MM astronomy in the ET era
11/02/2026

ACME Overview and status

Andrea Melandri, Silvia Piranomonte & Paolo D'Avanzo

Funded by the European Union

Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or of the European Research Executive Agency (REA). Neither the European Union nor the granting authority can be held responsible for them. The ACME project has received funding from the European Union's Horizon Europe Research and Innovation programme under Grant Agreement No 101131928.

The consortium

Funded by the European Union

- 40 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)

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)

Project structure

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

INAF@ACME

Chi Siamo?

8 istituti INAF coinvolti nel progetto:

INAF - OARoma (Capofila)
INAF - OABrera
INAF - OAPadova
INAF - OAS Bologna
INAF - OATrieste
INAF - OAAbruzzo
INAF - OACapodimonte
INAF - IAPS Roma

21 Ricercatori + post docs

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Project structure

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

INAF@ACME

Project co-Coordinator: **Paolo D'Avanzo**
INAF reference person: **Silvia Piranomonte**
21 INAF researchers (> 60% from RSN4) from 8 structures

Contribution to:
WP1: Coordination and Management
WP3: TA3/VA3 Provision of scientific expertise for multi-messenger observations
WP4: Provision of improved access to near-real time and archival multi-messenger data.
WP6: Training for scientists and engineers.

WP1 – Coordination of the project

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Coordination team:

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

ACME
Astrophysics Centre for Multimessenger studies in Europe

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

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

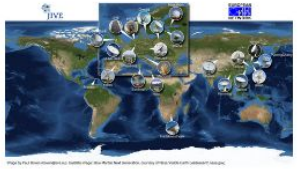
- **Nine instruments** covering radio, optical, γ, neutrinos, and cosmic rays.
- Those with existing processes: access **from Year 1**
- KM3NeT, Pierre Auger, CTAO: access **from Year 2**

