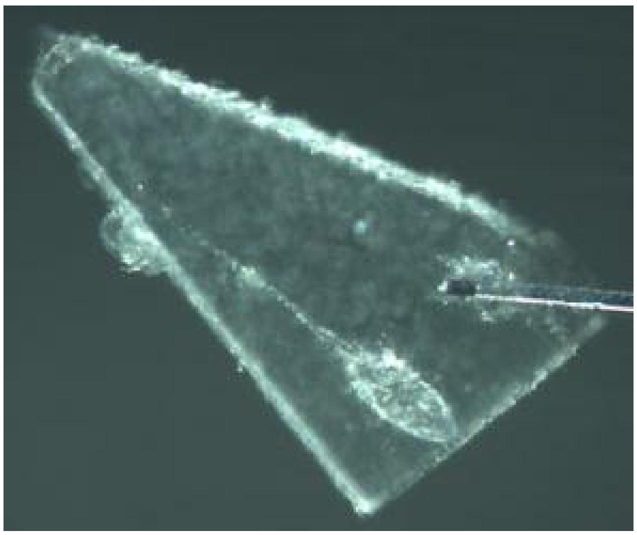
Stardust@home launches today

August 1 2006



Stardust@home volunteers will look for tracks like this, which was made in the Stardust spacecraft's aerogel collector by a comet grain and extracted for study earlier this year using techniques developed at UC Berkeley's Space Sciences Laboratory. (Photo by Hope Ishii/Lawrence Livermore National Laboratory)

On your marks, dust hunters! The University of California, Berkeley's Stardust@home project - a needle-in-a-haystack search for interstellar dust that's open to anyone with a computer - gets off the ground tomorrow (Tuesday, August 1) at 11 a.m. PDT.

The project was announced in January as NASA's Stardust spacecraft was prepared to deliver to Earth its payload of cometary and interstellar dust grains embedded in a relative ocean of aerogel detector. Almost immediately, Stardust@home drew nearly 115,000 volunteers eager to search for these interstellar motes within the millions of scans of the Stardust Interstellar Dust Collector that eventually will be put on the Internet.

Using a Web-based virtual microscope developed at UC Berkeley, volunteers will vie to find the fewer than 50 grains of submicroscopic interstellar dust expected to be there.

Stardust@home director Andrew Westphal, a UC Berkeley senior fellow and associate director of the campus's Space Sciences Laboratory, said he hopes the dust particles, made in supernova explosions as much as 10 million years ago, will provide clues to the internal processes of distant stars. Supernovas, flaring red giants and neutron stars all produce interstellar dust and generate the heavy elements like carbon, nitrogen and oxygen, that are necessary for life.

"How we analyze these grains depends a lot on how big they are," Westphal said, noting that if they are as large as the comet dust they could be studied with an X-ray microscope or probed with ion or electron beams. "These grains will be so precious that they will be studied for decades."

A panel of 132 tiles of aerogel, a foamy material that is the lightest known manmade solid, brought speeding dust to a soft landing as Stardust cruised through space toward its rendezvous with comet Wild 2 in 2004. While many of the more abundant grains of comet dust have already been extracted from a separate panel of aerogel detectors and are now being analyzed, the search for micron-sized grains of interstellar dust has been held up by the difficulty of scanning the aerogel.

"The scanning, which is being done at Johnson Space Center in Houston, has been more challenging than we hoped," said Westphal. "The terrain of the aerogel surface is rougher than we expected, which makes it difficult to get the scanner in focus."

Westphal developed the digital microscope scanner based on his previous experience scanning glass detectors for cosmic ray particles. The scanner is now on loan from UC Berkeley to NASA's Johnson Space Center, where colleagues Jack Warren and Ron Bastien are scanning the interstellar dust collector in the Cosmic Dust Laboratory. In each field of view, which is about the size of a grain of salt, the scanner focuses at 42 depths into the transparent aerogel, from the surface down to 100 microns - the thickness of a human hair. These are turned into a "focus movie" that volunteers using the virtual microscope can easily view with the glide of a mouse.

Despite the scanning difficulties, he and team members Dr. Anna Butterworth, physics graduate student Joshua Von Korff, Dr. Bryan Mendez of the Center for Science Education at the Space Sciences Laboratory, undergraduate Xu Zhang, and programmer Robert Lettieri are ready to go with about 40,000 fields of view for volunteers to search.

"The volunteers may go through that in a day," Westphal acknowledged. But it's critical, he added, to have many eyes look at each field of view and focus up and down through the aerogel to find the rare, carrot-shaped tracks made by dust grains slamming into the detector. As volunteers search through the available scans, more will be added as NASA personnel scan up to four new tiles a week. The last should be available in early 2007 and bring the total fields of view to 700,000, entailing nearly 30 million separate scans.

"Several hundred volunteers have expressed their anxious anticipation of the launch of the project," noted Mendez. "All the pre-registrants will receive by August 1 an e-mail announcing the launch of the project and inviting them to come to the Web site, read the background information and practice searching in the tutorial. When they have completed that, they may take an online test to see how good they are at finding simulated star dust tracks. If they successfully complete the test, they can then register and begin using the virtual microscope to search for real stardust tracks."

Those who find a confirmed dust grain will get the chance to name it.

Westphal came up with the Stardust@home idea as an inexpensive way to search the detectors for the several dozen grains of dust, each too small to see with the naked eye. He worked with computer scientist David Anderson, director of UC Berkeley's SETI@home project, and graduate student Von Korff to develop the virtual microscope. Mendez and Nahide Craig, assistant research astronomers at the laboratory, are creating a teacher's lesson guide that uses the Stardust@home virtual microscope to teach students about star dust and the origins of the solar system. Sections of the Stardust@home Web site are also aimed at the general public.

The project is funded by NASA and has received critical technical and developmental support from Amazon Web Services and The Planetary Society, which has also supported the SETI@home project to detect intelligent signals from space. SETI@home is an automated program that acts as a screen saver on home computers. Unlike SETI@home, where the computer processes all the data, Stardust@home is a hands-on activity. And it offers the public a rare chance to participate in a NASA mission.

"Think of this mission as the ultimate cosmic road trip," said Bruce Betts, The Planetary Society's director of projects. "On long journeys, you're bound to end up with a few bugs - or dust particles - smashed against the windshield, but in the case of Stardust, the research team wanted to collect them intact without smashing or vaporizing them."

The Stardust@home project uses the Amazon Simple Storage Service (Amazon S3) to store and deliver the tens of million of images that represent the data collected from the dust particle aerogel experiment.

On the Net:

SETI@home project -- setiathome.ssl.berkeley.edu/

Stardust@home -- stardustathome.ssl.berkeley.edu/

Source: UC Berkeley

Citation: Stardust@home launches today (2006, August 1) retrieved 25 April 2024 from https://phys.org/news/2006-08-stardusthome-today.html