

*The Hubble Space Telescope is a joint ESA/NASA project and was launched in a low-Earth orbit 600 km above the ground in 1990 by the Space Shuttle mission STS-31. During its years of operation Hubble has managed to become one of the most important science projects ever.*

### **Description**

The Hubble Space Telescope is a co-operation between ESA and NASA. It is a long-term space – based observatory. The observations are carried out in visible, infrared and ultra-violet light. Hubble has in many ways revolutionised modern astronomy, being a highly efficient tool for making new discoveries, but also by driving astronomical research in general.

### **Objective**

Hubble was designed to take advantage of being above the Earth's disturbing atmosphere, and thereby providing astronomers with observations of very high resolution – essential opening new windows to planets, stars and galaxies. Hubble was designed as a flagship mission of high standard, and has served to pave the way for other space – based observatories.

### **How the mission was named**

Hubble Space Telescope is named after Edwin Powell Hubble (1889-1953) who was one of the great pioneers of modern astronomy.

### **Industrial Involvement**

The ESA contribution to Hubble included the Solar Panels and the Faint Object Camera (FOC). Prime contractors for the FOC were Dornier (now DaimlerChrysler Aerospace, Germany), and Matra (France); for the Solar Panels British Aerospace (UK).

### **Launch date**

24 April, 1990, 12:33:51 UT (deployment 26 April 19:38 UT)

### **Launcher**

Space Shuttle Discovery (STS-31)

### **Launch mass**

11 110 kg

### **Dimensions**

Length: 15.9 m, diameter: 4.2 m. In addition two solar panels each 2.4 x 12.1 m.

**Payload** (current)

A 2.4 m f/24 Ritchey-Chretien telescope with four main instruments, currently WFPC2, STIS, NICMOS and FOC. In addition the three fine guidance sensors are used for astrometric observations (positional astronomy).

WFPC2 — Wide Field/Planetary Camera 2 is an electronic camera working at two magnifications. It has four CCD detectors with 800 x 800 pixels. One of these (called Planetary Camera) has a higher resolution (<0.1 arcsecond).

STIS — Space Telescope Imaging Spectrograph uses so-called MAMAs and CCDs to provide images and spectra. It is sensitive to a wide range of light from UV to Infrared.

NICMOS – Near Infrared Camera and Multi-Object Spectrometer provides images and spectra in the infrared. NICMOS uses cooled HgCdTe detectors. Currently NICMOS is dormant and awaits a new cooler to be provided during Servicing Mission 3B.

FOC — Faint Object Camera – Is a very high resolution camera built by ESA. FOC is no longer in use and will be replaced by the new Advanced Camera for Surveys (ACS) during Servicing Mission 3B.

**Orbit**

Circular, 593 km with a 28.5 degree inclination. Orbital time is between 96 and 97 minutes.

**Operations**

The science operations are co-ordinated and conducted by the Space Telescope Science Institute (STScI) in Baltimore. The overall management of daily on-orbit operations resides with NASA's Goddard Space Flight Center (GSFC) in Greenbelt.

**Ground stations**

The data from Hubble are transmitted to the Tracking and Data Relay Satellite System (TDRSS). From TDRSS the data are sent to the TDRSS ground station and on to Goddard Space Flight Center, from where the science data are sent to STScI.

**Foreseen operational duration**

20 years (until 2010).

**Costs**

ESA's financial contribution to Hubble is 593 million Euros at 1999 economic conditions (including the development of FOC and the Solar Arrays, the participation in the operations and in the relevant Servicing Missions).