

ACME Multimessenger Citizen Science: Training Event for Amateur Astronomers

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Antoine Kouchner

June 10th 2025



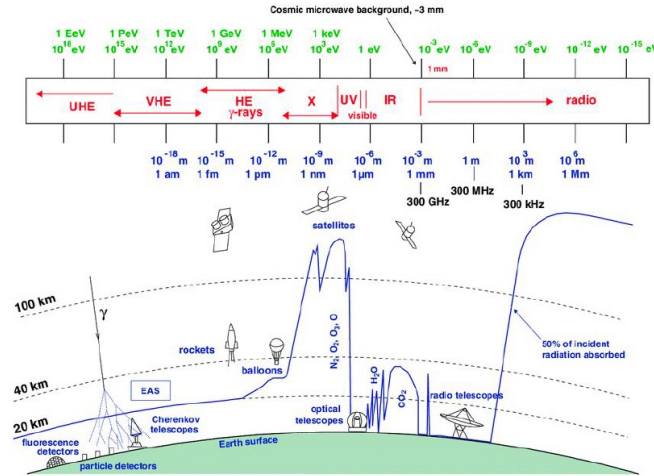
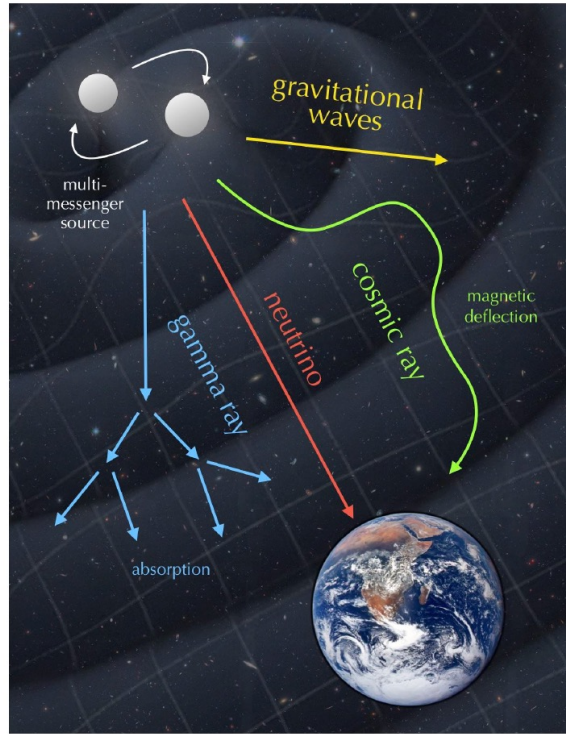
**Funded by
the European Union**



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Astrophysics Centre for Multimessenger studies in Europe

