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Federal Department of Economic Affairs, Education and Research EAER

State Secretariat for Education, Research and Innovation SERI
Space Office

Andreas Werthmueller, 11 February 2016

Factsheet

ASTRO-H in the extreme temperatures of the Universe

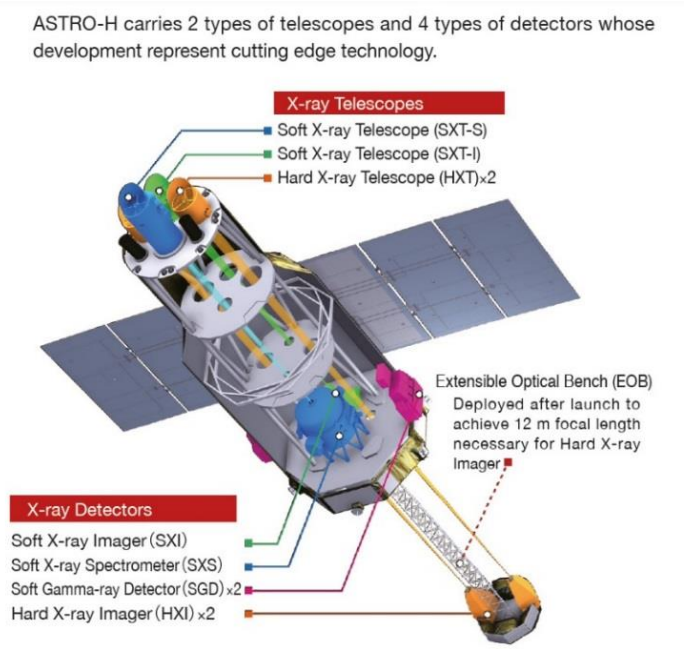
The extreme environment of our Universe, such as clusters of galaxies, black holes, and gases of several millions of degrees are rich astrophysical X-ray sources. The ASTRO-H satellite, to be launched on 12 February 2016, will use X-rays to observe the Universe. ASTRO-H will revolutionize our understanding of the Universe of high energies, in particular the structure of the Universe and the extreme conditions near black holes, and it will explore the thermal and non-thermal phenomena of our Universe. Switzerland has contributed to the technological development of ASTRO-H and in return actively participates in the scientific exploration. In addition, the University of Geneva and the European Space Agency ESA work together to provide European astronomers with an interface to exploit the capabilities of the ASTRO-H satellite.

ASTRO-H the 6th

ASTRO-H is the 6th satellite in a series of X-ray astronomy missions launched by the Japanese space agency (JAXA). ASTRO-H is the result of an international collaboration led by JAXA and involving over 70 institutions in Japan, the USA, Canada and Europe, including the University of Geneva. These institutes contribute significantly to many aspects of the development of ASTRO-H's software and hardware. Its launch is scheduled during the morning of February 12, 2016 (Swiss time) and, as per the tradition, it will be renamed with a Japanese name following the launch. The satellite is equipped with four instruments of cutting-edge technology which will enable simultaneous detection of a broad range of wavelengths from soft X-rays to gamma rays. In particular, one of its instruments will provide the highest spectral resolution ever achieved in the 3 to 10 Kev energy band.

Mission data and technical parameters of ASTRO-H

Scheduled launch	12 February 2016 Tanegashima Space Center, Japan
Launch:	H-IIA F30
Orbit:	Low earth orbit (altitude 575 km, inclination 31°
Mission duration	> 3 years
Mass of satellite	2.7 t
Total length	14 m following deployment of the optical platform
Electric Power	< 3500 W
Telemetry rate	8 Mbps (X- Band)
Telescopes & instruments	ASTRO-H has 2 types of telescopes and 4 types of detectors, which have all required the development of leading technologies in various fields.



Anticipated scientific results

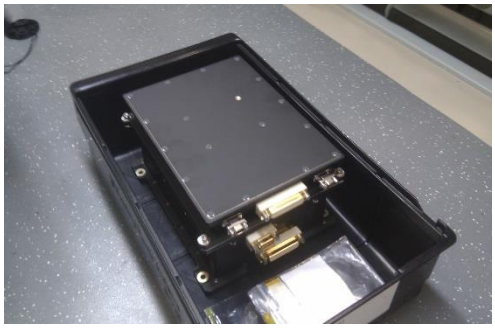
ASTRO-H consists of state-of-the-art instruments and other more conventional ones, the combination of which allows simultaneous coverage of the whole X-ray spectrum. This will allow a number of discoveries for numerous astrophysical objects. Exceptional results are anticipated, namely in the understanding of the structure of the Universe and its evolution as well as of the extreme conditions near black holes.

Swiss Contribution to ASTRO-H

The University of Geneva participates to the ASTRO-H mission in collaboration with SRON (Netherlands Institute for Space Research) with the development of a filter wheel and its control electronics for the microcalorimeter SXS. This filter wheel is necessary to optimise the performance of the SXS, in particular during the observations of very high X-ray sources. The filter wheel also contains an X-ray generator, developed by the SRON and piloted by the control electronics, to perform calibration of X-ray spectral energy observation. These elements will assist in guaranteeing the stability of the determination of the photon energy by the microcalorimeter SXS.

The filter wheel was developed and manufactured by Ruag Space (ZH), based on an initial concept developed at the University of Geneva. The control electronics was conceived by the firm Micro-Cameras & Space Exploration (MCSE, NE). The manufacture of the electronics was undertaken by the University of Geneva.

'ASTRO-H filter wheel (Photo:Ruag)



Electronics casing (Photo: UNIGE)

The scientists at the University of Geneva already significantly contribute to the calibration effort which will be necessary to the processing of the data from ASTRO-H within this joint venture. They will also play a central role in data processing, thanks to the establishment in Geneva of the ASTRO-H European Science Support Center (ESSC) which is aimed at facilitating access to the ASTRO-H mission and to its data for European scientists.

The ESSC is organizing an event on 12th February 2016 at 08:45 to follow the launch live. The programme can be found at: http://www.isdc.unige.ch/astroh/

For more information:

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Artist view of the ASTRO-H satellite (Photo JAXA)