X-IFU
ATHENA
X-ray Integral Field Unit

Media kit

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X-IFU in a nutshell

A revolutionary instrument

The X-IFU is a **revolutionary X-ray spectrometer**. It is one of the two instruments of the **European Space Agency**'s future space telescope, **Athena (Advanced Telescope for High Energy Astrophysics)**. With its X-ray eyes, **the X-IFU will observe the hot and energetic Universe**, a world of **clusters of galaxies, black holes**, and **exploding stars**.

The X-IFU combines **high spectral resolution** with **high quality imaging**. In other words, the **X-IFU will be able to capture images of astrophysical objects** in which each pixel of the image will provide us with **a full spectrum** containing **a lot of information about the objects**.

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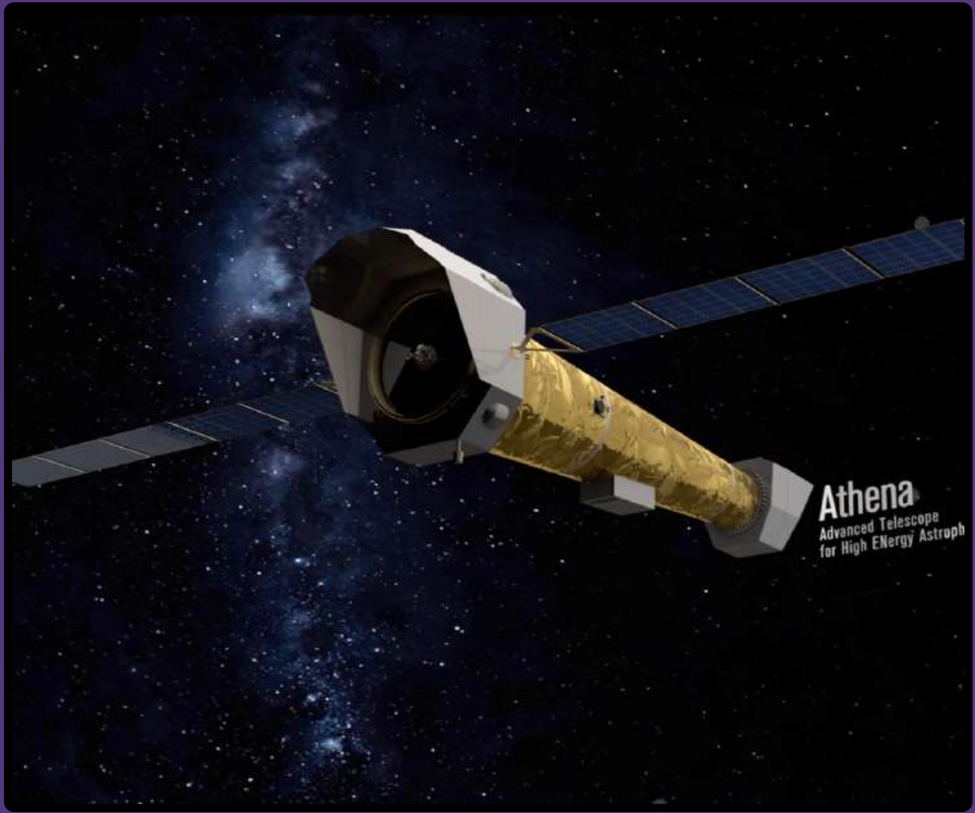
https://x-ifu.irap.omp.eu/x-ifu/x-ifu-in-anutshell

About Athena



An ESA flagship mission

Athena (Advanced Telescope for High ENergy Astrophysics) is a general-purpose open X-ray observatory mission that was **selected by ESA in June 2014** as the third Large mission opportunity within its **Cosmic Vision programme**. The mission was selected to address the **hot and energetic Universe scientific theme**.

Its unprecedented capabilities will allow the astronomical community to address a wide range of astrophysics topics, including among others: accreting compact objects such as black holes over their whole mass range and neutron stars, the hot gas around clusters of galaxies, distant gamma-ray bursts, supernova explosions and remnants, stars, white dwarfs, exoplanets and their parent stars, and the interstellar medium.