From O. Blanch ACME Kick-off

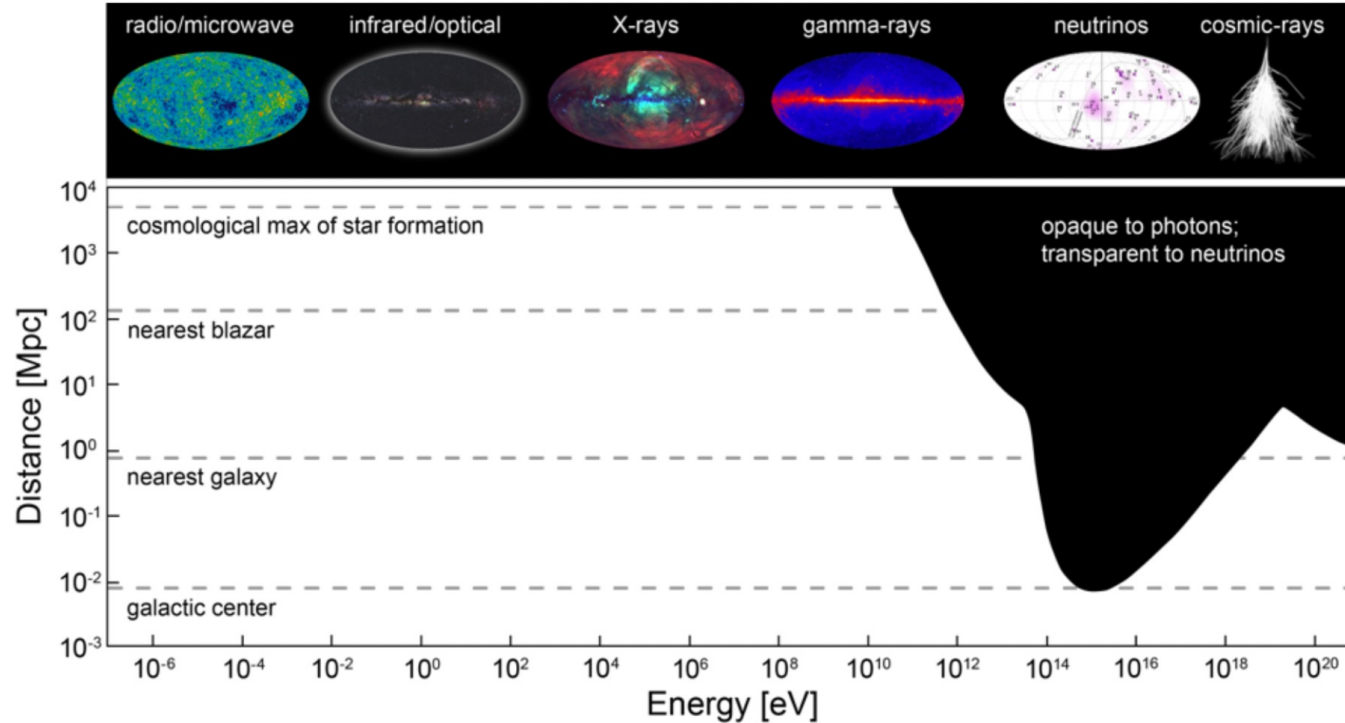


And MM is not any more the future but already the present.

Efforts on going all across astronomy, including gamma-ray astronomy

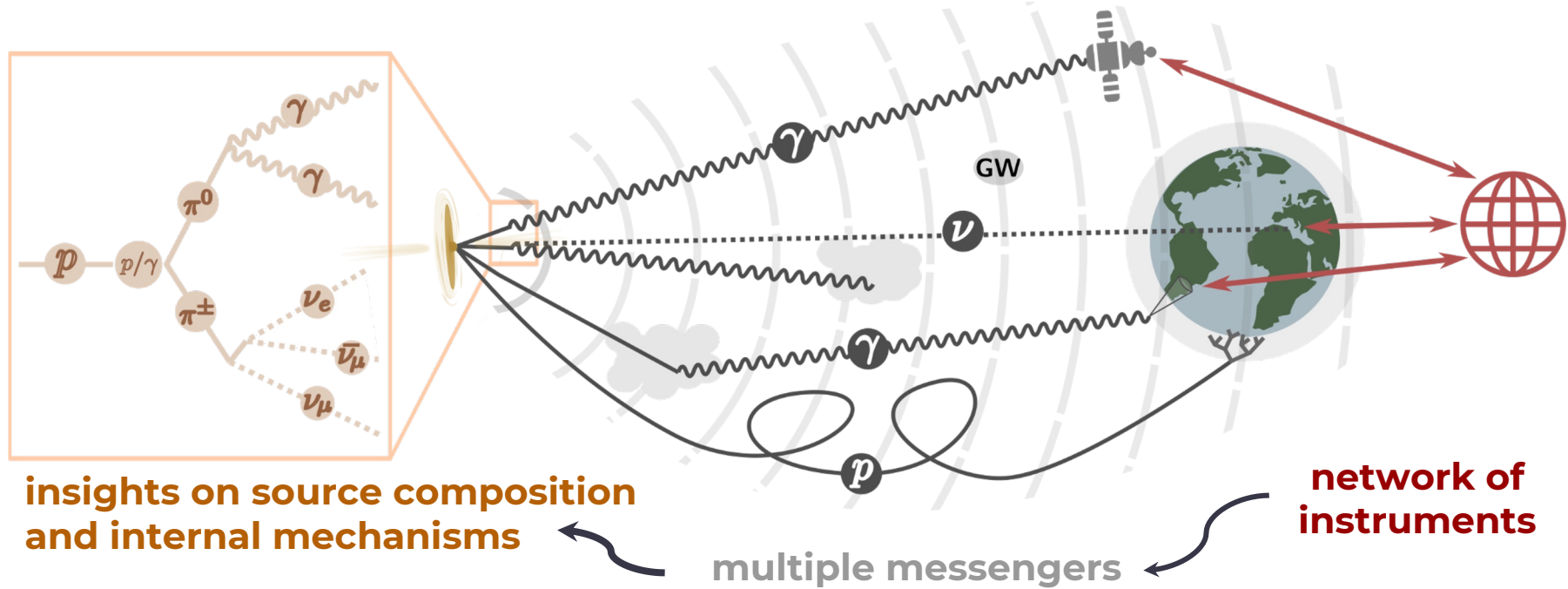
Establishing a lasting link between communities is the underlying objective

Astrophysics Centre for Multimessenger studies in Europe



The Universe is opaque to EM radiation for $\frac{1}{4}$ of the spectrum,

Multi-messenger Astronomy



need coordination and harmonized access!

