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Status of AHEAD2020

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Coimbra AHEAD2020 Progress Meeting on Space Experiments
1-2 October 2020

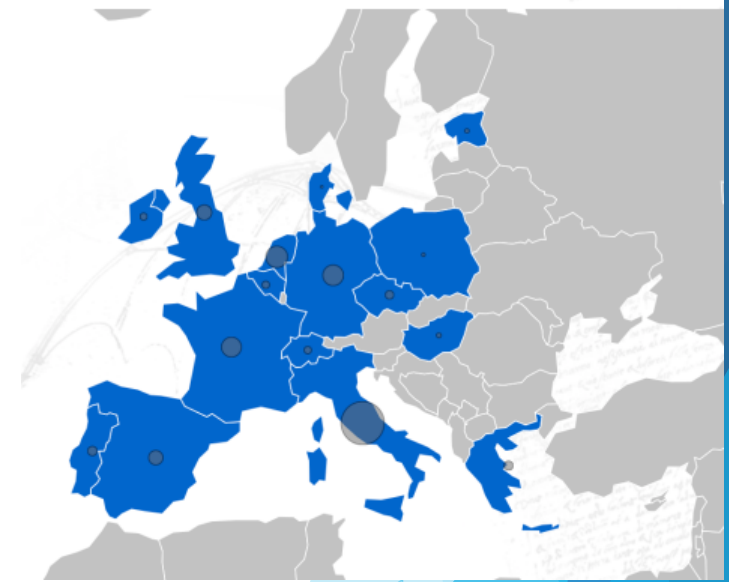
AHEAD2020

Integrated Activities for the High Energy Astrophysics Domain



AHEAD2020 in a nutshell

- AHEAD2020 (Integrated Activities for High Energy Astrophysics Domain) is the research infrastructure for High Energy Astrophysics selected as advanced community in the EU Horizon 2020 program.
- AHEAD2020 builds on our previous program, funded in H2020 as starting community, that allowed us to qualify now as advanced community. Its main goal is to improve the level of integration reached by the previous AHEAD program, while broadening its impact to include the new multi-messenger science and the European GW community.
- Started on 2 March 2020; scheduled end is 1 March 2024 (duration: 4 years).
- The Consortium is coordinated by INAF (coordinator: L.Piro) and includes 38 European institutions, including 3 SMEs



2
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The AHEAD2020 goals [1/2]



- Integrate and coordinate national activities in high-energy astrophysics at a much higher level than it is presently available within Europe, and extending such effort by bringing in multimessenger activities.
- Push the limits of current technology, develop the appropriate tools and strengthen the infrastructure needed for maximizing the scientific return of new future high energy and multimessenger facilities: *Athena, satellites for the transient and multimessenger Universe (nanosat, Theseus, Einstein Probe), neutrino and GW observatories (KM3NET, Einstein Telescope).*
- Provide a network of ground-based test facilities for developing, calibrating and testing both generic technologies as well as instruments developed for space missions in an environment representative of space conditions.

3



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The AHEAD2020 goals [2/2]



- Ensure maximal scientific return from present and near future observing facilities in the field of high energy and multimessenger astronomy (including XMM, INTEGRAL, Fermi, Chandra, Einstein Probe, SVOM, VIRGO, LIGO, VHE and neutrino observatories) by **making accessible and usable multimessenger data, developing data analysis and theory tools**
- Promote HE and multimessenger astrophysics at various levels (e.g., regional, national, European, international) and in different communities (scientists, teachers, and public). Prepare communities in less experienced countries to participate in the high energy and multimessenger science.
- Prepare the community to the scientific exploitation of the new facilities under development in Europe in high energy and multimessenger astrophysics by **training the next generation of young researchers in the field.**