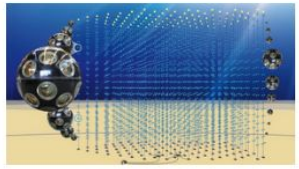

CFHT


CTAO


e-MERLIN

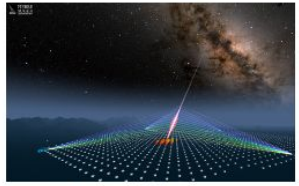

Effelsberg


EVN


KM3NeT


LOFAR


MAGIC

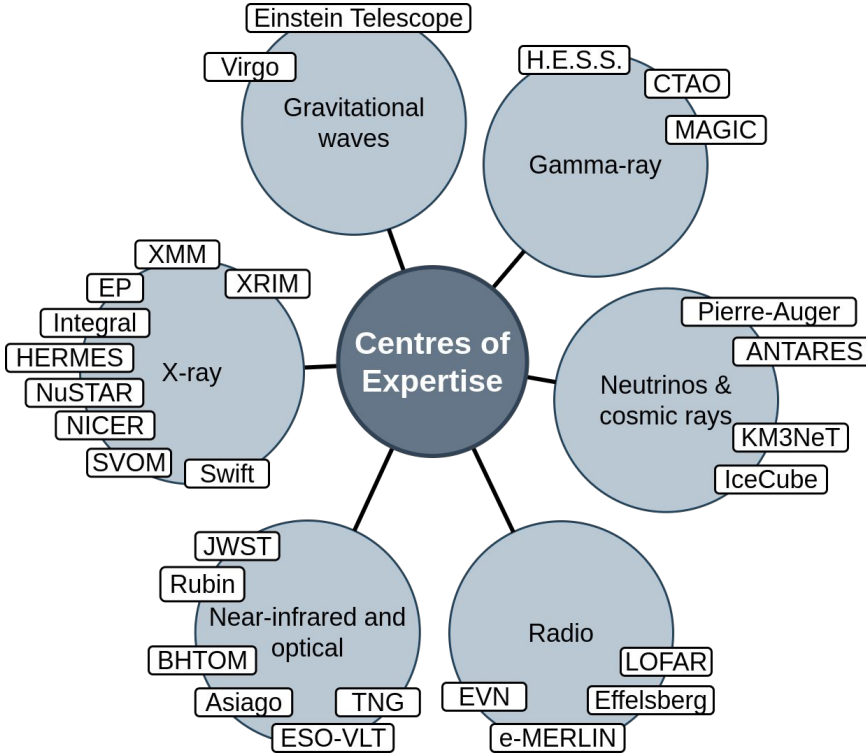

Pierre Auger Observatory

Funded by the European Union

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.
- JCE-OPT/NIR coordinator: **Andrea Melandri**



WP3 – TNA calls and virtual access

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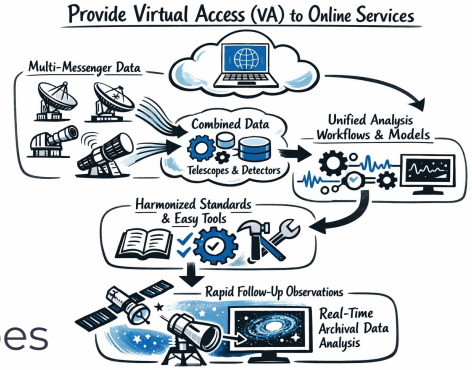
- Visit to institutes
  - 1-2 week(s) stay
  - fully funded
  - Two calls per year

- Virtual access to expertise
  - Online platform to get support
    support.acme-astro.eu
  - Remote hands-on sessions and tutorials
    see calendar

APC
AUTh Laboratory of Astronomy
BUW
CPPM
GSSI
IFAE
IGFAE
INAF
INFN
IRAP
IRFU
L2IT
SRON
UCLouvain
UNIGE

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 and 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**.