Need for well defined science cases

Aim:

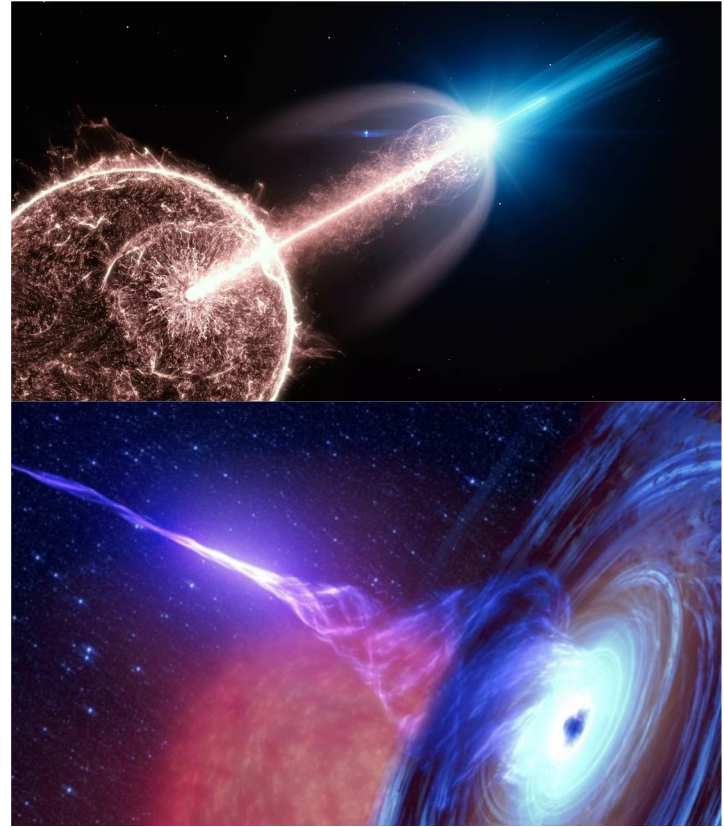
- ❖ to be aligned with the project aim and scope and focused on the scientific objectives and results
- ❖ for strategic communication to internal and external members and entities

Need for clearly defined science cases:

- ❖ when selecting projects submitted in TNA calls
- ❖ when evaluating potential new partners
- ❖ when defining the scope of granted VA expertise

What is at the core of ACME? – Phenomena

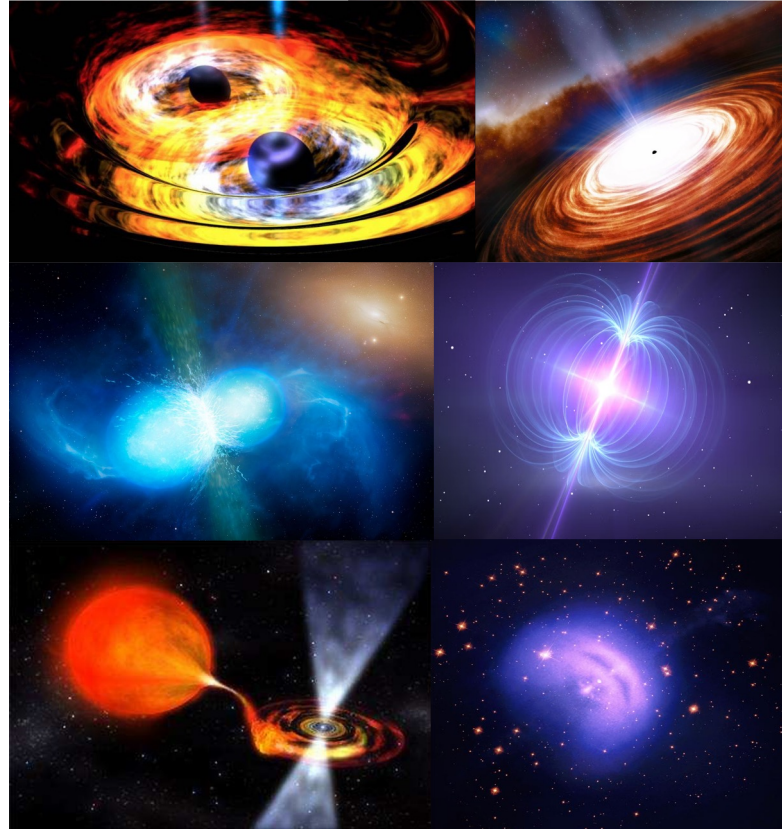
- ❖ Matter in extreme conditions
- ❖ Particle acceleration and propagation
- ❖ Gravitational lensing
- ❖ Explosive events
- ❖ All in a multi-messenger context