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https://www.the-athena-x-ray-observatory.eu/en

Project timeline

2013

The **instrument** is officially **named X-ray Integral Field Unit**

2014

The **first X-IFU Consortium meeting** is organised in Toulouse

2014

Athena is **selected as the second large mission** in **ESA**'s Cosmic Vision programme

2018

The **X-IFU Consortium** is formally **endorsed by ESA**

2022

Reformulation Phase

2023

Industrial invitation to tender release

2024

Industrial primes kick-off

2027

Mission Adoption

mid 2030s

Launch of the Athena observatory carrying the X-IFU

An international consortium

More than 300 people

The X-IFU is being built by an **international consortium**, **coordinated in France by IRAP**, the *Institute of Astrophysics and Planetology*, and **CNES**, the *National Center for Space Studies*. The X-IFU consortium brings together some **314 engineers and researchers** from over a dozen countries, the majority of which are ESA members, as well as the USA (NASA). 115 Consortium members are based in France, 59 in Italy and 31 in the Netherlands.

Scientific responsibility lies with **Didier Barret**, Senior Astrophysicist and Principal Investigator of the project. The project is managed at CNES by **Vincent Albouys**, the X-IFU Project Manager.

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https://x-ifu.irap.omp.eu/consortium/members

Scientific objectives

X-ray astronomy

X-ray astronomy is the **study of astronomical objects and phenomena that emit X-ray radiation**. X-ray telescopes and detectors have to be taken to space because Earth's atmosphere absorbs most X-rays. Nowadays, two flagship space observatories, ESA's XMM-Newton and NASA's Chandra, are in operation and deliver outstanding observations of cosmic X-ray sources. In the future, the **Athena space telescope, and its instrument X-IFU**, will be **even more sensitive to X-rays**.

