# Getting to Know SOHO

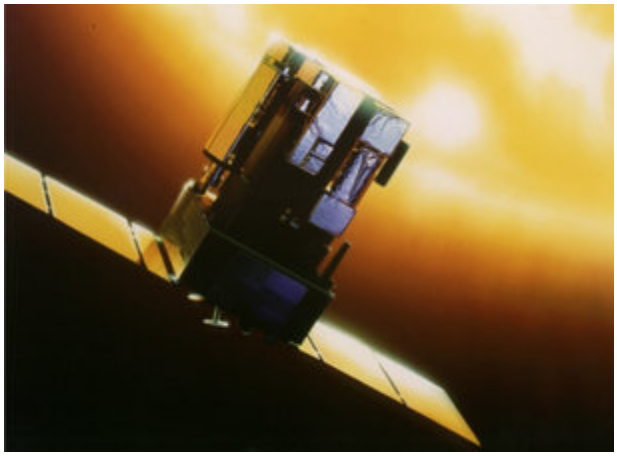
The Solar Heliospheric Observatory

## Background:

**SOHO:**

The Solar Heliospheric Observatory (SOHO) mission is a joint ESA/NASA mission that studies the Sun. Like Earth, SOHO follows an orbit around the Sun, studying its interior, surface, atmosphere and solar wind. SOHO sends continuous images of its observations back to Earth which scientists can use study to understand the nature of the Sun and predict how its activity will affect Earth and its environment.

Figure 1 – An artist's impression of the ESA/NASA SOHO satellite.



**Launching SOHO:**

SOHO launched from Cape Canaveral in Florida, U.S.A. on December 2, 1995 from the Atlas-IIAS launch vehicle. The Atlas-IIAS extends to 47.4 metres in length and 4 metres in diameter and has a total mass of 236,268 kg.

Figure 2 – SOHO launching from the Atlas-IIAS vehicle at Cape Canaveral in 1995.



The online observatory collaboration consists of the following partners:
Baldone Observatory, Brorfelde Observatory, Cardiff University, Harestua Solar Observatory, Helsinki Observatory

Follow the link below to watch the launch:

http://sci.esa.int/soho/14910-soho-launch/

**On-board SOHO:**

The SOHO satellite has a total of **12 instruments** on board with various filters in order to view different regions of the Sun and the various features they display.

Let's take a look at what some of them do…

The **Extreme Ultra-Violet Imaging Telescope (EIT)** observes the lower regions of the Sun's corona at ultra-violet wavelengths, allowing us to see some of the Sun's structural characteristics.

Because the Sun is so bright, its light overwhelms and hides some solar features that are not as bright as the main body. The **Large Angle and Spectrometric Coronagraph (LASCO)** is an instrument similar to the EIT but instead observes the Sun in visible wavelengths of light. A coronagraph is used to block the light emitted from the main body of the Sun in order to observe phenomena and features originating from the corona that are much fainter than the main body of the Sun.

The **Michelson Doppler Imager (MDI)** observes the surface of the Sun, the photosphere, in search of oscillations and magnetic field activity. This instrument terminated in 2011 and has now been replaced with its successor, the **Helioseismic and Magnetic Imager (HMI)** which observes the surface at visible light wavelengths.

The **Proba-2** payload is made up of four instruments. Two perform solar observations of the corona and internal solar physics at ultra-violet wavelengths. The other two measure the temperature of solar plasma (matter that is in a state that is neither a solid, liquid or gas) and plasma in the Sun's magnetosphere.

The **Coronal Diagnostic Spectrometer (CDI)** has an objective to probe the conditions of the Sun's corona and is sensitive to wavelengths of light in the extreme UV region of the electromagnetic spectrum.

The **Charge, Element and Isotope Analysis System (CELIAS)** studies the composition of the solar wind at UV wavelengths 17 – 70 nm, similarly the **Comprehensive Suprathermal and Energetic Particle Analyser (COSTEP)** is measuring the energetic particles that are continuously emitted from the Sun.

The **Solar Wind Anisotropies instrument (SWAN)** is used to measure the velocity of the solar wind and make observations of comets at UV wavelengths (115 nm – 180 nm). The **UV Coronagraph Spectrometer (UVCS)** is studying what is generating the solar wind and the nature of the Sun's corona in both UV and visible light wavelengths.

Moving now to another solar region, the **Solar UV Measurements of Emitted Radiation instrument (SUMER)** analyses bulk motions within the Sun's chromosphere and the lower regions of the corona just about it.

The **Energetic and Relativistic Nuclei and Electron sensor unit (ERNE)** is studying the solar atmosphere in order to investigate the solar processes that result in the release of energy and charged particles.

Finally, the **Variability of Solar Irradiance and Gravity Oscillations instrument (VIRGO)**, is studying solar variability and irradiance and global oscillations on the Sun at UV wavelengths 402, 500 and 862 nm.