First ACME workshop:
The gravitational wave sky and complementary observations

Toulouse, April 7, 2025

ACME

Astrophysics Centre for Multimessenger studies in Europe

Mathieu Lamoureux

Funded by the European Union

UCLouvain

fnrs
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The first steps

Multi-Messenger Astrophysics Workshop (MMAW)
October 10-12, 2022
EGO, Cascina, Italy

During the second day, working groups will be formed and these groups will convene in parallel in the morning of the third day for a common restitution in the afternoon, and a discussion for a common proposal for Multi-Messenger Astrophysics answering to the European Union call. **HORIZON-INFRA-2023-SERV-01-02**

Kick-off meeting in September 2024

Press Release on October 1st

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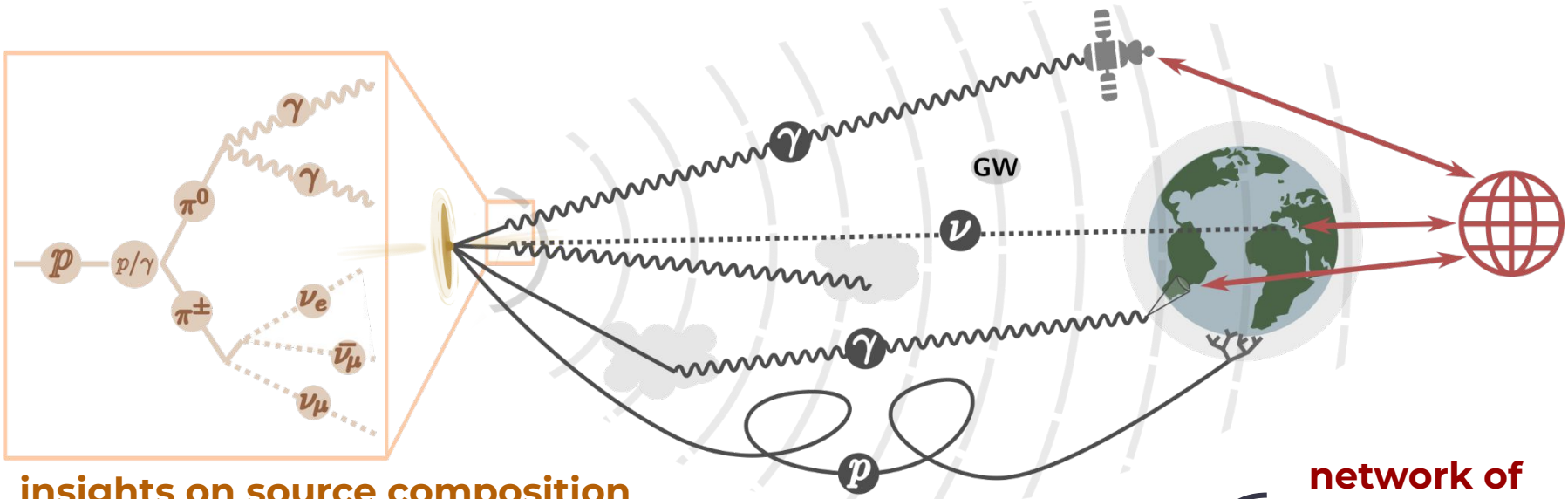
Multi-messenger Astronomy



insights on source composition and internal mechanisms

network of instruments

multiple messengers

need coordination and harmonized access!

ACME Consortium

- 40 partners
- 15 countries
- > 30 research infrastructures:
  - Observatories
  - Detectors
  - Cyber Infrastructures
  - Expertise centres
- Covering:
  - Gravitational waves
  - Radio
  - Optical
  - X-rays
  - Gamma-rays
  - Neutrinos
  - Cosmic rays

