
Services d'observation liés au PNHE

Natalie Webb



What are SO/SNO/ANO ?

The Commission Spécialisée Astronomie Astrophysique (CSAA) proposes the astrophysics/astronomy duties to INSU (*Institut National des Sciences de l'Univers, CNRS*)

L'INSU define the certified astronomy related duties called SNO (Service Nationaux d'Observations)

The French observatories (Observatoires des Sciences de l'Univers, OSU) where the CNAP (Conseil National d'Astronomes et Physiciens) staff are employed, are responsible for carrying them out

These duties are grouped into six Actions Nationales d'Observation

AA-ANO-1 Métrologie de l'espace et du temps

AA-ANO-2 Instrumentation des grands observatoires au sol et spatiaux

AA-ANO-3 Stations d'observation

AA-ANO-4 Grands relevés, sondages profonds et suivi à long terme

AA-ANO-5 Centres de traitement, d'archivage et de diffusion de données

AA-ANO-6 Surveillance du Soleil et de l'environnement spatial de la Terre

The interdisciplinary nature of the PNHE

High energy astrophysics studies the extreme in the Universe :

- formation, evolution and impact of compact objects
- relativistic particle acceleration
- creation of high energy neutrinos
- multi-messenger astrophysics
- stellar explosions
- gravitational waves
- cosmic rays

There are natural links with :

The physics and chemistry of the interstellar medium

- impact of cosmic rays, the magnetic field and γ -ray bursts as probes

Galaxies and Cosmology

- impact of supermassive black holes & dark matter, γ -ray burst probes

Stellar physics

- final stages of stellar evolution, nucleosynthesis, accretion-jets

Plasma physics and the Sun

- shock physics, particle transport, high energy emission

Nuclear physics

- neutron star equation of state, electron capture, neutrinos

XMM-SSC (ANO5)

 IRAP, Toulouse
CEA, Saclay
OAS, Strasbourg

 University of Leicester
MSSL
IOA, Cambridge

 AIP, Potsdam
MPE, Garching

 IFCA, Santander

 OAB, Milan



Responsible (France) : Natalie Webb
Partners : AIM/CEA, OAS

Software for reduction and analysis of
XMM-Newton data

Manual screening of all data reduced
automatically

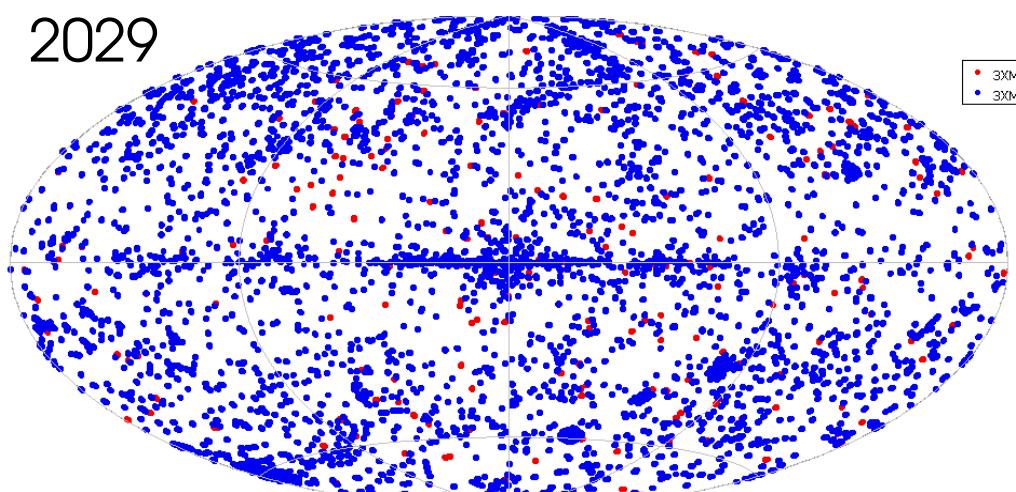
Catalogue production



XMM-Newton may stay in orbit until 2029

Software and calibration improve-
ments expected

Incremental and new catalogues



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Journées PNHE, 30-31 March 2016

Cerenkov Telescope Array (CTA, ANO2)

Responsible (France) : Jürgen Knödlseder (IRAP/OMP)

Partners : OSUG & Observatoire de Paris

First telescopes on site : 2017
(Two sites : Chile & La Palma)

