



AHEAD 2020

INTEGRATED ACTIVITIES FOR
HIGH ENERGY ASTROPHYSICS



WP4: Public Outreach

(WP coordinator: I. Georgantopoulos)

Ektoras Pouliasis
National Observatory of Athens

The key players are Rome (INAF), Athens (NOA), Santander (IFCA), Pisa (EGO) together with Leicester(LU), Munich (MPE), Toulouse (IRAP) and of course all other AHEAD2020 Institutes



AHEAD 2020
HIGH ENERGY ASTROPHYSICS

WP4: Public Outreach



Funded by the Horizon 2020
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Union Grant Agreement No. 871158

WHAT

(A)wareness

Inform the general public, students and educators of the background and recent discoveries in the HEA scientific area.

(B)oot

Inspire young people to follow careers in astrophysics as well as in the relevant technology.

(C)ollaborations

Promote the image of worldwide collaboration as a prerequisite for advancing science.

(D)issemination

Promote the AHEAD2020 produced educational and scientific material.

Objectives





WP4: Public Outreach



WHAT

WHO

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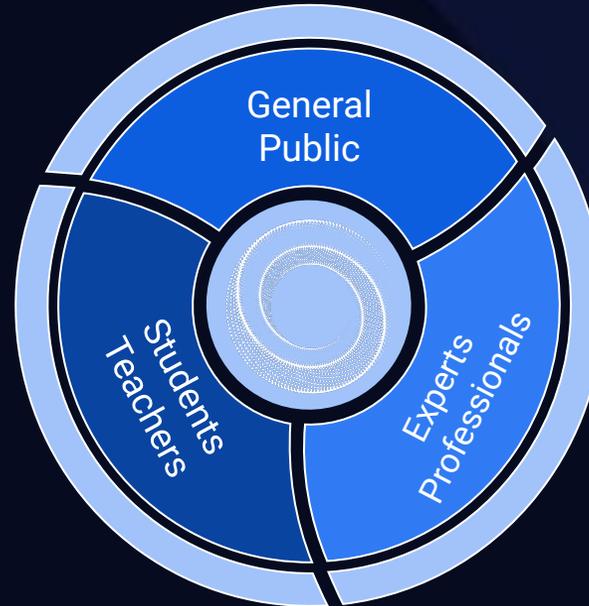
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Objectives

Target groups





WP4: Public Outreach



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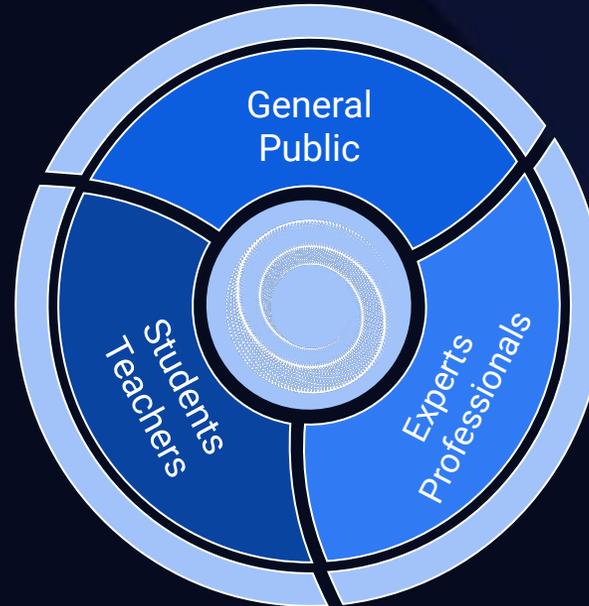
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(D)issemination

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AHEAD2020 WP4 tasks:

- Web-page & social media
- Educational Videos and applications
- Open days and summer schools
- Educational Posters
- Multi-wavelength Astronomy Art room
- Mini Conference on public outreach