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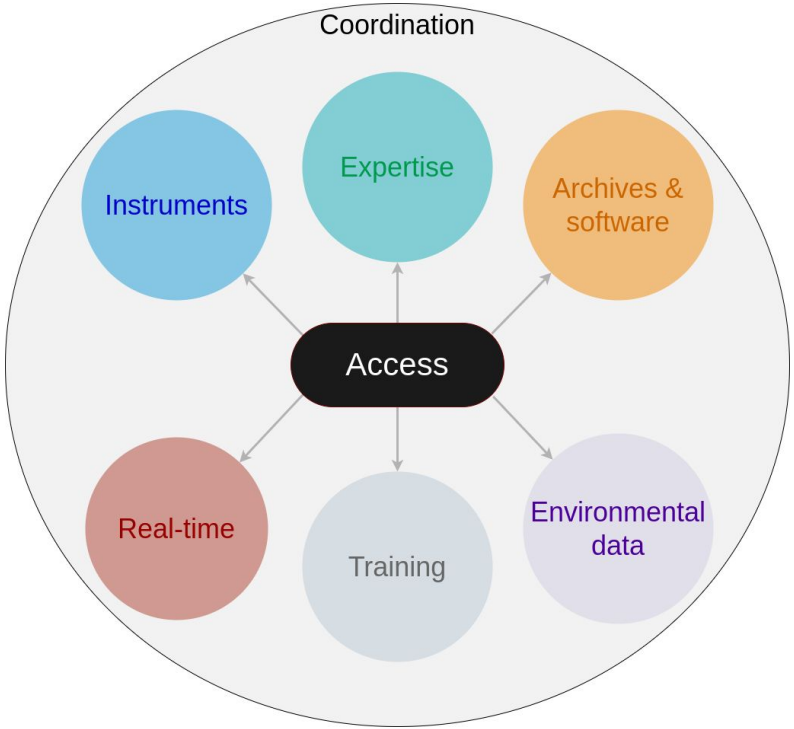
Project structure

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



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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)**

WP1 – Coordination of the project

Coordination team:

- Antoine Kouchner (Coordinator)
- Paolo d'Avanzo (Co-coordinator),
- Mathieu Lamoureux (Technical coordinator)
- Julie Epas (Project manager)

For any inquiries, please use the **contact form**:
https://www.acme-astro.eu/contact-us/

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WP2 – Transnational Access

WP leaders: Robert Beswick, Damien Dornic, Izabela Rottmann

- Provide **Transnational access** (TNA) to infrastructures with complementary observational data: radio, high-energy gamma rays, neutrinos, cosmic rays
- Develop and implement the **TNA procedures** for new infrastructures
- **Facilitate new, innovative science** via cross-disciplinary programmes and increase scientific impact
- By **linking Astronomy & Astroparticle communities**, extend the user communities and enable new science via access to multiple facilities

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WP2 – Telescopes and detectors

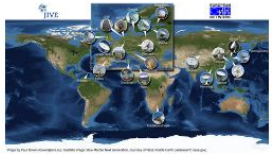
- **Nine instruments** covering radio, optical, γ, neutrinos, and cosmic rays.
- Those with existing processes: access **from Year 1**
- KM3NeT/Pierre Auger/CTAO: access **from Year 2**

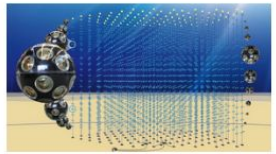

CFHT


CTAO


e-MERLIN

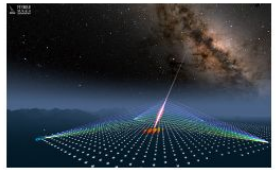

Effelsberg


EVN


KM3NeT


LOFAR


MAGIC


Pierre Auger Observatory

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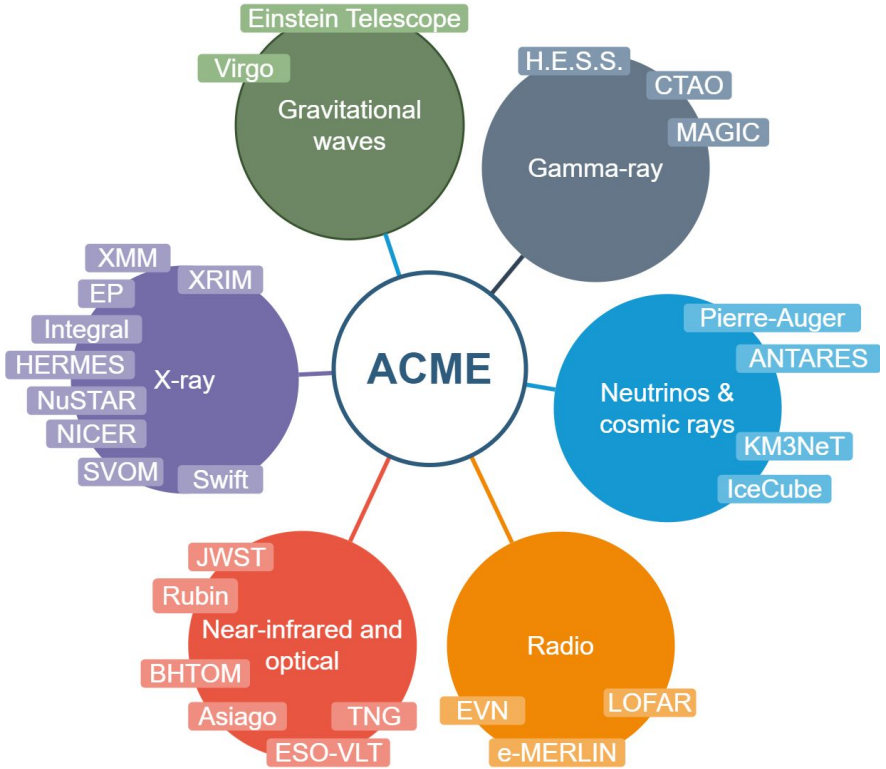
WP3 – Provision of scientific expertise