Understand origin of cosmic rays
and their role in the Universe

Understand nature of particle
acceleration around black holes

Search for nature of matter and
physics beyond Standard Model



Credit: DESY/Milde Science Comm /Eduard

Conception, development, construction and operations of CTA

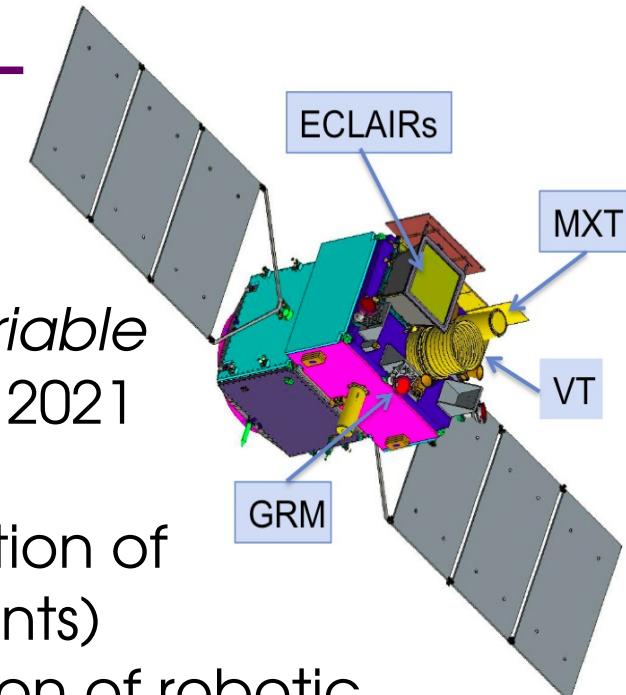
Activities : detectors, telescope instrumentation, software

SVOM (ANO2)

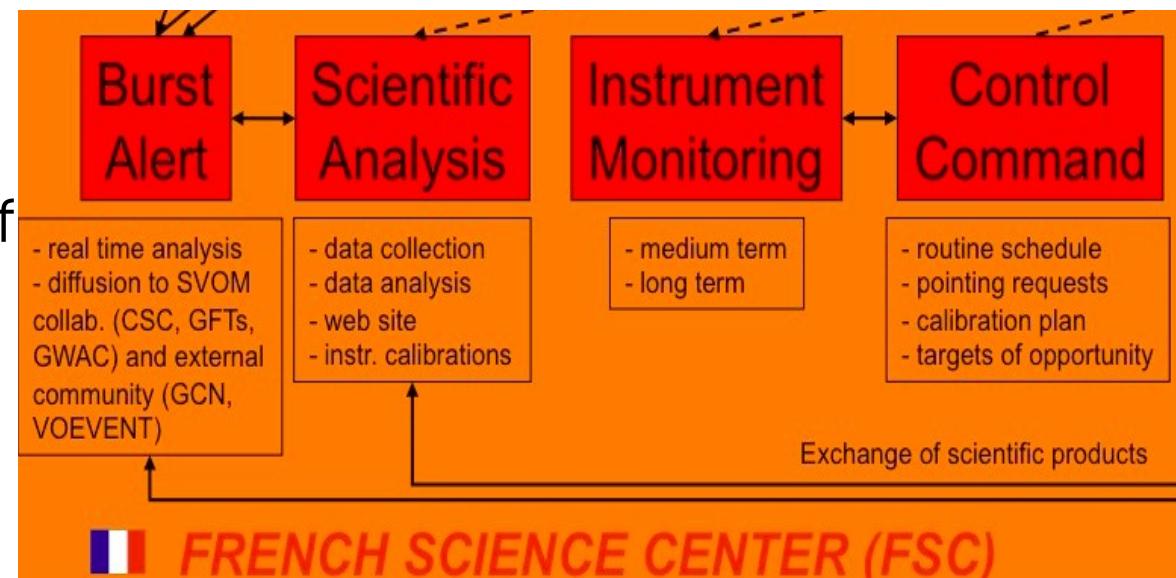
Responsible (France): Stéphane Basa (Pytheas)

Partners : OMP, AIM/CEA, OAS

SVOM (*Space-based multi-band astronomical Variable Objects Monitor*), French-Chinese mission, launch: 2021



- Conception, realisation, delivery, tests & integration of ECLAIRs & MXT and the alert network (for transients)
- Conception, realisation, delivery, tests & validation of robotic telescopes
- Ground segment (FSC):
 - Conception, development, tests, validation & delivery of algorithms, software & reduction pipelines + data quality control
 - Simulations and recipes to test software