Objectives

Target groups

Methods



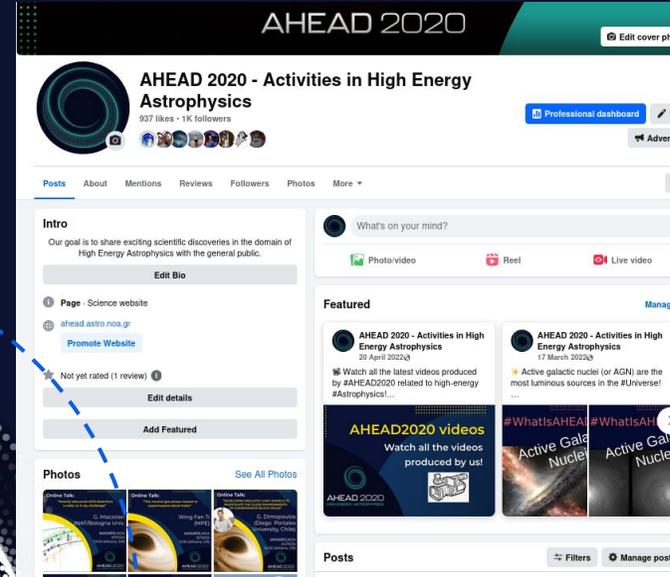
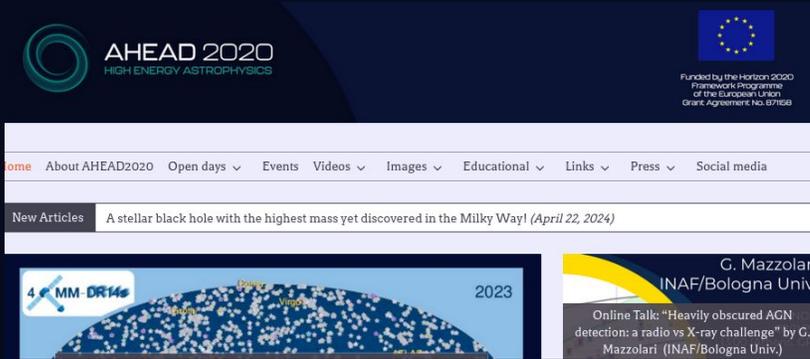


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Web-page / social media

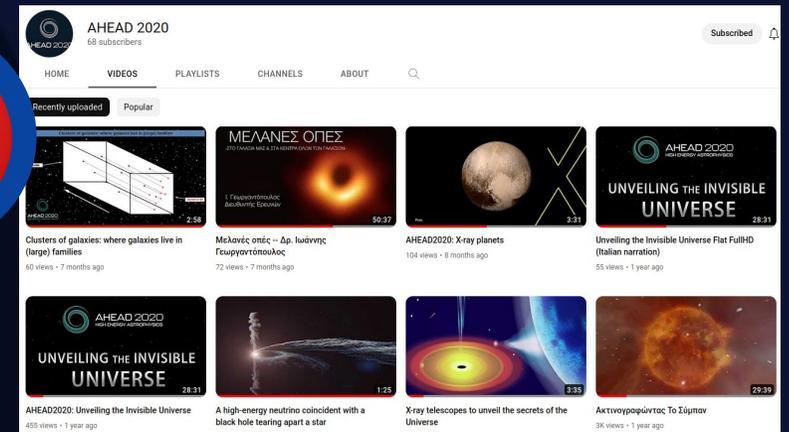
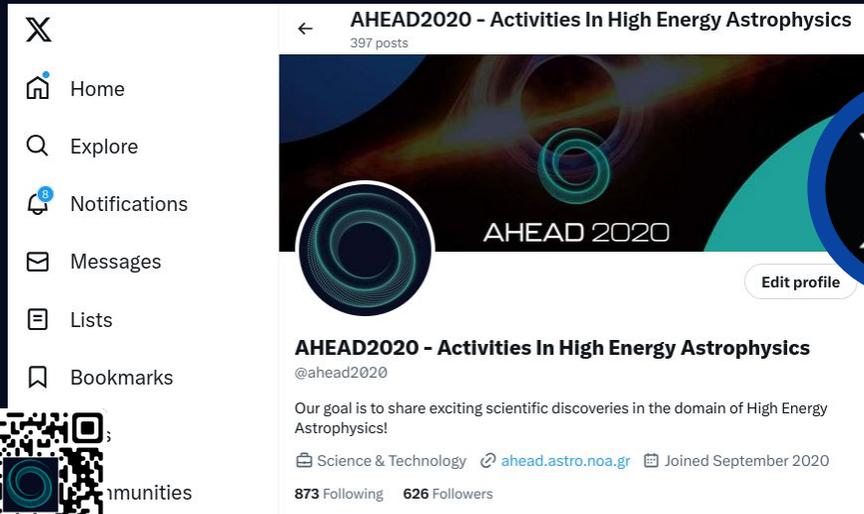