What is at the core of ACME? – Sources

Compact objects at all scales

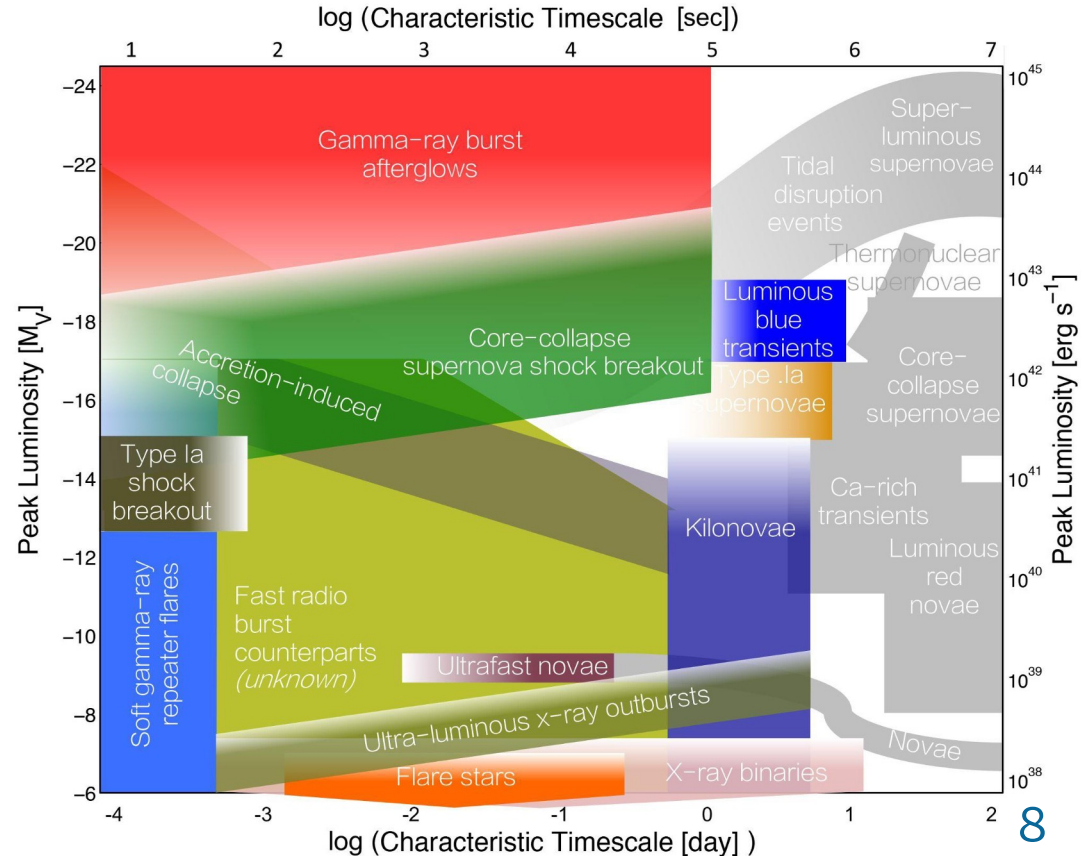
- ❖ SMBH (mergers)
- ❖ AGN
- ❖ BNS/BHNS mergers
- ❖ Pulsars
- ❖ X-ray binaries
- ❖ Pulsar Wind nebulae



What is at the core of ACME? – Sources

Astrophysical Transients

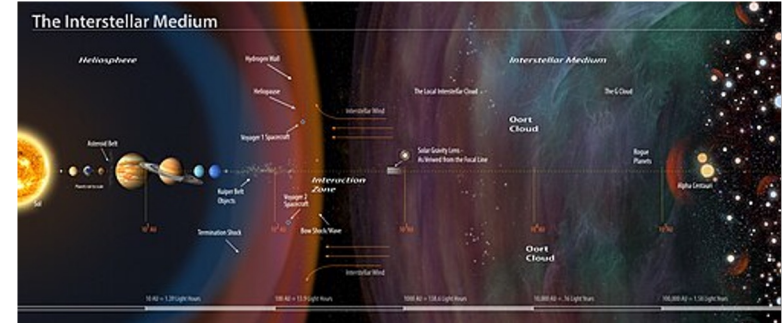
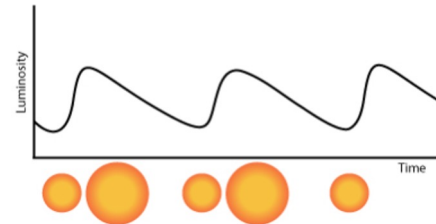
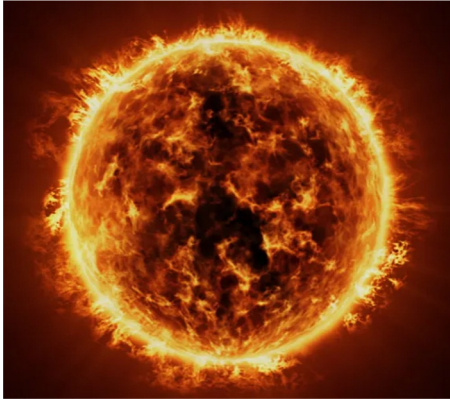
- ❖ Gamma-ray bursts
- ❖ XRBs / ULXs
- ❖ Magnetars
- ❖ FRBs
- ❖ TDEs
- ❖ SNe
- ❖ Novae
- ❖ KNe