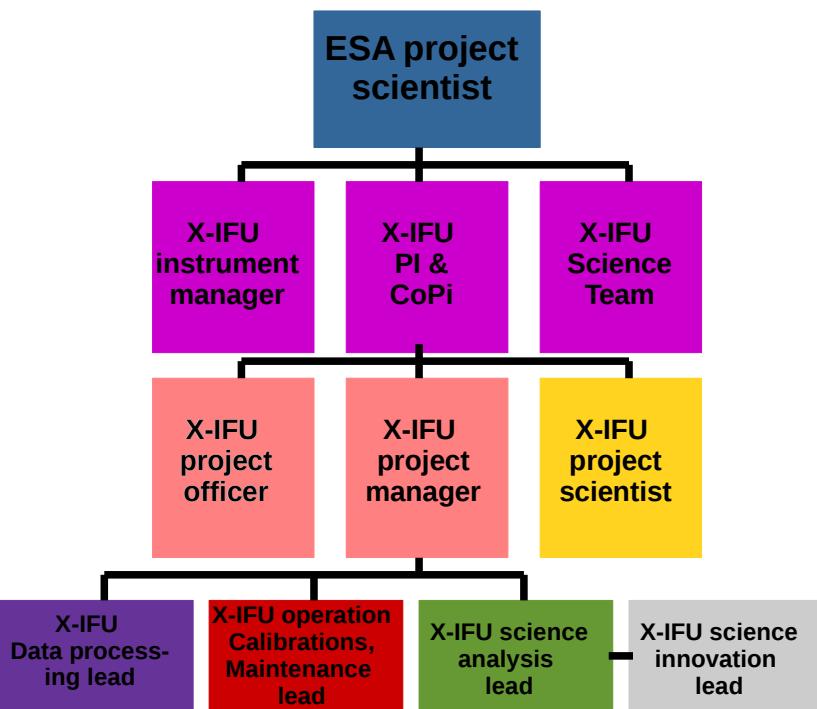
Athena X-IFU (ANO2)

Responsible (France) : Didier Barret (IRAP/OMP)
Partners : AIM/CEA

Athena : Advanced Telescope for High ENergy Astrophysics, for 2028
General X-ray observatory for all science topics

French PI : X-IFU and French project scientist for l'X-IFU ISC (Instrument and Science Centre)

- Conception, realisation, delivery, tests & integration of X-IFU (CNES : project management)
- Instrument and Science Centre activities :



Many other SNO related to PNHE

Radio
Microwave
Infrared
Visible
Ultraviolet
Visible
X-ray
Gamma-ray



Amateur radio



Aircraft communication



Microwave oven



TV Remote Control



Night vision goggles



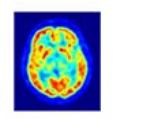
UV light from the Sun



Airport security scanner



PET scan



Terrestrial gamma-ray flashes



SKA

Radio telescope at Nançay/pulsar monitoring

ALMA : Cosmology, galaxies, AGN, supernovae, gamma-ray bursts, accretion-ejection

Euclid : launch 2020 : nature and properties of dark energy, dark matter, gravity, early Universe

VLT/ ELT (2024) :cosmology, galaxies, dark matter & dark energy.

Not λ associated : ANO5 data centres
Data reduction, data archiving and distribution
Examples : XMM-SSC, OVGSO, Paris Data Centre

See also : <http://insu.obspm.fr/>

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Journées PNHE, 30-31 March 2016

Evolution of PNHE related SNO

Data centres (ANO5)

– should we have one or many high energy related data centres ?

ANO4 (Deep, wide and long surveys) for Athena, other ?

Service related to LSST (Large Synoptic Survey Telescope)/eRosita ?

- survey related activities ?

SKA : Large overlap with PNHE & SKA activities, ideal for SVOM follow-up

- mobilise community to maximise French return from SKA

Gravitational wave related SNO ?

Other multi-messenger related SNO (cosmic rays, neutrinos, ...) ?

A federated effort in conjunction with support from the PNHE should enable us to get our priority SNO certified

What can the PNHE do to support PNHE related SNOs ?

A few suggestions :

- Identify SNO priorities for the PNHE
- Make the priorities known (PNHE web site, ...)
- Federate the effort towards these SNO (public policy, meetings, ...)
- Ensure SNO are certified by INSU & support new requests for certification

Reinforce the teams supporting our favourite observatories !