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General public

>90% Experts - Professionals





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Web-page / social media (Topics)



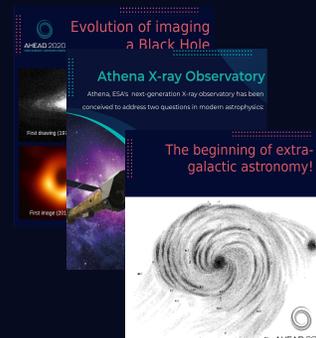
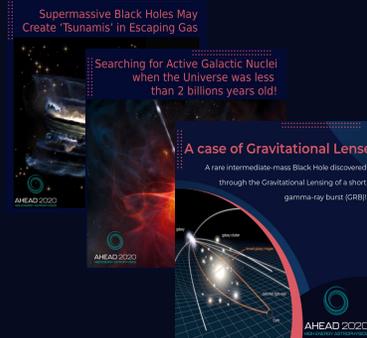
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High-Energy
Astrophysics

Events

Articles - Papers

Educational





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Web-page / social media (Topics)



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High-Energy
Astrophysics

AHEAD 2020

Events

Articles - Papers

Educational

News

Products

Schools - Events

COSPAR 2022
44th Scientific Assembly
in Athens 16-24 July 2022

Exploring the Hot and Energetic
Universe: Athena scientific conference,
7-10 Nov. 2022 in Barcelona

COSP
44th SC
16-24 July
AMS-2

AGN on the Beach:
The many facets of feeding
and feedback in jetted AGN
10-15th September 2023, Tropea, Italy

Workshop Overview

Supermassive Black Holes May
Create "Tsunamis" in Escaping Gas

Searching for Active Galactic Nuclei
when the Universe was less
than 2 billions years old!

A case of Gravitational Lens
A rare intermediate-mass Black Hole discovered
through the Gravitational Lensing of a short
gamma-ray burst (GRB)

Evolution of imaging
a Black Hole

Athena X-ray Observatory
Athena, ESA's next-generation X-ray observatory has been
conceived to address two questions in modern astrophysics.

The beginning of extra-
galactic astronomy!

AHEAD2020 - Activities in High Energy Astr...
Everything is set up and we are ready for the researchers night in Athens

AHEAD2020 - AO Cycle2
2nd Announcement of Opportunity

- Trans-national access to
- Visitor programme
- Trans-national access to
- Trans-national access to

1st prize in the "Best Full-dome"
category in the 20th Balkan
international film festival

Opening: 12 July 2021
Deadline: 30 August 2021

AHEAD 2020
HIGH ENERGY ASTROPHYSICS

**UNVEILING THE INVISIBLE
UNIVERSE**

AHEAD 2020 - Activities in High Energy Astrophysics
Clusters of galaxies: where galaxies live in large families

Listening to new
cosmic messengers

How much do you know
about high-energy
Astrophysics?

ASTROQUIZ

"Planets Through differen
A joint Athens-Santander i
See the planets in real time and discover ho
would look like if you had X-ray vision

X-ray seminars

IAAS

AHEAD2020 winter school of
Astrophysics in Athens, Greece

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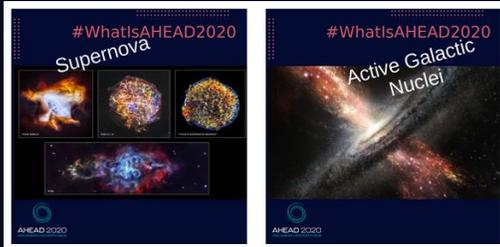


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Web-page / social media (Campaigns)



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1

#WhatsAhead2020

Increase scientific interest in high energy
Astrophysics providing basic concepts,
explanations and current status



2

#WholsAhead2020

Enhance the visibility and awareness of the
general public concerning the scientific outcome
of AHEAD2020 and also the people who are part
of it.