WP4 – Platforms and tools within ACME

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JupyterHub at JIVE

LOFAR

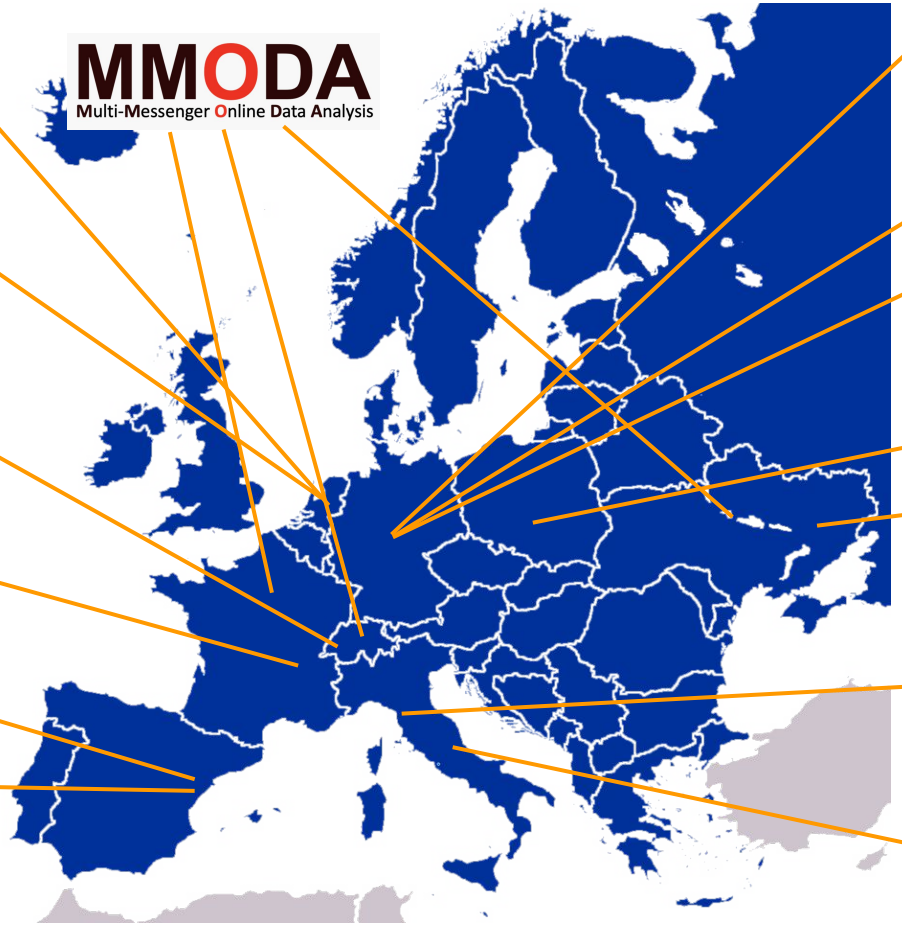
INTEGRAL Science Data Centre

iram

COSMO HUB

MAGIC Datacenter

MMODA
Multi-Messenger Online Data Analysis



Cosmosim

KM3NeT

PIERRE AUGER OBSERVATORY

BHTOM.SPACE

UTR-2 Radio Telescope Data

GWOSC

SSDC
Space Science Data Center

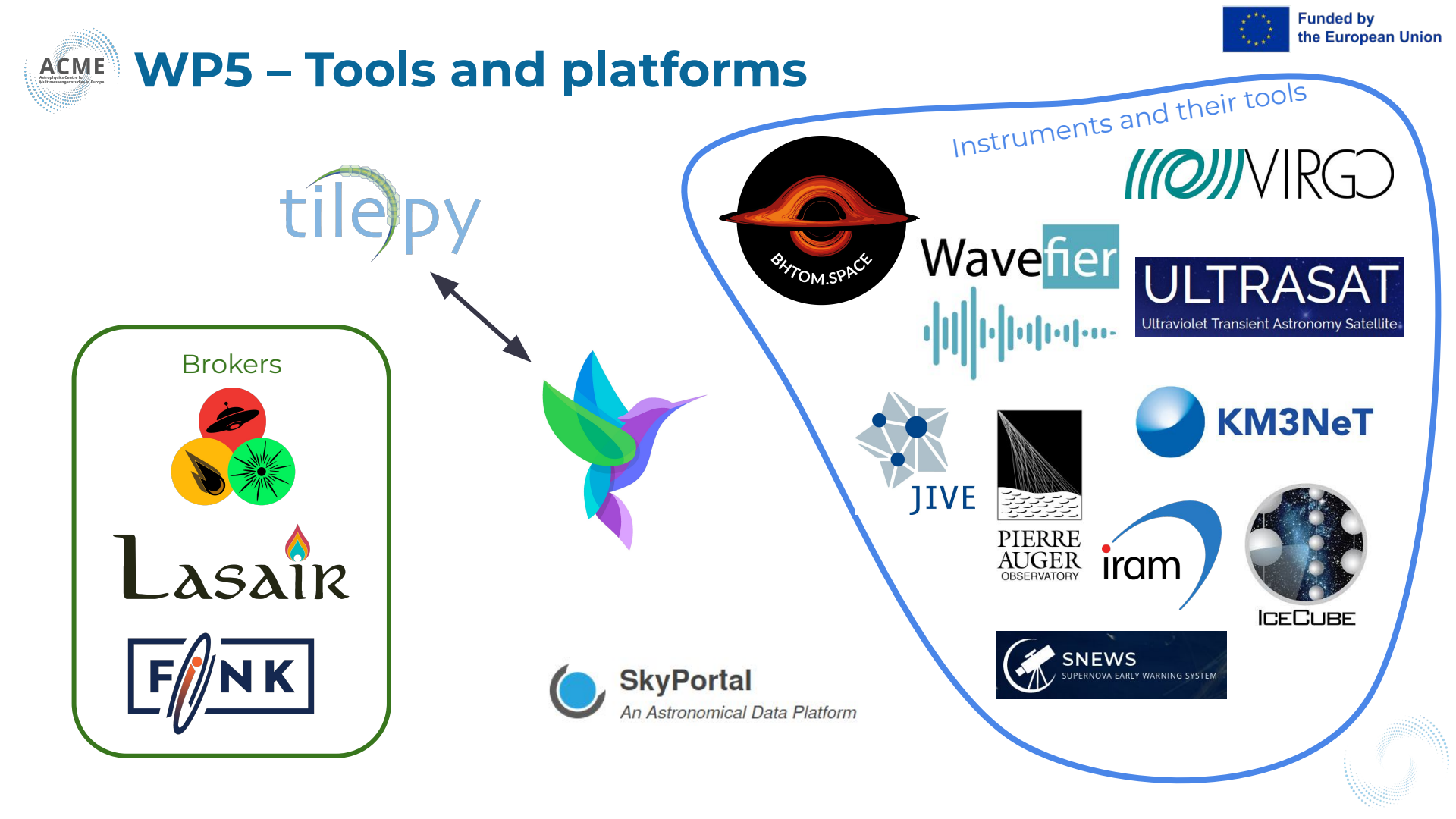
WP5 – coordination for real-time alerts

Funded by the European Union

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.

WP5 – Tools and platforms



WP6 – Training for scientists and engineers

Funded by the European Union

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

See upcoming events on ACME website.

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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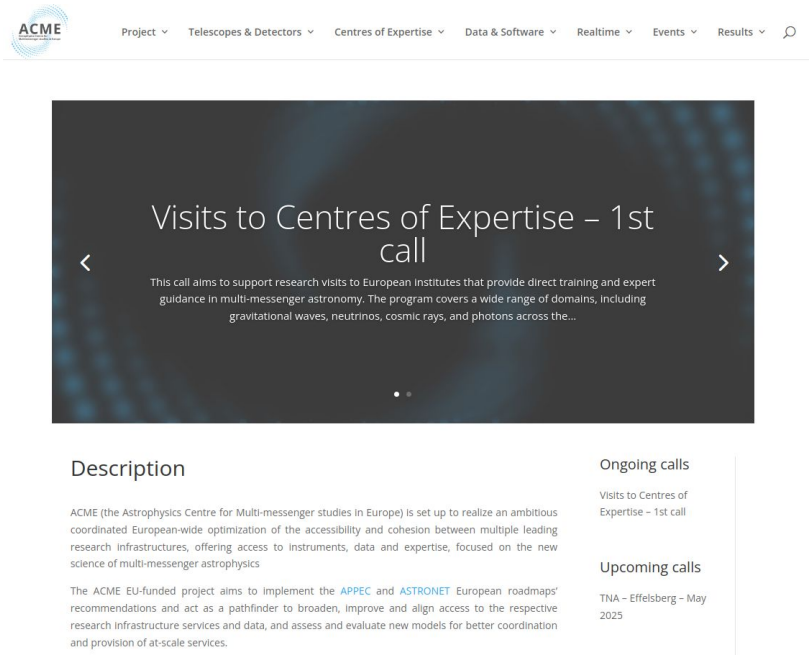
ACME communication channels



The website

- Presentation of all infrastructures, tools, members…
- Ongoing activities (calls, workshops)
- Archive of all useful materials

www.acme-astro.eu

LinkedIn

@acme-astro

ACME
Astrophysics Centre for Multimessenger studies in Europe

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Astrophysics Centre for Multimessenger studies in Europe

https://www.acme-astro.eu

The Astrophysics Centre for Multi-messenger studies in Europe (ACME) consortium gathers 40 institutes, 15 countries, over 30 research infrastructures from Astronomy and Astroparticle domains, covering GW, Gamma & X-rays, neutrinos, CR, radio, optical.
One common objective: to provide enhanced access to infrastructure and services for the European multi- messenger and time-domain research communities.