What is not at the core of ACME? – Sources

- ❖ The Sun, Solar System objects, and exoplanets
- ❖ Variable stars
- ❖ Interstellar matter

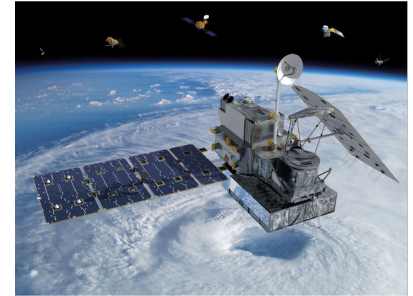
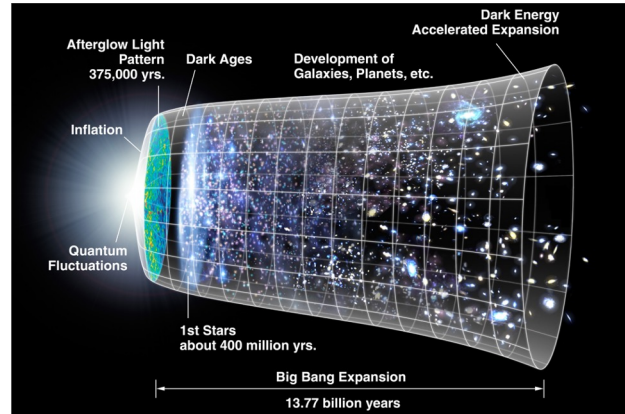
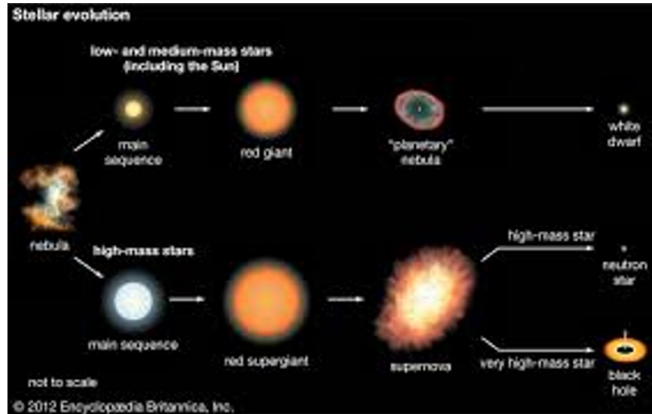
Exceptions can apply if deemed necessary by the selection committee or the project management



What is not at the core of ACME? – Phenomena

- ❖ Cosmological studies
- ❖ Galaxy evolution, galactic structure
- ❖ Stellar birth, stellar evolution
- ❖ Spacecraft observation
- ❖ Exobiology

Exceptions can apply if deemed necessary by the selection committee or the project management



The consortium

- ❖ 42 partners
- ❖ 15 countries
- ❖ > 30 research infrastructures
- ❖ Covering:

*radio, optical, near infrared, X-rays,
gamma-rays, gravitational waves,
neutrinos, cosmic rays*

Project duration:

Sept. 2024 – Aug. 2028

Total cost:

14.5 M€ (100% EU)

Supported by:

- AstroParticle Physics European
Consortium APPEC



- A planning and advisory Network for
European astronomy ASTRONET



Project structure

Objective: improve access to research infrastructures for multi-messenger science.