3

#visitingAhead2020

AHEAD2020 Transnational Visitor Programme
scientific purposes & outcomes





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Web-page / social media (Impact)



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Impact

TWEET HIGHLIGHTS

Top Tweet earned 6,168 impressions
What do we know about super massive black holes?
Ektoras Pouliasis is a Postdoctoral researcher at National Observatory of Athens @EAA_NOA
He gives us his answer for #BlackHoleWeek
pic.twitter.com/lvZwUkibex

Top mention earned 87 engagements
Athena X-ray observatory @AthenaXObs - May 2
#BlackHoles are possibly the most intriguing objects in the Universe
What do you know about them? Follow @AthenaXObs @AthenaXIFU @ahead2020 @XMM2Athena to get all the answers!
Our scientists will answer crucial questions about black holes for this #BlackHoleWeek!
pic.twitter.com/5LRTlIsHfm

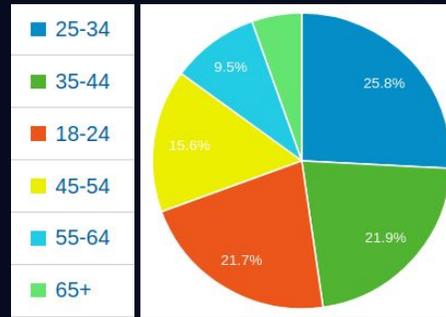
MAY 2022 SUMMARY

Tweets	21	Tweet impressions	10.3K
Profile visits	1,442	Mentions	12
New followers	23		

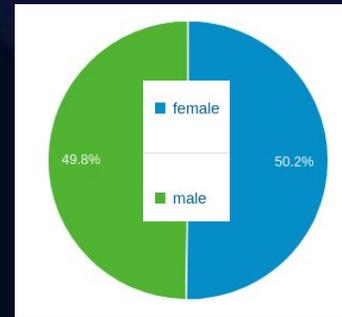
Q&A with our scientists
Answer by Ektoras Pouliasis

Q&A with our scientists
Black Holes
Do black holes grow?
How do black holes hide from us?
How massive are black holes?

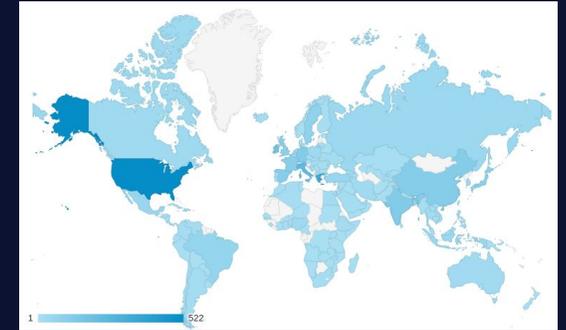
Age



Gender



Location



1. United States	15.68%	13. Brazil	1.95%
2. Greece	10.00%	14. Turkey	1.65%
3. Italy	6.85%	15. Mexico	1.50%
4. Ireland	5.41%	16. Netherlands	1.47%
5. India	3.72%	17. Bangladesh	1.44%
6. Germany	3.63%	18. Indonesia	1.38%
7. China	3.48%	19. Russia	1.38%
8. Spain	3.24%	20. Poland	0.99%
9. France	3.12%	21. Canada	0.96%
10. United Kingdom	2.76%	22. South Korea	0.96%
11. Japan	2.61%	23. Nigeria	0.96%
12. Sweden	2.40%		

Evolution of imaging @BlackHole
9 February 02:09
Black holes are region in ...
Post
Reach 47,986

#WhatsAHEAD2020 Active Galactic Nuclei
17 March 02:00
Active galactic nuclei (or ...
Post
Reach 4,324