WP leaders: Marica Branchesi, Zsolt Paragi

- **Access to expertise** on **infrastructures, observations, data analysis and interpretation, joint MM analyses.**
- One Centre of Expertise per messenger = **network of distributed nodes**.
- Implementation: hands-on sessions, help desk user support, visits to the Centres of Expertise.



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WP3 – TNA CALLS AND VIRTUAL ACCESS

- Visit to institutes
  - 1-2 week(s) stay, fully funded
  - First call just ended
  - Next one **in Autumn**

- Virtual access to expertise
  - Online platform to get support
  - Documentation, tutorials…

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WP4 – ACCESS TO ARCHIVAL DATA AND TOOLS

WP leaders: Andrii Neronov, Lukasz Wyrzykowski

- Provide **Virtual Access (VA) to online services**:
  - combination of the data products of various telescopes/detectors
  - multi-messenger data analysis workflows (including models).
- Lower the barrier of learning practices of the other communities via **harmonization of standards for data access and analysis tools**.
- Planning of follow-up observations via provision of services for **on-the-fly analysis of archival multi-messenger data**.

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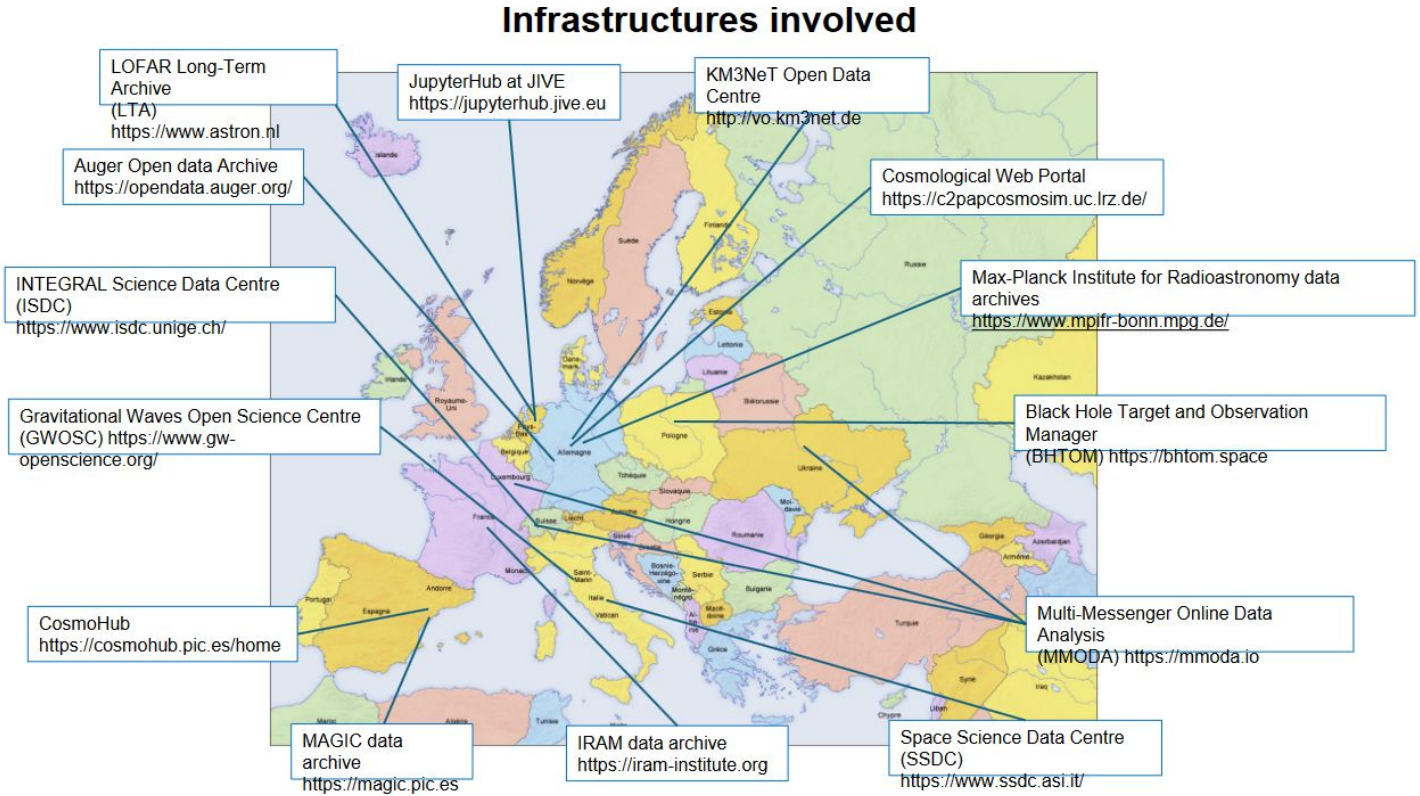
WP4 – ACCESS TO ARCHIVAL DATA AND TOOLS