1. **Coordinate** the activities
2. Harmonized **transnational/virtual access** to RIs
3. Develop **centres of expertise**
4. Improve **science data products** management
5. Manage **real-time alerts and observations**
6. Provide **training** for new generation
7. Open data sets to **other disciplines**, increase **citizen engagement**

→ 7 corresponding Work Packages (WP)

Transnational Access



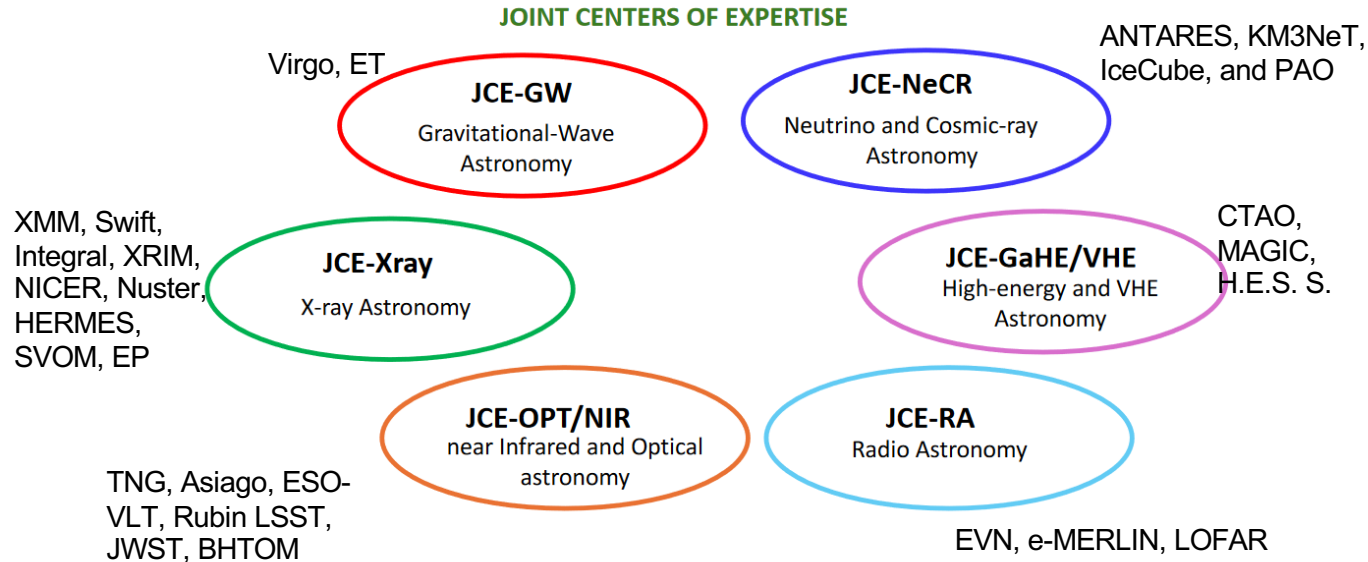
DELIVERING TRANSNATIONAL ACCESS FOR MULTI-MESSENGER AND TIME-DOMAIN

Radio	EVN (JIVE, Tr, Ir, Mh, Yb), LOFAR, e-MERLIN, Eff
OPT	CFHT
GW	
GaVHE	CTA, MAGIC
Xray	
NeCR	Auger, KM3Net

- ACME will enable open Transnational Access to 9 world-leading spanning radio, optical, and high-energy astrophysics, alongside astroparticle facilities.
- RI with existing open access processes will offer TA from year 1: EVN, LOFAR, e-MERLIN, Effelsberg, CFHT, MAGIC
- The remaining facilities will deliver TA after the development of TA process (year 2 onwards): KM3Net, Pierre Auger Observatory, (CTAO)

