

## Press Release

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*After CHEOPS launched in December 2019, Almatech will fly back into space aboard the Solar Orbiter satellite in February 2020!*

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Almatech SA is the unique Swiss company involved in both CHEOPS and SOLAR ORBITER programs of the European Space Agency (ESA).

The SOLAR ORBITER is an ESA mission with a strong participation of NASA dedicated to the in-situ observation of the Sun and its corona.

Solar Orbiter will be positioned 5 times closer to the Sun than to Earth within the orbit of Mercury, just 42 million kilometers away.

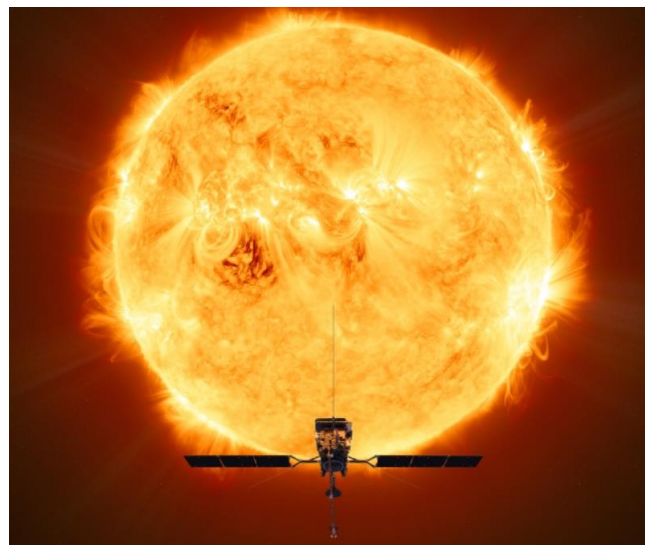
The Solar Orbiter surfaces facing the Sun will have to withstand temperatures above 500°C while the shaded areas will have to undergo the temperature of the interstellar vacuum of -180°C.

The rocket carrying Solar Orbiter, an Atlas V 411 provided by NASA, will take off from Cape Canaveral in Florida on February 6, 2020 (at dawn UTC). An Almatech delegation invited by NASA will be on site for the launch!

The mission builds on the legacy of missions such as Ulysses (1990-2009) and SOHO (1995 to present) will also provide complementary data to NASA's Parker Solar Probe.

Thanks to a suite of complementary instruments, Solar Orbiter will be able to study the plasma environment locally around the spacecraft (in-situ data collected by 4 instruments) and to collect remote data from the Sun (remote sensing by 6 instruments including **STIX** and **SPICE**), linking the activity of the Sun with the space environment of the inner solar system.

Almatech SA is proud to have been the industrial partner of scientists for the **STIX** and **SPICE** instruments soon to be close to the Sun.



The **STIX** scientific instrument is an X-ray spectro-imager consisting of 30 collimators, each collimator consisting of a pair of grids and a detector. The detectors are cooled to -20°C which is a challenge due to the heat of the Sun.

These pixel detectors, consisting of a crystal and an integrated circuit, are located inside the electronic signal processing module called **DEM** for **Detector Electronic Module**. An ultra-precise and fast **Attenuator Mechanism** is incorporated into the **DEM** to decrease the X-ray flux in the event of a solar flare to prevent damage to the ultra-sensitive detectors.

The ultra-compact design, manufacture and integration under extreme cleanliness conditions of the complete **DEM** was a major technological challenge brilliantly achieved by Almatech.

The STIX Instrument allows complete images of the sun and its corona to be taken in X-ray spectrography.

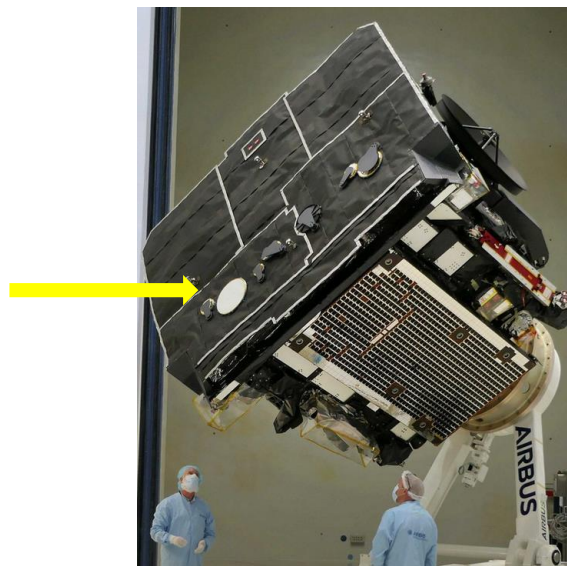
Due to the long observation periods required, the STIX instrument is protected behind polished **Beryllium Windows** that greatly reduce the entry of heat from the sun while being transparent to X-rays for observation.

**Almatech SA** completed the following parts and subsystems to the full satisfaction of FHNW (University of Applied Sciences North-western Switzerland at Brugg-Windisch – AR -), Prof. Säm Krucker **STIX** Instrument Principal Investigator:

- The complete **Detector Electronic Module (DEM)** including the 30 collimators and the signal processing electronic cards
- The **Attenuator Mechanism** in case of solar flare
- The **Beryllium Windows** to protect the Instrument which are Mission Critical for the whole satellite

These **Beryllium Windows** are classified as **Mission Critical** because a failure of these windows would inevitably lead to the loss of the entire Solar Orbiter satellite. Indeed, in case of failure, the heat of the Sun would gradually melt the entire satellite entering through the hole created in its armour, see photo below..

Mission Critical Beryllium  
Windows



The **SPICE** scientific instrument is a coronal imaging spectrograph using the EUV extreme ultraviolet spectral band whose main scientific objective is the characterization of plasma in the solar atmosphere and in the regions source of the polar wind.

SPICE is developed by the Rutherford Appleton Laboratory (RAL) located in Harwell, UK in collaboration with the Davos Observatory (PMOD), this under the responsibility of ESA.

SPICE uses a set of entrance slits and a complex diffraction grating scattering the sunlight onto a double detector.

**Almatech SA** completed the following master piece to the full satisfaction of RAL and *Observatorium Davos* (GR) Principal Scientific Investigators of the SPICE Instrument:

- The ultraclean and precise **Slit Change Mechanism** located at the heart of the SPICE Instrument in the ultra-sensible optical cavity allowing several input slits necessary for the dispersion of the Sun light to be positioned with extreme precision



*SPICE Ultraclean and Precise Slit Change Mechanism developed by Almatech SA*

As main industrial partner and the only Swiss company involved in both CHEOPS and SOLAR ORBITER programs, **Almatech SA** located on the EPFL Campus at Lausanne is very proud of the trust shown and the recognition of the quality of its work by FHNW, RAL Laboratory, Observatorium Davos, the European Space Agency (ESA) and more generally by the entire scientific community. Almatech SA also thanks SEFRI/SSO in charge of the funding for the trust shown.

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Contact:  
Hervé Cottard  
CEO  
Almatech SA  
Space & Naval Engineering  
[www.almatech.ch](http://www.almatech.ch)  
[herve.cottard@almatech.ch](mailto:herve.cottard@almatech.ch)