Planets through different ey...
27 September 01:19
Post
Reach 5,671

The winter school of #Ast...
13 February 01:54
Post
Reach 4,307





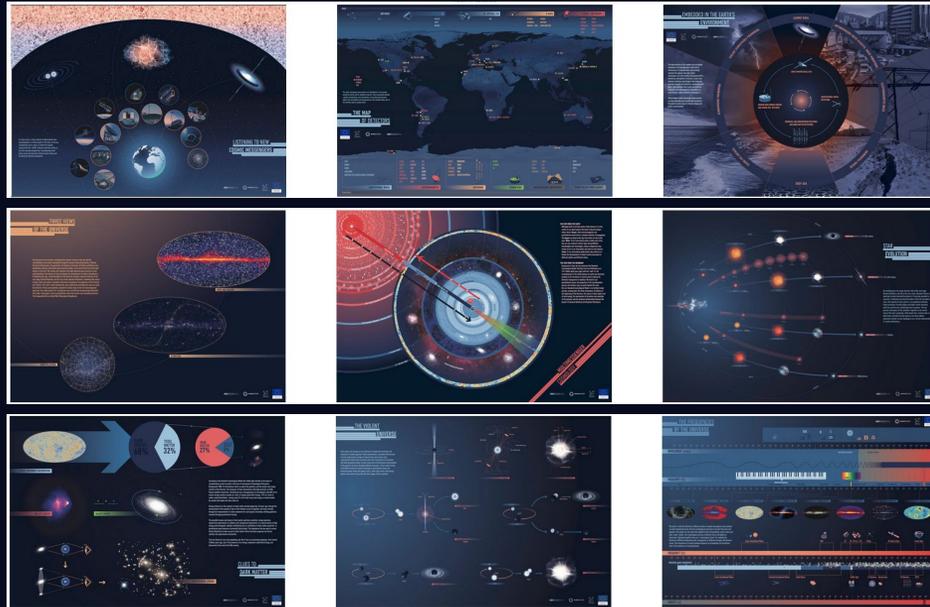
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Educational material



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9 educational posters (EGO)

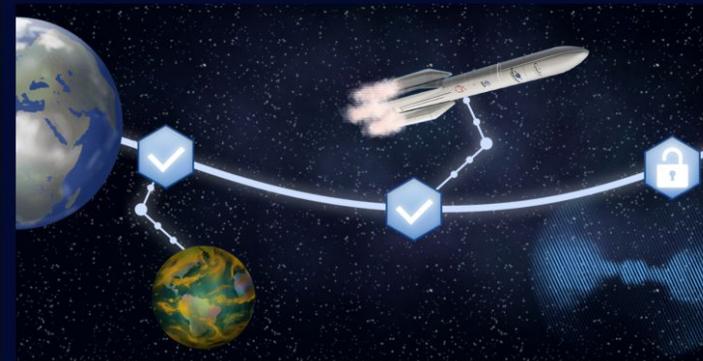


3 short educational video (IFCA)



Web-game/quiz
(INAF, NOA, ULEIC)

How much do you know
about high-energy
Astrophysics?



ASTROQUIZ





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Multi- λ Astronomy Art room (EGO)



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- In mid-September 2024 the Big Bang Machine was delivered to EGO, for its first use.

- The kick-off of the Big Bang Machine took place during the European Researcher's Night 2024

Impact:

> **140 visitors**, 20% of which were kids aged 3-13 years, visited the van and had the opportunity to make an immersive and interactive experience of the origins and evolution of the Universe



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HIGH ENERGY ASTROPHYSICS

- Collaboration with **ESO** for the distribution
- Focus: Multi-messenger astronomy and HEA synergies
- Translated **>15 languages**
- **Awards:**
 - 6 official selections in international film festivals
 - "Best Full-Dome Video" winner at Baikal International Film Festival.
 - "Best Visual Effects" winner at Siberia Full-Dome Festival.