4



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Workpackages

Work package No	Work Package Title	Lead Partic. No	Lead Participant Short Name	Person-Months	Start Month	End month
WP1	AHEAD Management	1	INAF	121	1	48
WP2	NA1- General Networking for High Energy Astrophysics	6	UA	18.85	1	48
WP3	NA2- Networking activities for the synergies between the Gravitational Wave and High Energy Astrophysics community	7	EGO	13.5	1	48
WP4	NA3- Public Outreach	4	NOA	56.7		
WP5	TA1- Access to experimental facilities	1	INAF	32.27	1	48
WP6	TA2- Access to Data Analysis	5	ULEIC	20.6	1	48
WP7	TA3- Computational Astrophysics	11	UNIGENEVE	11	1	48
WP8	VA1- Access to Gravitational Wave Science Archive and Tools	7	EGO	12	1	48
WP9	JRA1- Technologies and Techniques for Microcalorimeters	2	SRON	209.7	1	48
WP10	JRA2- Optics for next generation X-ray observatories	3	MPG	76	1	48
WP11	JRA3- Space Experiments for HE Astrophysics & Multimessenger Astronomy	16	NUID UCD	109.6	1	48
WP12	JRA4- Multimessenger Astronomy exploitation & tools	10	GSSI	244.5	1	48
WP13	JRA5- Laboratory Astrophysics	9	CNRS	73.2	1	48
WP14	JRA6- Advanced Tools for Data Analysis	1	INAF	168	1	48
WP15	JRA7- Technology Innovation and Exploitation for Society	15	TAS	138	1	48
				1304.9		

3 Networking Activities (NA)

3 TransNational Access (TA)

1 Virtual Access (VA)

7 Joint Research Activities (JRA)

ahead.iaps.inaf.it



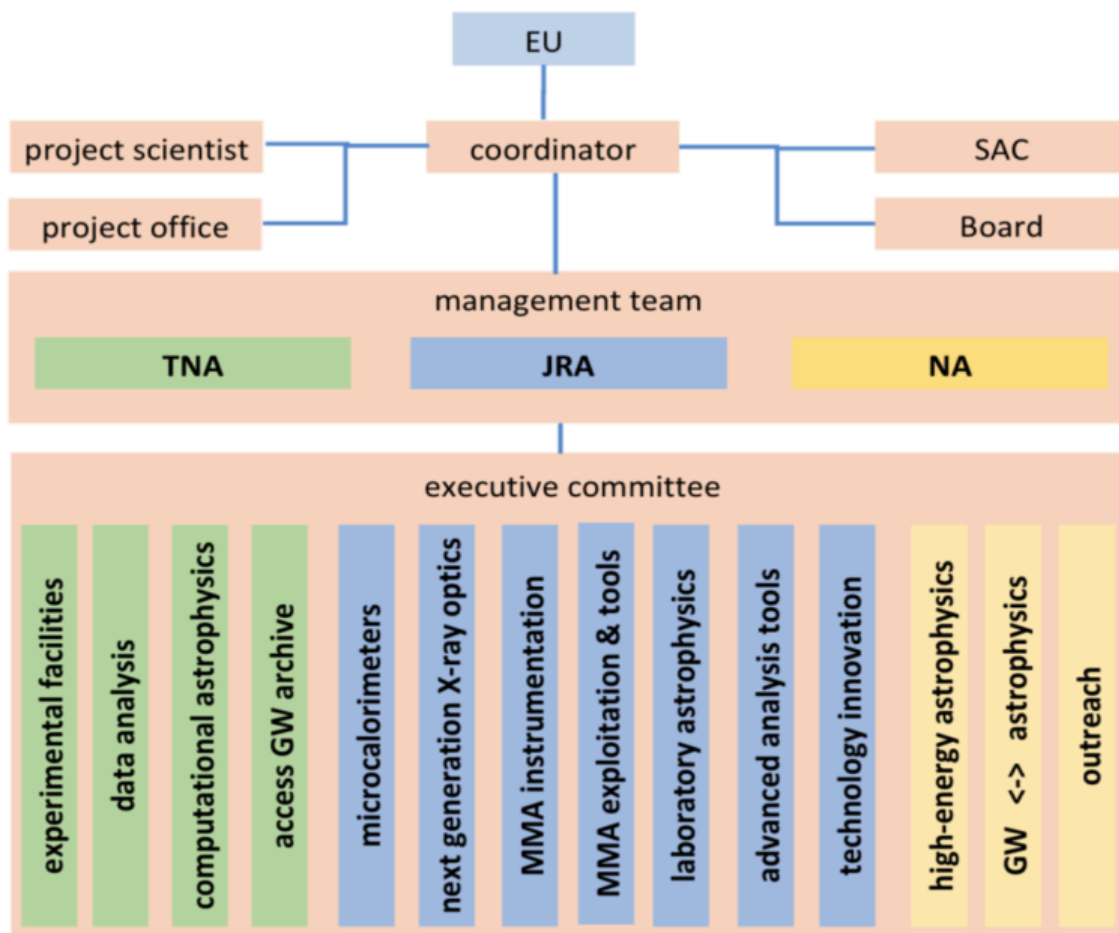
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Management scheme