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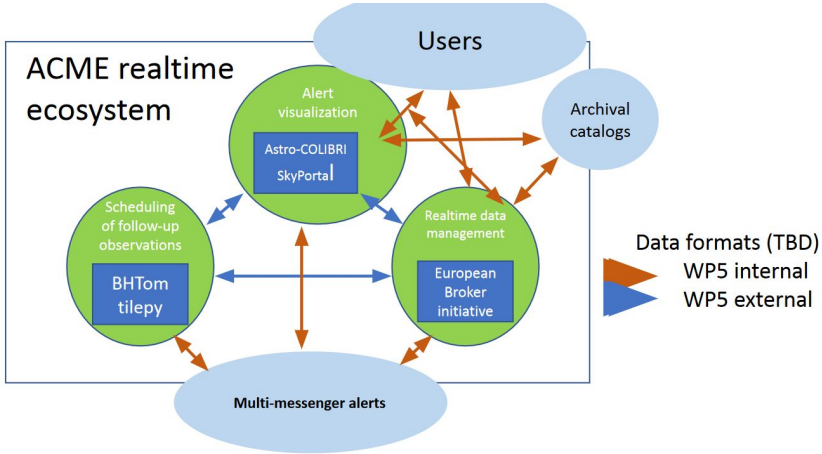
WP5 – COORDINATION FOR REAL-TIME ALERTS

WP leaders: Fabian Schüssler, Marek Kowalski

- 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.



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WP6 – Training for scientists and engineers

WP leaders: Natalie Webb, Heidi Korhonen

- Assist the scientists in taking, analysing and interpreting multi-wavelength/messenger observations and coordinating efforts.
- This will be achieved via conferences, workshops, schools, and hackathons, and through providing dedicated training material.
  - 3–4 in person events per year
  - 2–3 virtual schools/hackathons per year

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WP6 – Training for scientists and engineers

Next incoming events

Tue Jun 10

All day

ACME Multimessenger Citizen Science: Training Event for Amateur Astronomers

Mon Sep 15

All day - Fri Sep 19

JIVE VLBI School 2025

Mon Sep 29

All day - Fri Oct 3

The 16th Gaia Science Alerts and ACME Time-Domain Workshop

Details on ACME website.

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WP7 – Environment and society

WP leaders: Gwenhaël De Wasseige, Stephen Serjeant

- Make **auxiliary environmental data available** through dedicated services.
- Involvement of **citizen scientists** and **amateur astronomers**.
- Support the **inclusion of under-represented/disadvantaged communities**.

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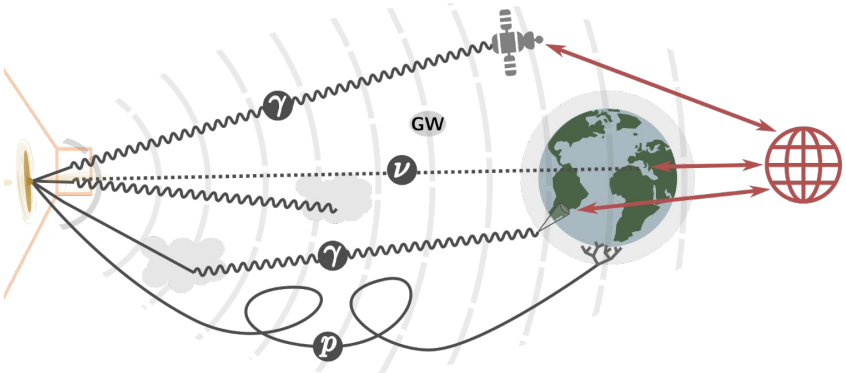
Outlook

- ACME aims to better coordinate among multiple messengers and wavelengths, and facilitate joint analyses.
- Towards common data formats, tools, and applications for archival and real-time searches. Extend access to other domains.
- Organise training of young and experienced researchers.
- More information on the website: www.acme-astro.eu



Backups

ACME Project Structure

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CTAO


e-MERLIN


Effelsberg


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