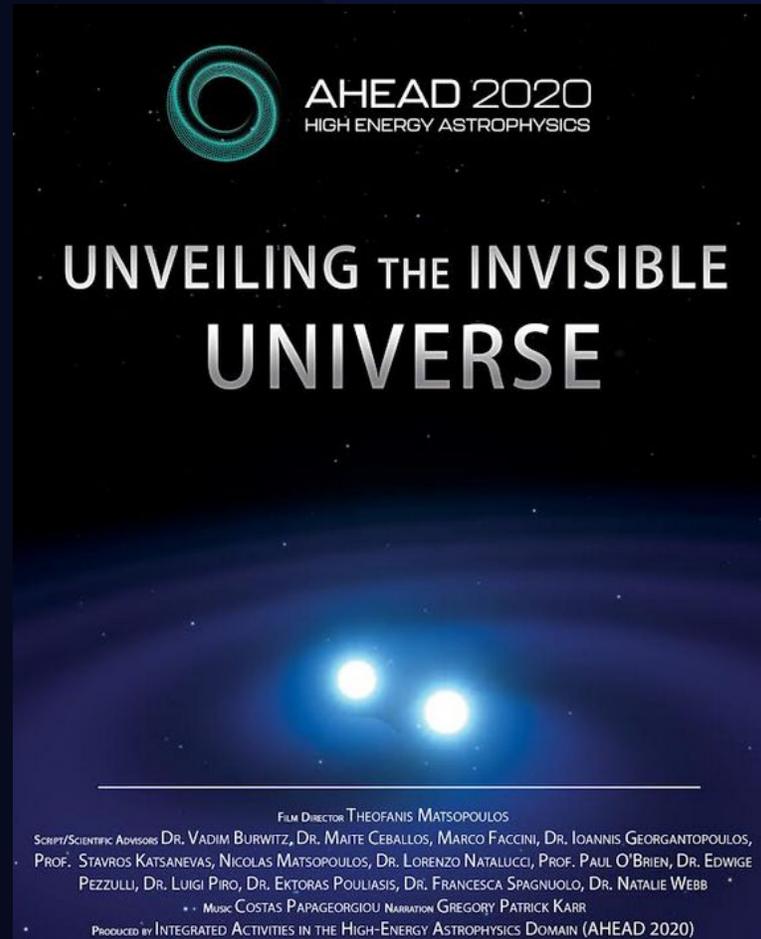
Featured at major events:

- European Researcher Nights
- Aegean Science Festival
- Premiered at Penteli Visitor Center (Athens)
- Memorial event for Stavros Katsanevas at Goulandris Museum of Natural History in Athens



Dome video

Dome video (NOA, ESO)



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IMPACT:

- Distributed to **>200 planetariums** worldwide
- Reaches **8.5 million viewers** annually.



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HIGH ENERGY ASTROPHYSICS

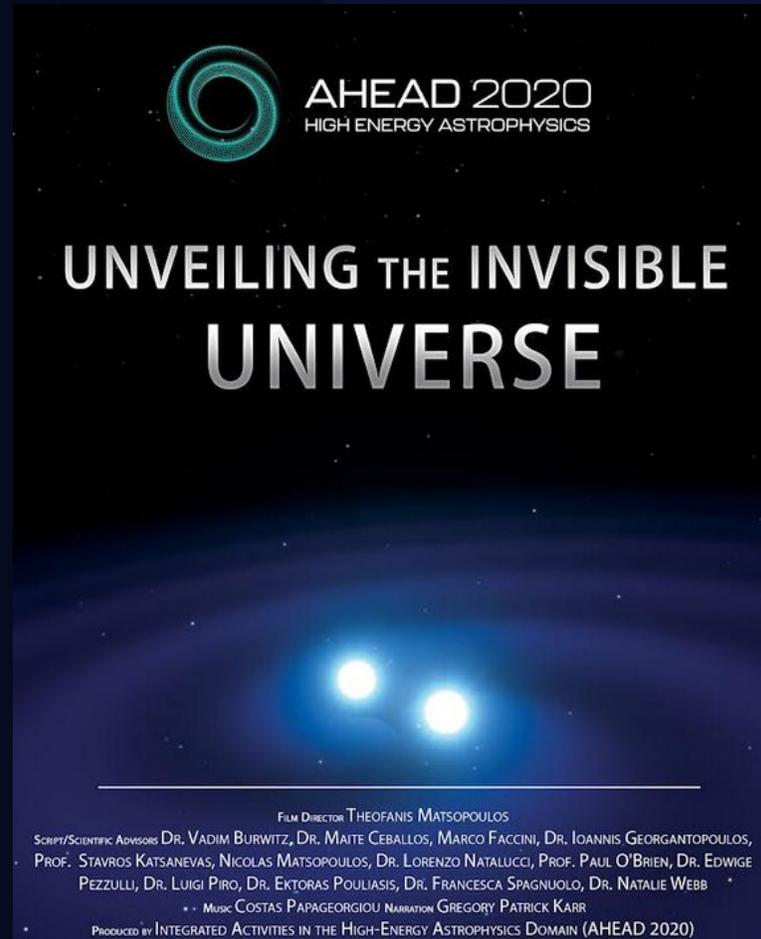
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IMPACT:

- Distributed to **>200 planetariums worldwide**
- Reaches **8.5 million viewers annually.**
- **Documentary Film**
- Released in February 2023 to expand audience reach
- Incorporates **interviews** with AHEAD2020 researchers
- Available on YouTube for **global access**
- Ongoing plans for distribution to **TV networks worldwide**





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HIGH ENERGY ASTROPHYSICS

Open days

Schools, workshops, lectures, talks



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High-Energy Astrophysics Dedicated Schools (NOA)

- **Six schools** (4 summer, 2 winter of 2 days) for 5th & 6th grade students, engaging them in astrophysics topics from the solar system to black holes and cosmology.