The project has been funded by the European Union (call: HORIZON-INFRA-2023-SERV-01, grant no. 101131928) for 4 years (Sept 24, Aug 28), for a total cost of 14.5 MEuro.

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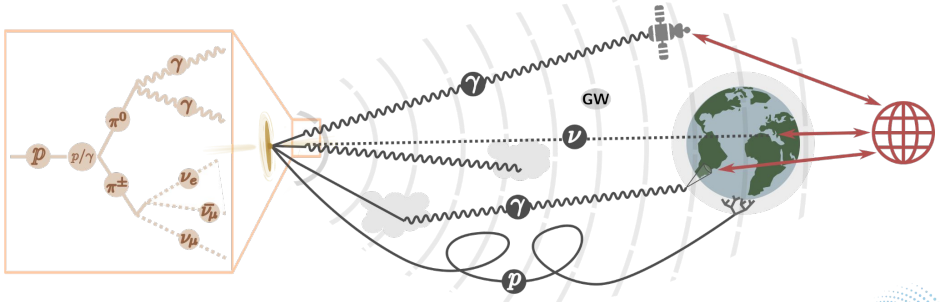
Science cases

ACME provides access to the infrastructures and the expertise for the broad community of researchers carrying out multi-messenger astronomy. The science topics of ACME are very broad; they cover the study of astrophysical objects or phenomena that may be linked to physical processes responsible for the production of electromagnetic radiation, particles, and/or gravitational waves.

The studied phenomena include:

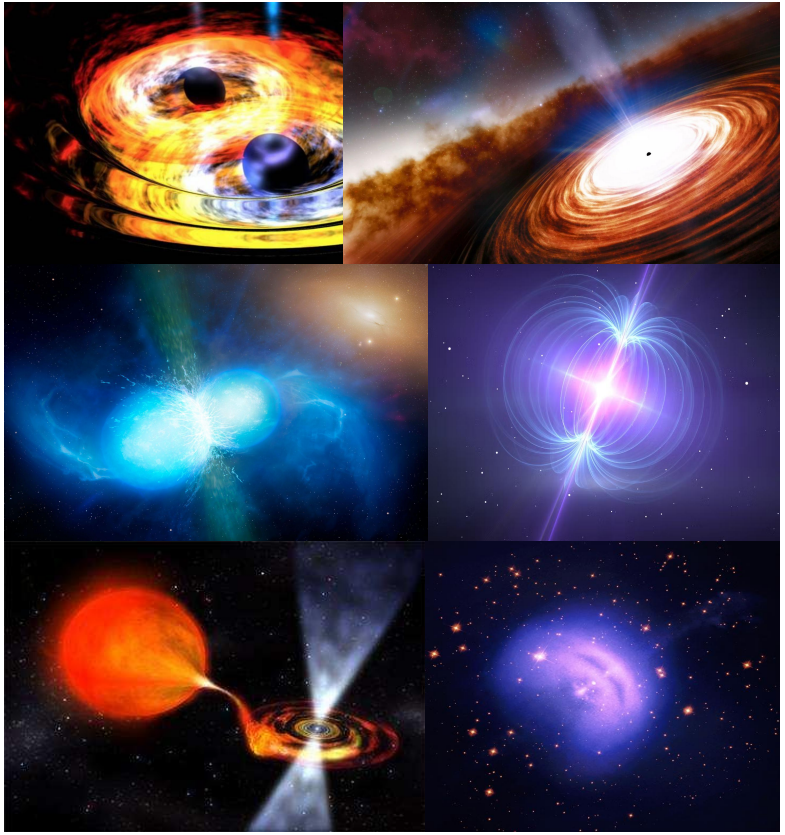
- Matter in extreme conditions
- Particle acceleration and propagation
- Explosive events
- All in a multi-messenger context



Science cases - Sources

Compact objects at all scales

- SMBH (including mergers)
- AGN / Blazars
- compact binary mergers
- Pulsars
- X-ray binaries
- Pulsar Wind nebulae



Science cases - Sources

Astrophysical Transients

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