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Networking Activities

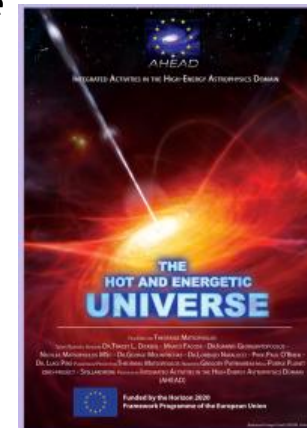
Networking activities in AHEAD2020 deal with the following broad categories:

- AHEAD2020 Visitor Program (WP2)
- Organisation of meetings and schools (WP2,3)
- Public Outreach (WP4)

A new project is concerning the Networking activities for the synergies between the Gravitational Wave and High Energy Astrophysics community (WP3).

Topics addressed are:

- Multimessenger Research
- Synergies with High Energy and Geoscience
- R&D concerning multi-messenger physics with application to next generation GW interferometers
- Low latency Triggers and Access to GW Data
- Definition of the enabling technologies and the key technical design elements of the next generation of large infrastructures



Projection of the AHEAD Video "The Hot and Energetic Universe" at Researcher's Night 2017 in Frascati

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Joint Research Activities

Joint research activities in AHEAD2020 deal with the following categories:

- Key technologies for future observing facilities: Microcalorimeters (WP9), X-ray optics (WP10), Instrumentation for HE astrophysics and multimessenger astronomy (WP11)
- Development of advanced data analysis tools (WP14)
- Exploitation of multimessenger science from current and future observatories (WP12)
- Laboratory Astrophysics (WP13)
- Technology Innovation and exploitation for society (WP15)

In the area of **key technologies for multimessenger science (WP11)** we address:

- Nanosallite infrastructures (Hermes)
- Compton Telescope Cubesat (COMCUBE)
- Compact detectors optimised for the detection of short GRBs
- Future missions beyond the baseline (Theseus, Astena)



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Access opportunities [1/2]

AHEAD2020 will issue 7 AOs during ~4 years to advertise several services mostly (but not solely) based on transnational visits.

The calls are issued periodically with a bi-annual cadence. A peer-review process is implemented via the AHEAD2020 selection panels. Visits of successful applicants are fully funded.

- **Trans-national access to ground and test facilities** (TA1, WP5)

Such facilities are used to test and/or calibrate new technology space hardware as well as hardware developed for specific astronomical space missions, but can be also used in a wider context of space applications.

- **Visitor Program** (NA1, WP2)

Supporting research visits to institutes/laboratories located in European or associated countries, in order to foster new or strengthen existing collaborations. Eligible candidates are scientists or engineers from Astrophysics institutes in both EU and non-EU countries.



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Access opportunities [2/2]



- **Trans-national access to X-ray data analysis (TA2, WP6)**

Providing access to data analysis methods including use of data tools, archives and space instruments via tutorials and mentoring by experienced scientists at the delivery institutes. To exploit both EU-funded and international HE astronomy observing facilities and data archives in order to enhance high-energy astrophysics science across Europe.