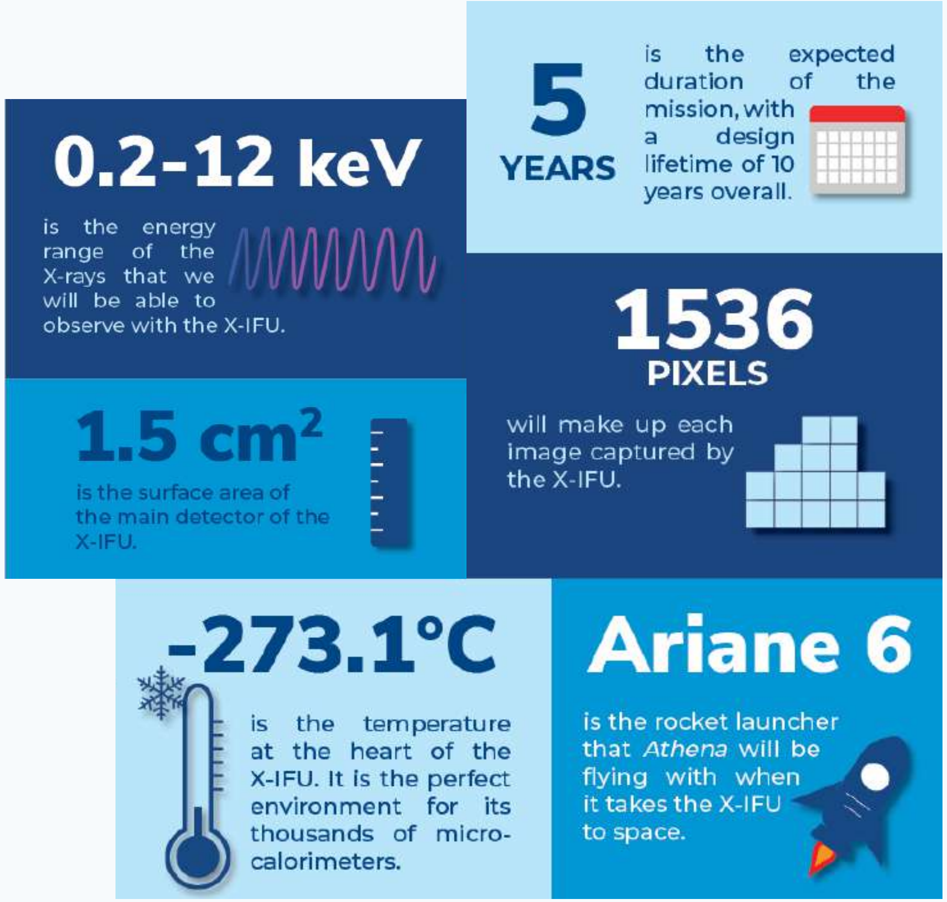
The hot and energetic Universe

Clusters of galaxies, black holes, and exploding stars are astrophysical objects, and many others, are under **extreme conditions** and subject to violent physical processes. They **form the hot and energetic Universe**. All have the common ability to emit X-ray light, which will be detected by the X-IFU. Understanding these phenomena will allow scientists to unravel the mystery of the growth of black holes; and to understand how they impact the formation and the evolution of galaxies, in other words, how they shape the Universe.

Expand our knowledge

The **X-IFU combines high spectral resolution** with **high quality imaging**. Thanks to its unprecedented capabilities, it will enable astrophysicists to **answer some of our most burning questions about the Universe**. They will extract breakthrough information about the **formation and evolution of the large structures** of matter observed in the Universe. They will also **expand our knowledge about the birth and life of black holes**, along with how they interact with the galaxies in which they live.

Instrument capabilities



What are the X-IFU capabilities?

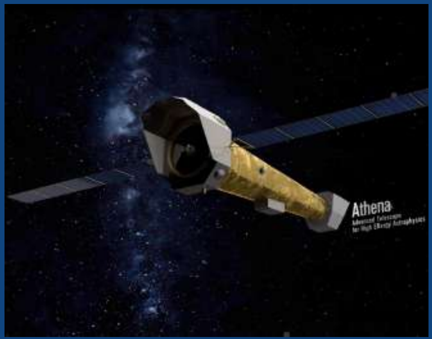
Cutting-edge technologies will allow the X-IFU to accurately **measure the energy of the X-rays** that are collected by the telescope mirror. The instrument uses **micro-calorimeters**: **highly sensitive heat sensors** capable of measuring the tiny amount of heat released when an X-ray is absorbed.

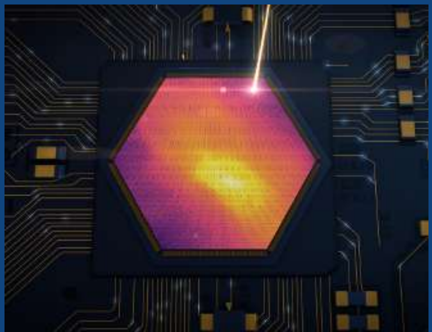
The key capabilities of X-IFU lie in its unprecedented **spectral resolution**, better than **4.0 eV up to 7 keV** (with a design goal of 3 eV), combined with a **large effective area**, over a **4 arcminute** (the equivalent diameter) hexagonal field of view and a low instrumental background. In addition, thanks to the defocussing capability of the telescope, the X-IFU will be **able to observe the brightest X-ray sources of the sky**, with micro-second time resolution, and yet keeping its excellent spectral resolution.

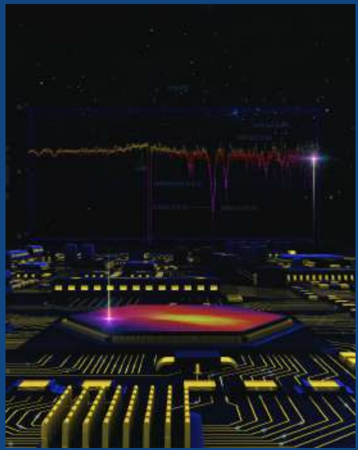
https://x-ifu.irap.omp.eu/x-ifu/key-capabilities

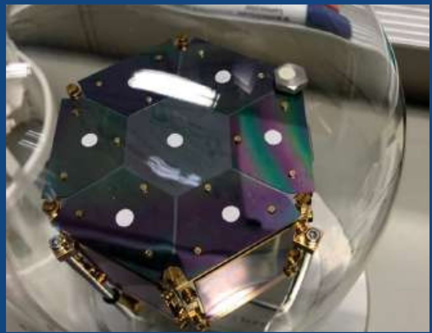
Resources: pictures

Photos available upon request.



