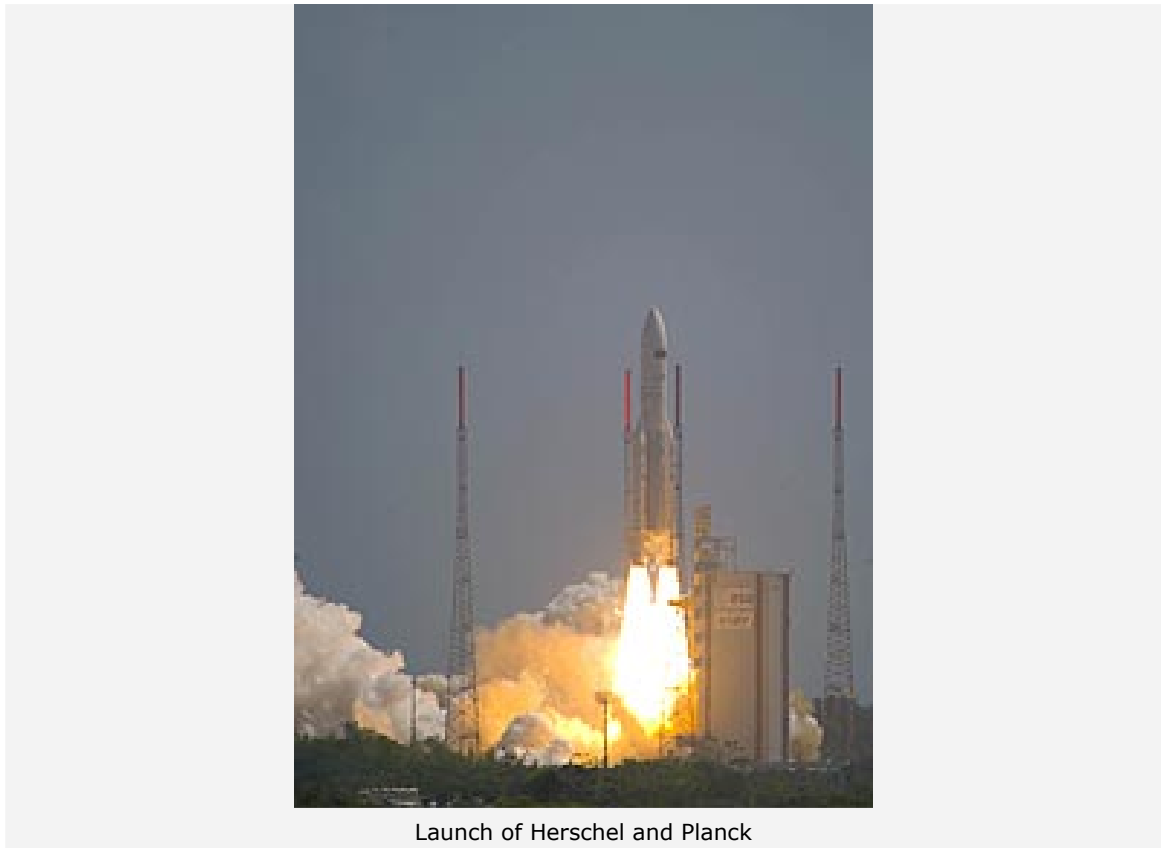

News Archive Space 2009

Herschel and Planck space telescopes in space

14 May 2009



Dual Ariane launch with German research instruments

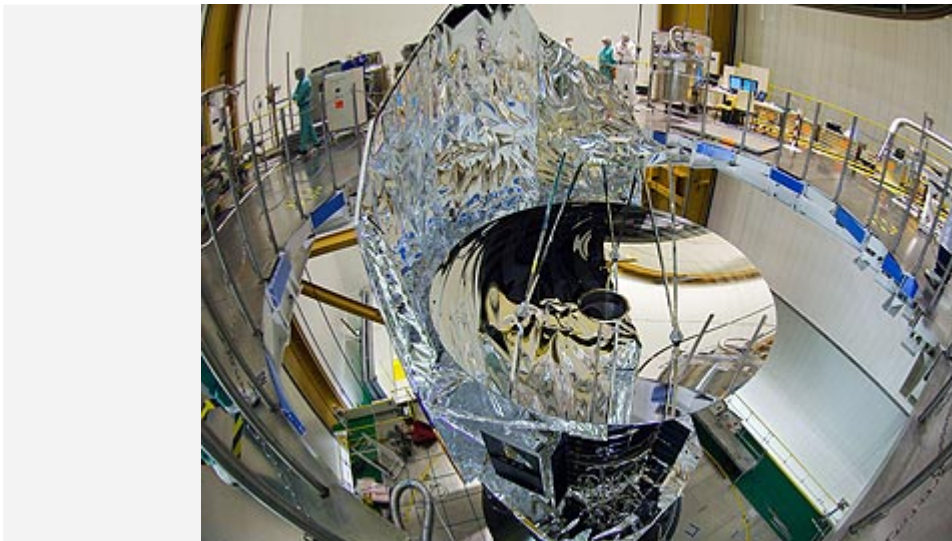
The Herschel and Planck space telescopes were successfully launched from the European spaceport in Kourou at 15:12 CEST today. The satellites were carried on their way to Lagrange point L2, around 1.5 million kilometres from the Earth, by an Ariane 5 ECA launch vehicle. The two infrared telescopes are carrying high-tech German research instruments, which are financed by the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) using funds from the German Federal Ministry of Economics and Technology (Bundesministerium für Wirtschaft und Technologie; BMWi). Herschel will study extremely cold objects in galaxies while Planck will use the cosmic background radiation to examine the primordial universe. German scientists have a significant degree of involvement in these ambitious European Space Agency (ESA) missions.