- **Trans-national access to computational astrophysics (TA3, WP7)**

This new TNA will provide new opportunities for European researchers to access free of charge complex computational astrophysical simulations, models and tools to simulate, compare, and analyse X-ray and gamma-ray data.

- **Virtual access to GW archive services and tools (VA1, WP8)**

Provision of a website that focuses on facilitating remote access to the existing Gravitational Wave Open Science Center (GWOSC) infrastructure.



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Infrastructures for TNA/VA

Facilities

Access provider short name	Short name of infrastructure	Installation		Installation Country code	Estimated number of user projects*
		Nr	Short name		
ULIEGE	CSL	1	FOCAL 2	BE	2
ULIEGE	CSL	2	Shaker 200	BE	4
ULIEGE	CSL	3	BBOTOC	BE	6
UNIFE	LARIX	1	LARIX-A	IT	3
UNIFE		2	LARIX-T	IT	4
CNR	BABE	1	BABE	IT	8
INAF	XACT	1	XACT	IT	1
INAF	BEaTriX	1	BEaTriX	IT	5
CR	Vibration Facility	1	Shaker	NL	3

Data Analysis

ULEIC	DEPT.PHY S.ASTRO	1	DEPT.PHYS. ASTRO	UK	8
UNIGENEVE	DEP.ASTRO	1	DEPT.ASTRO -DA	CH	8
INAF	INAF	1	BOLOGNA	IT	12
INAF	INAF	2	OAR	IT	8
INAF	INAF	3	PALERMO	IT	12
INAF	INAF	4	IAPS	IT	4

Access provider short name	Short name of infrastructure	Installation		Installation Country code	Estimated number of user projects*
		Nr	Short name		
NOA	NOA	1	IAASARS	GR	4
CEA	CEA	1	CEA	FR	8
SRON	SRON		SRON	NL	12
UNIFE	DEP.FST		DEP.FST-DA	IT	4
NCAC	CAMKPAN	1	CAMKPAN-DA	PL	4

UNIGENEVE	DEPT. ASTRO	2	DEPT. ASTRO-CA	CH	7
INAF	OAT	1	OAT	IT	7
INAF	OAPA	1	OAPA	IT	14
ULEIDEN	LEIDEN-OBS	1	LEIDEN-OBS	NL	7
UNIFE	DEP.FST	1	DEP.FST-CA	IT	7
UBATH	DEP.PHYS	1	DEP.PHYS	UK	7
LMU MUENCHEN	USM	1	USM	DE	7
NCAC	CAMKPAN	2	CAMKPAN-CA	PL	7
EGO	EGO	1	EGO	IT	7

