



# AHEAD

## Integrated Activities for the High Energy Astrophysics Domain



Luigi Piro<sup>1</sup> and Lorenzo Natalucci<sup>1</sup>  
on behalf of the AHEAD Consortium

This project is funded by  
the European Union

1. INAF, Istituto di Astrofisica e Planetologia Spaziali, Rome

### Summary

AHEAD (Integrated Activities in the High Energy Astrophysics Domain) is a forthcoming project approved in the framework of the European Horizon 2020 program (Research Infrastructures for High Energy Astrophysics). The overall objective of AHEAD is to integrate national efforts in high-energy Astrophysics and to promote the domain at the European level, to keep its community at the cutting edge of science and technology and ensure that space observatories for high-energy astrophysics, with particular regard to Athena, are at the state of the art. AHEAD will integrate key research infrastructures for on-ground test and calibration of space-based sensors and electronics and promote their coordinated use. In parallel, the best facilities for data analysis of high-energy astrophysical observatories will be made available to the European community. The technological development will focus on the improvement of selected critical technologies, background modeling and cross calibration for the benefit of future high energy missions like Athena, and the best exploitation of existing observatories. The advancement in space oriented instrumentation and cutting-edge sensor technology in Europe will enable the development of new technologies and the growth of the related European market with a dedicated technology innovation package. Through AHEAD, feasibility studies of space-based instrumentation for future gamma-ray missions will be also carried out. Finally, AHEAD will support the community via grants for collaborative studies, dissemination of results, and promotion of workshops, and a strong public outreach package will ensure that the domain is well publicized at national, European and International level. The project duration is 3.5 years starting September 2015.

### The AHEAD program

Joint Research Activities will mainly focus on:

- Technology development (sensors and optics for new generation X-ray instruments). Build-up on the Athena development to improve baseline technology
- Science prioritization and feasibility studies for gamma-ray instrumentation (~0.1-50 MeV)
- Background modelling and cross-calibrations
- Technology Innovation for applications outside the astrophysics domain

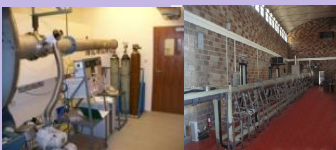
#### Networking activities:

Preparing the community at large for the successful exploitation of the high-energy telescopes of the next decade, with particular regard to Athena, but also facilities with European involvement closer to launch, such as ASTRO-H and E-Rosita.

- Visitor programs, schools, Topical Conferences/Meetings: supporting meetings, schools and grants for visitors
- Public Outreach: production of videos, educational material, coordination of press releases and organization of exhibitions

#### Transnational Access:

- Funding team visits to 13 experimental facilities in Europe:



X-ray Beamlines. LLTBF (Univ. of Leicester) and XACT (INAF/Palermo Observatory).



The LARIX-A hard X-ray beamline (Univ. of Ferrara).



Thermal vacuum and other test facilities. Test equipments at ERIOs (Lab. d'Astrophysique Marseille) and SERMS (Univ. of Perugia).

Plasma chamber at IAPS (INAF,Rome). High capacity shaker at the Centre Spatial de Liège (CSL)

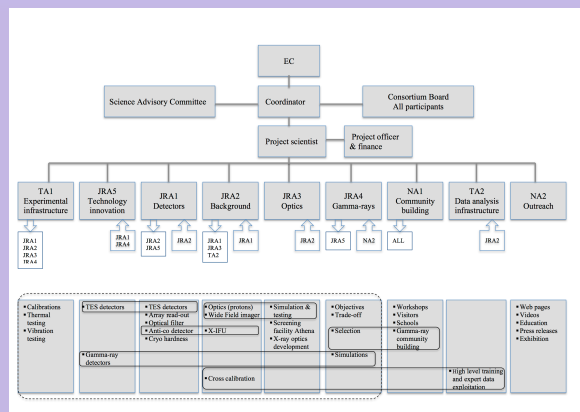
- Access to X-ray data analysis using archives of existing observatories, including tutorials and mentoring by experienced scientists. Funding visits to data centres at: 1. Univ. of Leicester, 2. SRON, 3. Univ. of Geneva, 4. INAF (OAR, INAF/Bologna, OAPA), 5. NOA, 6. CEA

All transnational access and visiting programs will be based on public calls to be released periodically.

### The Consortium

The AHEAD Consortium is formed by 26 major European Research Institutions from 16 countries:

ISTITUTO NAZIONALE DI ASTROFISICA (IT)	UNIVERSITY OF LEICESTER (UK)	SPACE RESEARCH ORGANIZATION NETHERLANDS (NL)
MAX-PLANCK-GESELLSCHAFT (DE)	NATIONAL OBSERVATORY OF ATHENS (EL)	THALES ALENIA SPACE ITALIA SPA (IT)
DANMARKS TECHNISCHE UNIVERSITET (DK)	CENTRUM ASTRONOMICZNE IM. MIKOLAJA KOPERNIKA (PL)	UNIVERSITÀ DEGLI STUDI DI FERRARA (IT)
UNIVERSITÀ DEGLI STUDI DI PERUGIA (IT)	UNIVERSITÉ DE LIEGE (BE)	UNIVERSITÀ DEGLI STUDI DI GENOVA
COMMISSARIAT À L'ÉNERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES (FR)	TECNOLOGIAN TUTKIMUSKESKUS (FI)	AGENCIA ESTATAL CONSEJO SUPERIOR DE INVESTIGACIONES CIENTIFICAS (ES)
CESKE VYSOKE UCENI TECHNICE V PRAZE (CZ)	UNIVERSITY COLLEGE DUBLIN (IE)	UNIVERSITÀ DEGLI STUDI DI PALERMO (IT)
TARTU OBSERVATORY (EE)	UNIVERSIDAD DE ALICANTE (ES)	LANCASTER UNIVERSITY (UK)
EBERHARD KARLS UNIVERSITÄT TÜBINGEN (DE)	LABORATORIO DE INSTRUMENTACAO E FISICA EXPERIMENTAL DE PARTICULAS (PT)	CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (FR)
UNIVERSITÉ DE GENÈVE (CH)	ISTITUTO NAZIONALE DI FISICA NUCLEARE (IT)	



Networking, joint research activities and access to infrastructures as devised in AHEAD, will serve to establish strong connections between institutes and industry to create the basis for a more rapid advancement of high-energy astrophysical science, space oriented instrumentation and cutting-edge sensor technology in Europe.

#### Acknowledgements

The project AHEAD is funded by the European Union as Research and Innovation Action under Grant No: 654215.

[ahead.iaps.inaf.it](http://ahead.iaps.inaf.it)