Herschel: next-generation infrared astronomy

Herschel Space Telescope

Herschel is the first space observatory to cover the entire wavelength range of the far-infrared (FIR) including the sub-millimetre range (60 to 670 microns). Because Herschel will study some parts of this spectrum for the first time, astronomers are expecting a wealth of new discoveries. They will use far-reaching observations of the sky to study the formation and development of galaxies since the dawn of the Universe. In the process, the scientists want to investigate the physical and chemical processes that take place in the interstellar medium and obtain new knowledge about how stars are formed from molecular clouds. In addition, they want to use high-resolution spectroscopy to map the composition of the atmospheres and surfaces of comets and planets.

The telescope's main mirror has a diameter of 3.5 metres. This makes Herschel the largest space telescope to date, being around one and a half times larger than Hubble. For weight reasons, the mirror is made from the ceramic material silicon carbide (SiC), which is being used for a mirror of this size for the first time.



Last look: Herschel on top of the launcher

In Germany, the Max Planck Institute for Extraterrestrial Physics (Max-Planck-Institut für extraterrestrische Physik; MPE) in Garching is involved in the development of PACS (Photodetector Array Camera and Spectrometer), one of Herschel's three scientific payloads. A large part of the work was carried out on behalf of MPE by the companies Kayser-Threde GmbH (Munich) and ASTEQ Applied Space Techniques GmbH (Kelkheim). The Max Planck Institute for Astronomy (Max-Planck-Institut für Astronomie; MPIA) in Heidelberg has funded a tilting mirror that was manufactured by Carl Zeiss AG in Oberkochen. The University of Cologne is coordinating the German contributions to the Dutch-lead instrument HIFI (Heterodyne Instrument for the Far Infrared). In addition, the University of Cologne has developed a mixer element and the Acousto Optical Spectrometer (AOS). The electronics for the AOS were manufactured by the Max Planck Institute for Solar System Research (Max-Planck-Institut für Sonnensystemforschung; MPS) in Katlenburg-Lindau. The local oscillator subsystem was developed under the direction of the Max Planck Institute for Radio Astronomy (Max-Planck-Institut für Radioastronomie; MPIfR) in Bonn.

Planck: studying the cosmic background radiation

Planck scanning the sky

Planck will significantly improve measurements of the cosmic background radiation and create a map of the entire sky with an angular resolution better than 10 arcminutes. Differences in temperature of around one-millionth of a degree Celsius are also expected to be detectable. Using Planck, scientists hope to obtain fundamental contributions to current questions in cosmology: What did the early stages of our Universe look like? How did it develop to become what it is today? How will it develop in future?

Planck is carrying a telescope with a mirror surface of 1.5×1.75 metres and two instruments that detect microwave radiation in different frequency bands. In Germany, the Max Planck Institute for Astrophysics (Max-Planck-Institut für Astrophysik; MPA) in Garching is involved. Scientists from MPA developed the software for data processing and information exchange while the instruments were being built, wrote the simulation programmes required for testing the data processing routines and analysis of the observation data and are building a database to store the data after they have been processed.



Planck

Herschel and Planck overview

	Herschel	Planck
Launch	14 May 2009 from Kourou, French Guiana	
Launch vehicle	ARIANE 5 ECA	
Orbit	Large Lissajous orbit around Lagrange point L2, at a distance of approx. 1.2 to 1.8 million kilometres from the Earth	Small Lissajous orbit around Lagrange point L2, at a distance of approx. 1.2 to 1.8 million kilometres from the Earth
Mission length	Three year (plus one year extension possible); the length of the mission will be restricted by the supply of liquid helium.	21 months (after reaching the L2 orbit and an approx. six month-long phase of tests, calibration, etc.)
Launch mass	3400 kilograms	1920 kilograms
Telescope dimensions	Diameter 3.5 metres (main mirror)	1.5 metres x 1.75 metres (main mirror)
Satellite dimensions	Height: 7.5 metres, diameter: 4.0 metres	Height: 4.2 metres, diameter: 4.2 metres
Instruments	PACS, HIFI, SPIRE	HFI, LFI
Costs	Total costs for ESA are around Euro 1.067 billion (1999 to end of mission in 2013), of which Euro 238.3 million is provided by Germany; plus for Herschel around Euro 50.5 million from DLR for instruments and operation as well as around Euro 50 million from the participating German institutes.	
Ground station	Perth, Australia	
Mission operation centre	ESOC, Darmstadt, Germany	
Scientific operation	ESAC, Villafranca, Spain	

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