EGO	EGO	1	GWOSC	IT	
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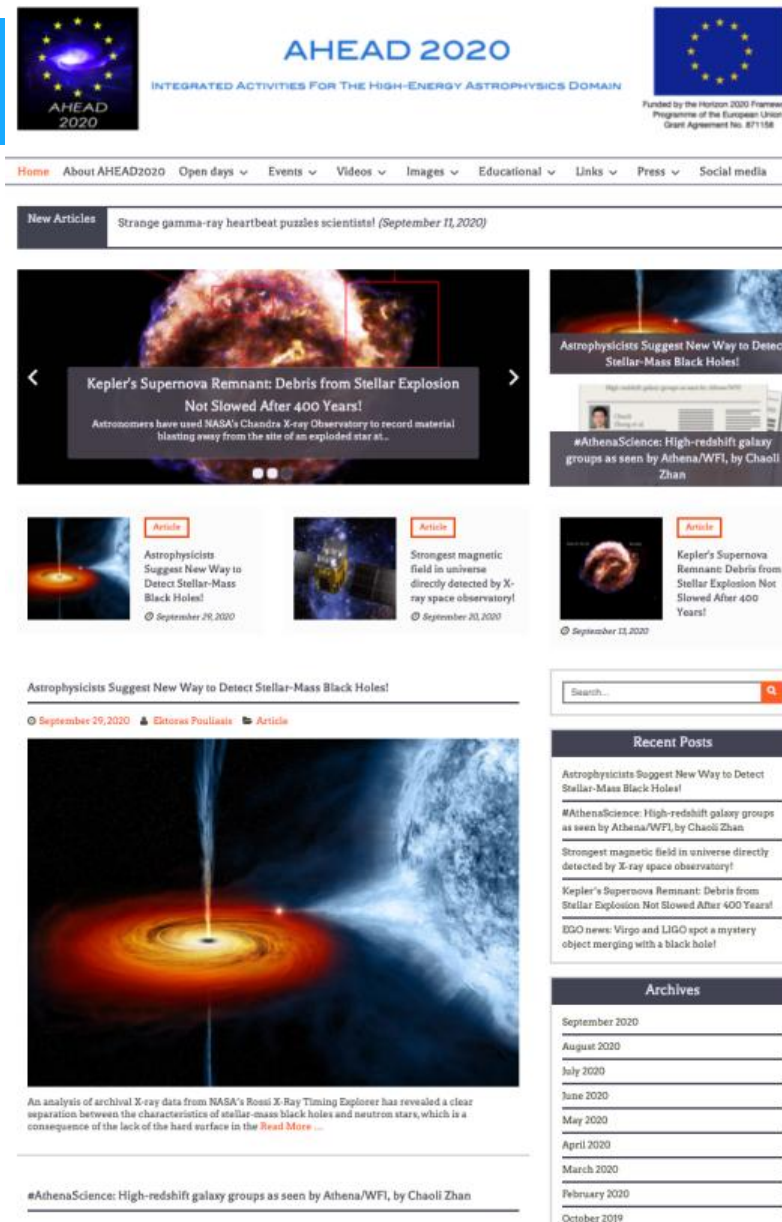
Data Analysis

Comp. Astrophysics

VA

AHEAD websites

- The AHEAD2020 project website is the main portal to access the AHEAD2020 opportunities (TA calls and visitor programs, meetings, schools, etc)
ahead.iaps.inaf.it
- It acts as a hub to other local websites to allow the community to exploit the AO calls (visitor program, TNA and VA resources)
- It also acts as project workspace for community support, documentation, upload/download for team users
- The AHEAD Public Outreach maintains a website at NOA premises, plus dissemination through different social networks (e.g. facebook, twitter and Youtube channel)
- Local websites at EGO, OA Palermo, Leicester and Alicante Universities are in place for infrastructure access management and networking activities



The AHEAD2020
Public Outreach
website at NOA
Athens



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Assessing Impact of Covid-19



We have performed an investigation to assess the impact of the pandemic. WP leaders have provided their analysis based on the evaluation at task level:

- WPs with delayed MS/Deliverables: **15 out of 15**
- WPs with incomplete activity within baseline period: **11 out of 15**
- No. Tasks with incomplete activity within baseline period: **24**
- **Requested extension: 9 months** (*projected end of project: December 1, 2024*)
- Request could be revised following evolution of the pandemic
- Pending feedback by EC
- New baseline schedule for AO calls: opening AO1 in December 2020
(6 months delay)



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Conclusive remarks



- AHEAD2020 has started. Much effort in the management area to face the Covid-19 pandemic especially with regard to the networking and transnational access activities
- The JRA workpackages show good progress despite the travel ban; much of the H/W and S/W developments are proceeding well.
- The reschedule of the program in order to cope with the Covid-19 delays will possibly require an amendment (pending response from EC)
- A meeting of the AHEAD2020 Board is scheduled on November 23
- The first AO is expected to be opened around December (current baseline). Visits could start as early as ~February-March if the pandemic evolution will improve



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Thank you!



The AHEAD KO Meeting in 2015