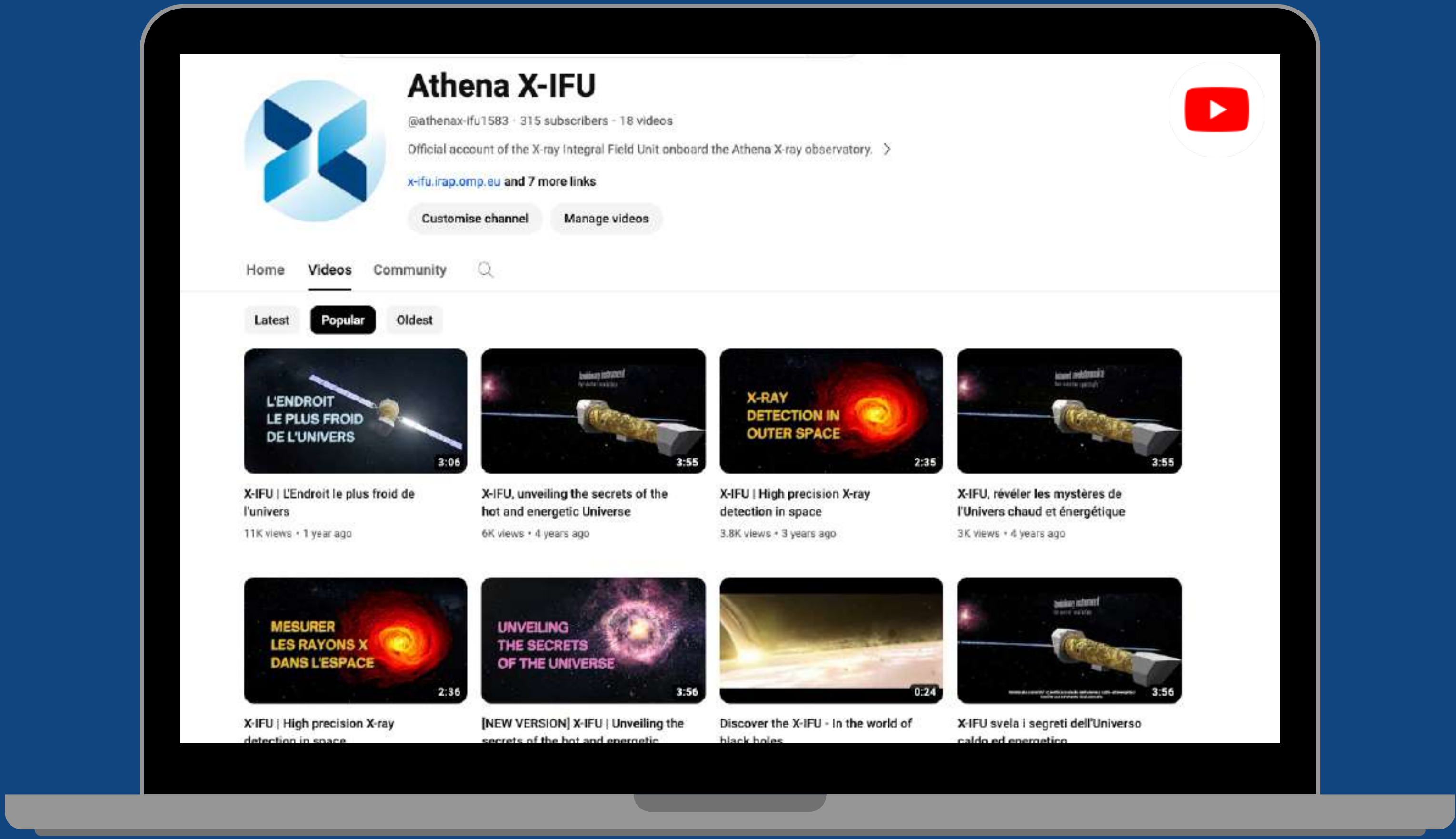






Resources: videos

Discover the X-IFU instrument on **YouTube**.



Contact & links

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ESA's website

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