- Over **200 students**.

Impact: Introduced young students to high-energy astrophysics via interactive talks, quiz, games, videos, VR, and hands-on activities.

High-Energy Astrophysics Projects (INAF-IAPS)

- **Two projects**, "L'ADAE" and "LASS `U," engaged 16-year-olds in high-energy astrophysics and science communication. Students created **podcasts** to share their findings.

- Students from Nomentano State Scientific High School.

Impact: Encouraged collaboration and communication in scientific discovery.

Lectures & Talks (AHEAD2020 Teams)

IRAP:

- **Over 100 talks**, seminars, and events organized across Europe to promote AHEAD2020 results and raise awareness of high-energy astrophysics.

NOA:

- **Over 50 online seminars** focused on high-energy astrophysics for students and professional astronomers.

Impact: Raised public and professional awareness of high-energy astrophysics.





AHEAD 2020
HIGH ENERGY ASTROPHYSICS

Open days

Merging high-energy Astrophysics with STEM, ART & Culture



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Energy of the Universe (INAF, 2021)

- Promoted hands-on learning of astrophysical concepts through **online experiments**.
- **20-30 students**.

Space and the Senses (EGO, 2021)

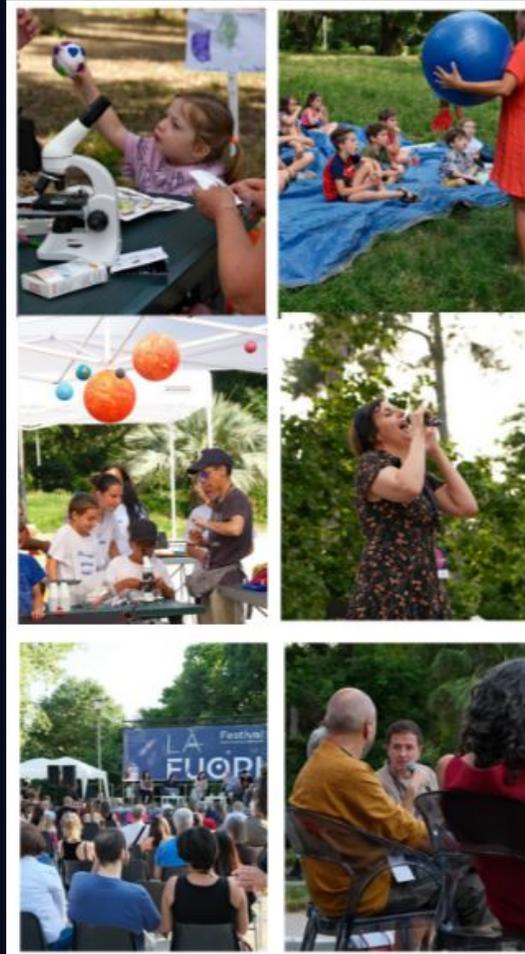
- Blended **science and music** to explore astrophysical phenomena beyond the senses.
- Public event with **numerous participants**

OUT THERE Festival (INAF-IAPS, 2022 & 2023)

- Integrated **STEM**, theatre, and music to promote scientific thinking and emotional engagement with high-energy astrophysics.
- **Hundreds of attendees** over two years.

EXHIBIT (INAF-OAR, 2024)

- Showcased the role of astrophysical probes in understanding the Universe, reaching school students and general public.
- **Hundreds of students** and visitors, still ongoing.



Astrophysics & Theatre (INAF-IAPS, 2022-2024)

- Fostered scientific inquiry among elementary and middle school students by integrating **art and science** for interactive learning.
- **Local schools** in Rome, ongoing.

Science Interpreter Programme (ULEIC, 2024)

- Trained undergraduates in science communication, resulting in the creation of **interactive science** activities for public engagement.
- **Over 27,000 direct interactions** with the public.