Open access to experts

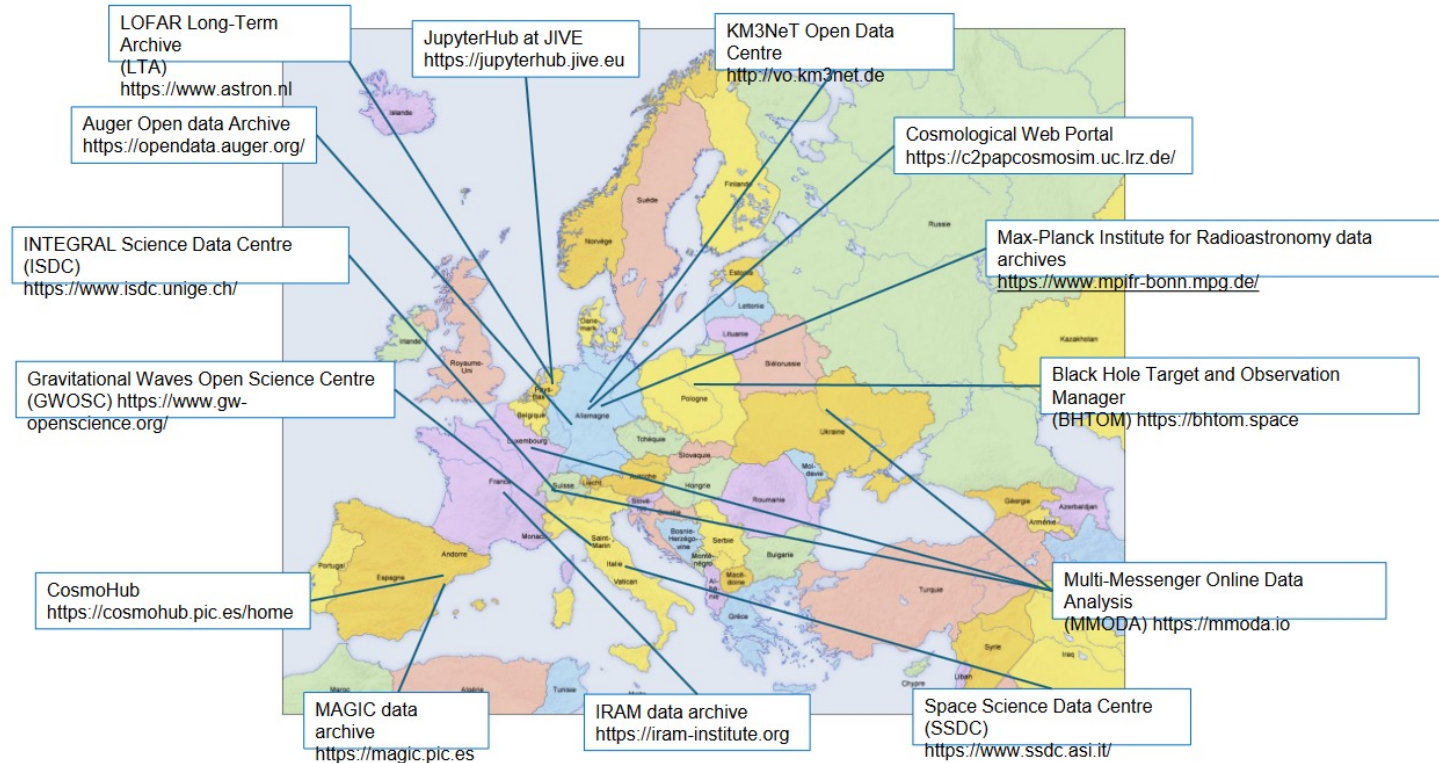
infrastructures, observations, data analysis and interpretation, joint MM analysis



Implementation: hands-on sessions, help desk user support, visits to the Centres of Expertise.

Improved access to archival multi- messenger data

Infrastructures involved

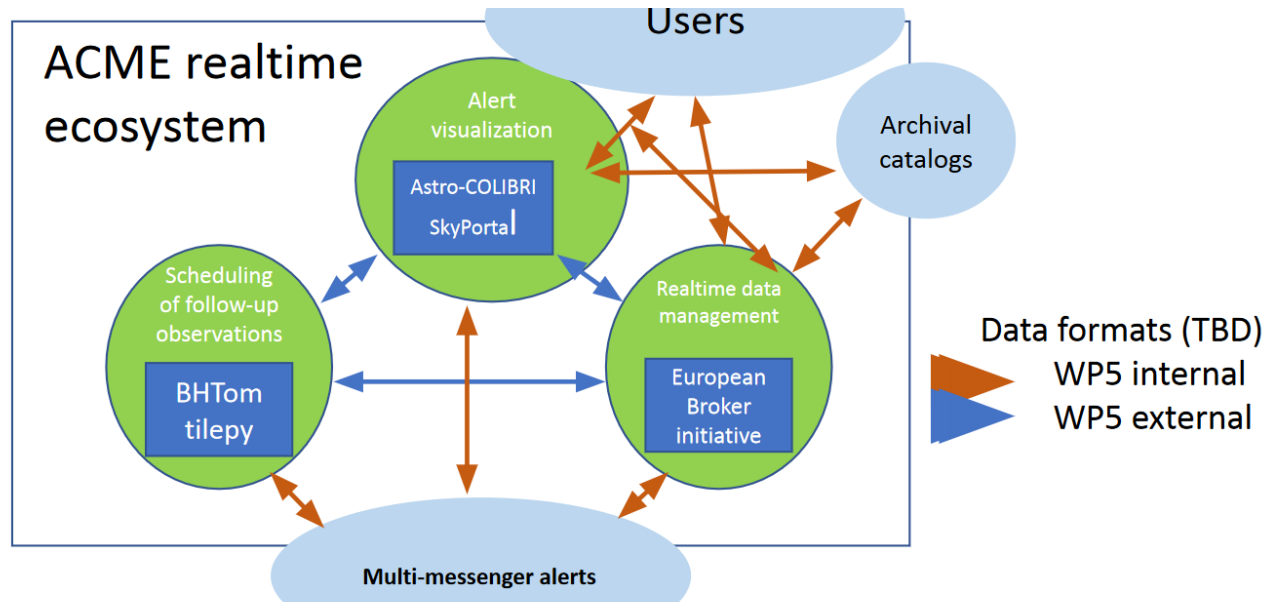


harmonization of standards for data access and analysis tools

Improved coordination for real-time detection

Goals:

