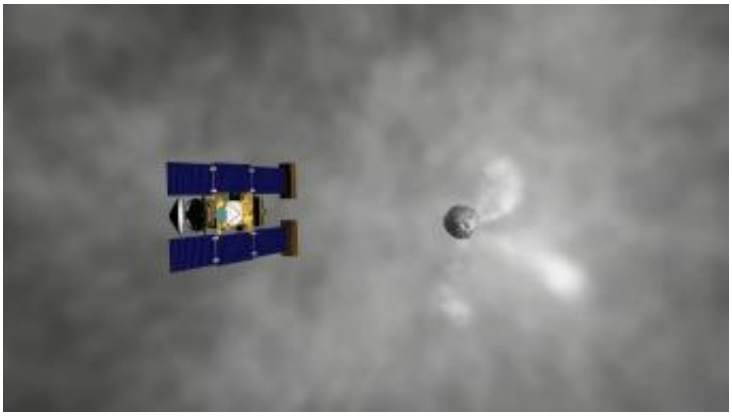
Stardust Capsule Set to Return to Earth on Sunday

January 11 2006



Artist&acutes impression of Stardust&acutes encounter with Comet Wild 2. Scientists believe the material snatched from the trail of a comet could provide dramatic information about the birth of the solar system and the origins of life on Earth. Launched in 1999, the 385-kilogram (849-pound) probe, circled the Sun twice and then flew in January 2004 by comet Wild 2, which was located at the time next to Jupiter. Credit: NASA

This Sunday morning (15th January) at 10.12am GMT a capsule containing dust from Comet Wild 2 will return to Earth landing in the Utah Desert near Salt Lake City. The landing of the capsule marks the return of NASA's Stardust mission which has been on a three billion-mile trip to collect pristine cometary material and interstellar dust.

After their collection samples will be distributed to a limited number of

specialist research teams. Four UK institutions have been invited to be part of these Preliminary Examination Teams: scientists from the Open University, the Natural History Museum, Imperial College and the University of Kent will be hoping that the material provides a key to unlock some of the secrets of the Solar System.

Prof Keith Mason, PPARC's Chief Executive Officer, which part funded the UK involvement in Stardust, said "The return of the samples from Stardust is a truly remarkable feat. It will be the first time in the history of space exploration that samples from a comet and from interstellar space will be returned to Earth. It is particularly exciting that scientists from the UK will be some of the first to analyse the samples - helping to further our understanding of the origins of the Solar System."

Following its launch in February 1999 Stardust made its brief but dramatic encounter with Comet Wild 2 (pronounced Vilt after its Swiss discoverer) on 2nd January 2004 capturing thousands of particles as it came within 146 miles of the comet. Remarkably, it survived the high speed impact of millions of dust particles and small rocks of up to half a centimetre across (Stardust passed Comet Wild 2 at 13,000 mph - over 6 times faster than a speeding bullet). Stardust's tennis racket shaped collector captured thousands of these comet particles into cells filled with Aerogel - a substance so light it almost floats in air.

After their capture the particles were locked away in a "clam shell" capsule to protect them on their journey back to Earth. Some 4 hours before landing the capsule will be released by the spacecraft, via a spring mechanism, where it will enter the Earth's atmosphere 410,000 feet over the Pacific Ocean. The capsule's aerodynamic shape and centre of gravity are designed like a shuttlecock so it will automatically orient itself with its nose down as it enters the atmosphere. At approximately 105,000 feet the capsule will release a drogue parachute to control its decent until the main parachute opens at around 10,000 feet. The capsule

is scheduled to land at 10.12am GMT, touching down at a speed of 4.5 metres/second (approximately 10 miles an hour).

After landing, the capsule will be recovered by a helicopter crew who will fly it to the US Army Dugway Proving Ground, Utah for initial processing before taking it to NASA's Johnson Space Centre in Houston. The first samples will be made available to a small number of teams, including The Open University's Planetary and Space Science Research Institute (PSSRI), for preliminary analysis before their release to the wider scientific community.

The Open University (UK) team including Dr Simon Green, Dr Ian Franchi, Dr John Bridges and Prof Monica Grady will be among the world's first scientists to analyse the samples that contain the fundamental building blocks of our Solar System. Analysis may be able to determine not only the origins of the Solar System from these samples, but also possibly the origins of life.

"The tiny particles that the Stardust mission is bringing back are the most scientifically exciting and technically challenging material that we have ever had the opportunity to study", said Prof Grady. "Imagine trying to pick up a grain that is less than a hundredth of the size of the full stop at the end of this sentence. It is amazing to think that such minute specks of dust can carry within them so much information about the origin of stars and planets."

"Stardust could provide a new window into the distant past", said Dr Green. "Comets are made of ice and are very cold and have been very cold since they were formed. That protects the material of which they were made from any process of heating, so they haven't been changed since they were formed, right at the beginning of the formation of the Solar System. So we can have almost a little time capsule of what things were like 4.5 billion years ago. We can also learn about processes in stars

and interstellar dust clouds in which the dust grains originally formed. They may also reveal information about the origins of life since comets are a source of organic material that may have formed the original building blocks of life-forming molecules."

Some facts:

The distance between Earth and Comet Wild 2 was 390 million kilometres (242 million miles) at the time of the encounter.

The spacecraft was protected from debris and rocks by a number of shields in order to guard its solar panels and body. In preparation for this journey the craft was pelted with rocks and debris travelling at six times the speed of a bullet.

The cometary particles were captured on a tennis racket like grid which contains a substance called aerogel - the lightest solid in the Universe! This is a porous material that allows the particles to become embedded with minimum damage. This means that on their return to Earth they will be as near as possible to their original state. Analysis of the sub-micron-sized particles will be a technical and instrumental challenge. The Open University has developed specialised handling and analytical procedures that will allow mineralogical and spectroscopic analysis of the precious material.

Once the samples are captured a clam like shell closes around them. The capsule then returns to Earth in January 2006 where it will land at the US Air Force Utah Test and Training Range, south west of Salt Lake City. Once collected, the samples will be taken to the planetary material curatorial facility at NASA's Johnson Space Centre, Houston, where they will be carefully stored and examined.

STARDUST, is part of NASA's Discovery Programme of low cost,

highly focused science missions, was built by Lockheed Martin Astronautics and Operations, Denver, Colorado, and is managed by the Jet Propulsion Laboratory for NASA's Office of Space Science, Washington D.C.

Source: PPARC