ELSEWHERE Festival (IAPS-INAF, 2024)

- Explored migration through a combination of **science lectures and theatre**, enhancing understanding of global issues with a scientific lens.
- Nearly **700 people**.

Schools Loan Box (ULEIC, 2024)

- Developed and distributed hands-on science kits to primary schools, promoting **STEM education** even in financially challenging times.





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HIGH ENERGY ASTROPHYSICS

Open days

Diversity, Equality, and Inclusivity of PO Activities



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FULL TIME - Astrophysics in Prison (INAF-IAPS, 2023 & 2024)

- Merged astrophysics and theatre exploring time as a physical and personal concept.
- Prisoners in Frosinone **Prison**, 3 participants featured at the OUT THERE Science and Art Festival (2023)

How the Universe Works (INAF-IAPS)

- Project with a **mental health clinic**, engaging participants in discussions about the Universe and energy.
- 50 participants in 3 sessions.

Women in Science (IRAP, IFCA)

- Initiatives to highlight **women's contributions** to astronomy and astrophysics, including social media campaigns and interviews.
- Social media engagement.

IGNITE! Community Programme (ULEIC)

- After-school clubs targeting **disadvantaged communities** in Leicester to encourage STEM participation through space missions.
- Over 200 primary-aged children in Leicester.

Online HEA Schools (NOA)

- Two online schools during the pandemic reached children from **remote places**.
- Children from across Greece and Cyprus.





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HIGH ENERGY ASTROPHYSICS

Open days

European Researchers' Nights (ERN) & Collaborations with EU HEA Projects



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European Researchers' Nights (EGO, NOA, INAF)

- AHEAD2020 institutes actively participated in **ERNs across multiple years**, engaging thousands of people, particularly students, in high-energy astrophysics

- AHEAD2020 educational material, Interactive Presentations, Virtual Reality (VR) Experiences, Live Demonstrations and Observations, Theatrical Performances, Panel Discussions, etc.

- More than **30,000 people** attended, including students, researchers, and the general public.

Joint Online Initiatives (XMM2ATHENA, X-IFU, ATHENA)

- Post-pandemic, AHEAD2020 and other EU projects held online activities for events like the International Day of Women and Girls in Science, fostering greater collaboration among institutes and increasing public awareness of high-energy astrophysics.

Planets Through Different Eyes: A Joint Athens-Santander Night (2022, IFCA-NOA)

- A collaboration between IFCA and NOA, featuring the AHEAD2020 video "X-ray Planets," a talk on Solar System planets, and live observations of Jupiter and Saturn, ending with a Kahoot game.

CLAXSON: International Master Classes in Astrophysics (2022-2024, IFCA-IRAP-NOA):)

- For secondary school students to classify X-ray sources using the CLAXSON web tool.
- **Over 200 students** participated in 2022-2023, with the third edition planned for December 2024.





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P.O. Conference SHARING AHEAD 2022



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SHARING AHEAD 2022

- Focused on public outreach and social engagement in astrophysics
- Explored the role of research institutions in modern science communication

Objectives

- Showcase best practices in public outreach
- Strengthen collaborations among AHEAD2020 members and other EU science projects
- Facilitate knowledge sharing between researchers and science communicators



Attendance

- Researchers and science communication experts from AHEAD2020 and other institutions and from other H2020 projects such as ESCAPE, REINFORCE and ORP
- **55 participants** in person, including media representatives
- Nearly **300 views on live streams** from the Astronomical Observatory of Rome channels

Impact

- Promoted collaborative approaches to astrophysics outreach
- Highlighted innovative communication strategies for engaging the public





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WP4: Summary



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- The majority of tasks were delivered on time!

Impact Highlights

- Continuous flow of news and online material (through web-page, social media, youtube)
- Reached tens of thousands of participants, including students, educators, and the general public via teaching schools, Open days and nights , summer schools, and more
 - Enhanced student engagement with interactive and experiential learning tools.
 - Enabled cross-disciplinary learning by integrating art, STEM and science.
 - Strengthened cross-institutional collaborations and showcased EU-funded research.
- Production of a variety of material mainly videos, Video game, Posters, Art room increasing the awareness of public
- Mini conference promoted collaborative approaches to astrophysics outreach