- Create a real-time ecosystem, in which researchers obtain virtual access to different, essential and improved alerts streams
- Provide tools to manage and analyze the streams
- Visualise the data and organize follow-up observations based on detections made in near real time



Training for Early Career Scientists & Engineers

Goals:

- Assist the scientists in taking, analysing and interpreting multi-wavelength/messenger observations and coordinating efforts
- About 30 conferences and workshops planned

The first ACME workshop: The gravitational wave sky and complementary observations

- IRAP, Toulouse, 7-11th April
- 100 participants, ~20 % remotely
- <https://acme-grav-waves.sciencesconf.org/>



Home SOC & LOC Abstract submission Registration Participants Practical information Contact

MEETING DESCRIPTION

The first ACME workshop
The gravitational wave sky and complementary observations
Toulouse, France
7th-11th April 2025

This is the first ACME workshop. It will focus on the gravitational wave sky and complementary observations. This workshop aims to provide astronomers with diverse information to help take, analyse and interpret multi-wavelength/messenger observations of the gravitational wave sky, as well as provide information on tools that can help coordinate efforts to observe the transient sky. A wide range of gravitational wave detectors and sources will be discussed, including gamma-ray bursts, kilonovae, stellar mass compact object binaries, massive black hole binaries and related objects, cosmological and exotic sources. There will also be a strong focus on line domain and transient astronomy. The programme will consist of review talks, invited talks and contributed talks as well as discussion sessions. There will also be space for posters.

Abstract submission opens on 6th December 2024 and will remain open until 26th January 2025. The programme will be published at the beginning of February 2025. Registration is open and will stay open until Thursday 27th March 2025. The meeting will be proposed in hybrid format. Some funding is available for participants. There is no registration fee for this meeting.

Please note we are not working with any specific companies to provide hotels, so please do not reply to spam emails offering accommodation for the meeting.

Invited speakers:

Sarah Arlen (Observatoire de Côte d'Azur, France)
Abbas Askar (Nicolaus Copernicus Astronomical Center, Poland)
Laura Bernard (LUTH, France)
Maria Grazia Bernardini (INAF - Astronomical Observatory of Brescia, Italy)
Phil Evans (University of Leicester, UK)
Alessia Franchini (Università degli Studi di Milano, Italy)
Agnieszka Czekaj (Instytut Astronomiczny, Kraków, Poland)

Citizen sciences

Goals:

- The objective of this WP are to extend the ACME services for the users that do not belong to the two main communities targeted in this call (astronomers and astroparticle physicists)
- data mining that can be provided by crowd-sourcing and the involvement of a community of citizen scientists.



Morning Session

- 10:00-10:05 : Welcome -- Stephen Serjeant & James Pearson (5 min)
 10:05-10:25 : Overview of ACME -- Antoine Kouchner (ACME Coordinator) (20 min)
 10:25-10:40 : Astro-COLIBRI platform for real-time alerts - introduction -- Fabian Schüssler (15 min)
 10:40-11:25 : Astro-COLIBRI interfaces (demo) -- Ilja Jaroschewski (45 min)
 11:25-11:45 : Break (20 min)
 11:45-12:15 : Astro-COLIBRI API (hands-on tutorial) -- Bernardo Cornejo (30 min)
 12:15-12:45 : RAPAS pro-am network for scientific alerts -- Thierry Midavaine (30 min)
 12:45-13:45 : Lunch Break (60 min)

Afternoon Session

- 13:45-14:30 : WIVONA project (talk + demo of interfacing with SAMP & Astro-COLIBRI) -- Jean-Paul Godard (45 min)
 14:30-14:45 : Virtual Observatory (VO) + python integration -- Renaud Savalle (15 min)
 14:45-15:00 : Break (15 min)
 15:00-15:20 : BHTOM: Why and How -- Lukasz Wyrzykowski (20 min)
 15:20-16:05 : BHTOM GUI/API (hands-on tutorial) -- Lukasz Wyrzykowski (45 min)
 16:05-16:25 : Researchers of high energy messengers: activities for high school teachers and students -- Antonio Iuliano (20 min)
 16:25-16:30 : Closing remarks -- Stephen Serjeant & James Pearson (5 min)
 16:30 : End

Thanks for your attention !

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https://www.linkedin.com/posts/acme-astro_multimessenger-astroparticle-astronomy-activity-7312505310244450304-3jBk