Dawn – first visual contact with Vesta

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The camera system on board the Dawn spacecraft has acquired its first image of the massive asteroid Vesta. Although the mission's first target is still about 975,000 kilometres away, appearing as just a large white dot, "we now have visual contact with our objective," said Ralf Jaumann of the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR). In August 2011, the camera will photograph the asteroid from an orbit with a planned survey altitude of 2700 kilometres; the data will then be processed to develop a three-dimensional model.

It has taken the NASA spacecraft over 43 months, during which it has travelled 2.6 billion kilometres, to come within imaging range of the irregularly shaped asteroid. The image acquired on 3 May 2011 shows the asteroid, which has a diameter of about 530 kilometres, as a white dot against a background of stars. Dawn will use its framing cameras over the next three months to navigate the approach and orbital capture by Vesta. "We are no longer flying without sight of our target," said Jaumann, head of the Planetary Geology Department at DLR's Institute of Planetary Research in Berlin. The camera system has now successfully demonstrated the first of its two functions by providing navigational data. "It is now clear that the camera system is working flawlessly and can fulfil its purpose as a navigation instrument."

The images obtained with the framing cameras will now be used to determine the exact relative trajectory of the spacecraft, and significantly improve its guidance and control to Vesta. According to current calculations, on 16 July 2011, Vesta will capture Dawn into orbit. The spacecraft will study the asteroid for roughly a year.

An asteroid in three dimensions

Beginning in August, the framing cameras will begin to perform their second function; the German camera system will analyse the surface of Vesta before Dawn continues its journey to visit the asteroid Ceres. Excitement is growing among planetary scientists as the spacecraft approaches Vesta. "We can't wait to begin exploring," says an enthusiastic Carol Raymond, a researcher at NASA's Jet Propulsion Laboratory and Deputy Principal Investigator for the Dawn mission. Although the appearance of the asteroid's surface is as yet unknown, it is thought likely that it has a solid crust similar to that of the Moon. The camera technologies have been exercised on the Rosetta, Mars Express and Venus Express missions. DLR's planetary scientists will process the data obtained with the cameras as Dawn orbits Vesta at different altitudes. The resulting terrain model will answer questions about Vesta's birth, geological history and battering by other asteroids.

The Dawn mission

The Dawn mission to Vesta and Ceres is managed by NASA's Jet Propulsion Laboratory (JPL) in Pasadena, which is a division of the California Institute of Technology, for NASA's Science Mission Directorate in Washington DC. The University of California, Los Angeles, is responsible for overall Dawn mission science. The camera system on the spacecraft was developed and built under the leadership of the Max Planck Institute for Solar System Research in Katlenburg-Lindau, Germany, with significant contributions from the German Aerospace Center (DLR) Institute of Planetary Research in Berlin and the Institute of Computer and Communication Network Engineering in Braunschweig. The Framing Camera project is funded by the Max Planck Society, DLR, and NASA/JPL.

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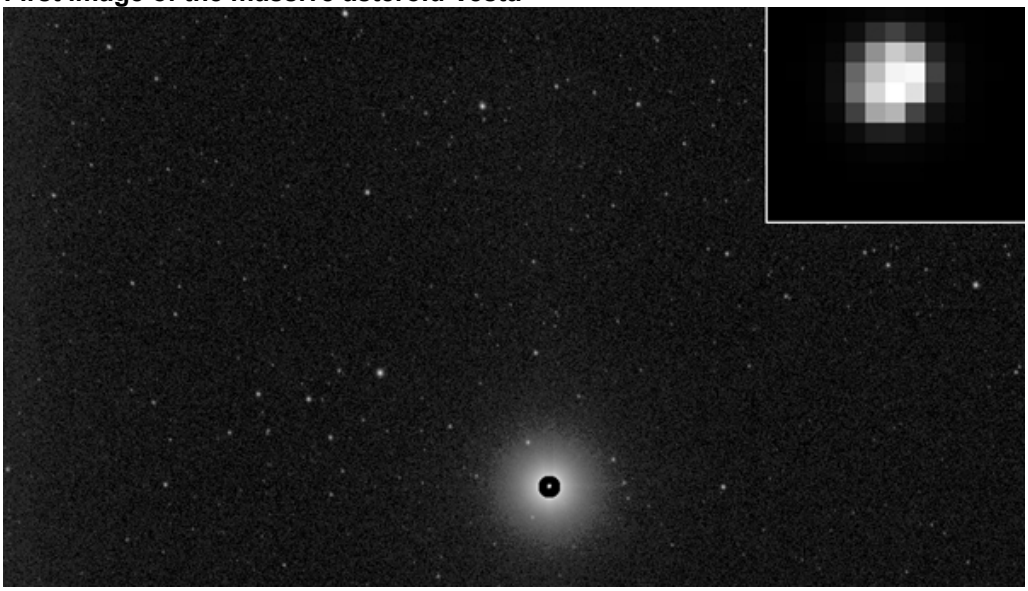
First image of the massive asteroid Vesta



This image, processed to show the true size of Vesta, shows the first glimpse of the giant asteroid Vesta in front of a spectacular background of stars. It was obtained by the framing camera aboard NASA's Dawn spacecraft on 3 May 2011, from a distance of about 1.2 million kilometres. Vesta is so bright that it outshines its starry background, so the framing camera team programmed a long exposure time to make the stars visible. The resulting exaggerated size of Vesta was corrected by superimposing a short exposure image of the target asteroid, showing its true size. Vesta is the small, bright pearl in the middle of the image. Vesta is 530 kilometres in diameter, and the second most massive object in the asteroid belt. But, as the inset shows, Vesta is approximately five pixels across in size in Dawn's early approach images.

Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA.

Unprocessed image of the giant asteroid Vesta

This is the first unprocessed image of the giant asteroid Vesta in front of a background of stars, obtained with NASA's Dawn spacecraft. It was obtained with Dawn's framing camera on 3 May 2011, from a distance of about 1.2 million kilometres. Vesta is seen in the centre of the image. The giant asteroid reflects so much sunlight that its size is dramatically exaggerated at this exposure.

Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA.

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