an "all-star" lineup of more than a dozen institutional partners, including NASA centers, federal labs and universities like Harvard, the Massachusetts Institute of Technology and the University of California at San Diego, said Burns. "We are bringing together some of the best astronomers in the nation for this effort," said Burns, a professor in the atmospheric and planetary sciences department.

As part of the LUNAR grant, the team will study the so-called "Dark Ages" of the universe -- the first half-billion years of its roughly 14 billion-year history -- in which hydrogen gas clouds had not yet collapsed from gravity to form stars, galaxies and black holes, said Burns. "We know it was crucial time with a lot of action."

Burns said some of the LUNAR observations will take place from the far side of the moon, the only "truly quiet" environment in terms of radio emissions in the inner solar system. The LUNAR team will develop new instruments, including a low-frequency array of radio antennas. One version of the array has antennas embedded in a plastic sheet that can be rolled out on the far side of the moon's surface to search for faint "hisses" generated by primordial material forming the first stars and galaxies, he said.

The CCLDAS activities will be focused on the CU-Boulder campus and will include faculty from LASP and the physics department as well as NASA Johnson Space Center, two small Boulder businesses -- Tech-X Corp. and Zybek Advanced Products Inc. -- and international partners, Horanyi said.

"We are especially interested in the physical characteristics of lunar dust, from its interactions with the moon's atmosphere and the solar wind to its impacts on optical and mechanical devices that will be on the moon for extended periods," Horanyi said. "This new institute will provide wonderful opportunities to scientists and students around the nation to come to CU-Boulder and conduct research on lunar dust issues."

Horanyi said a dust particle accelerator will be built by the team at the former nuclear physics facility on CU-Boulder's East Campus as part of the CCLDAS effort. The accelerator will speed the particles to "hypervelocities" exceeding six miles per second to simulate rapidly moving dust particles in lunar and space environments, he said.

"The selections of these two proposals by NASA are a feather in the cap of the University of Colorado at Boulder," said Stein Sture, CU-Boulder's vice-chancellor for research and dean of the Graduate School. "There is some very exciting and important science to be done both on the moon and from the moon, and we are pleased to be firmly entrenched in what is shaping up to be an exciting, long-term lunar exploration and research effort by NASA."

Burns said the fact that CU-Boulder won two of the seven awards nationwide from the Lunar Science Institute is "a real coup." "This shows once again that the University of Colorado is among the world's leaders in space science."

The other five teams selected as initial members of the agency's Lunar Science Institute today will be led by the Southwest Research Institute in Boulder, Brown University, Johns Hopkins University, the Lunar and Planetary Institute in Houston and NASA's Goddard Space Flight Center.

The seven teams were selected from 33 proposals. Based and managed at NASA Ames, the lunar facility is a virtual institute modeled after the NASA Astrobiology Institute. The institutes are supported by the Science Mission Directorate at NASA headquarters in Washington.

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