



Astronomy ESFRI & Research Infrastructure Cluster
ASTERICS - 653477



ASTERICS:

Astronomy ESFRI & Research Infrastructure Cluster

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Astronomy ESFRI & Research Infrastructure Cluster



what is ASTERICS?

- A €15 million Research Infrastructure funded by EC Horizon 2020 framework (2015-2019)
 - To help solve the **Big Data** challenges of European astronomy
 - To provide direct interactive access to the best European astronomy data in an international framework
 - *Cross-cutting synergies and common challenges*



ASTRON

Participating institutions





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Supporting organisations and networks




addressing common challenges in astronomy and astroparticle physics

- **supporting** and **accelerating** the implementation of a new generation of observatories
- **Focus on ESFRI projects**
- helping scientists to access data
 - **ESFRIs+ interoperating as an integrated multi- λ , multi-messenger facility**



multi- λ , multi-messenger

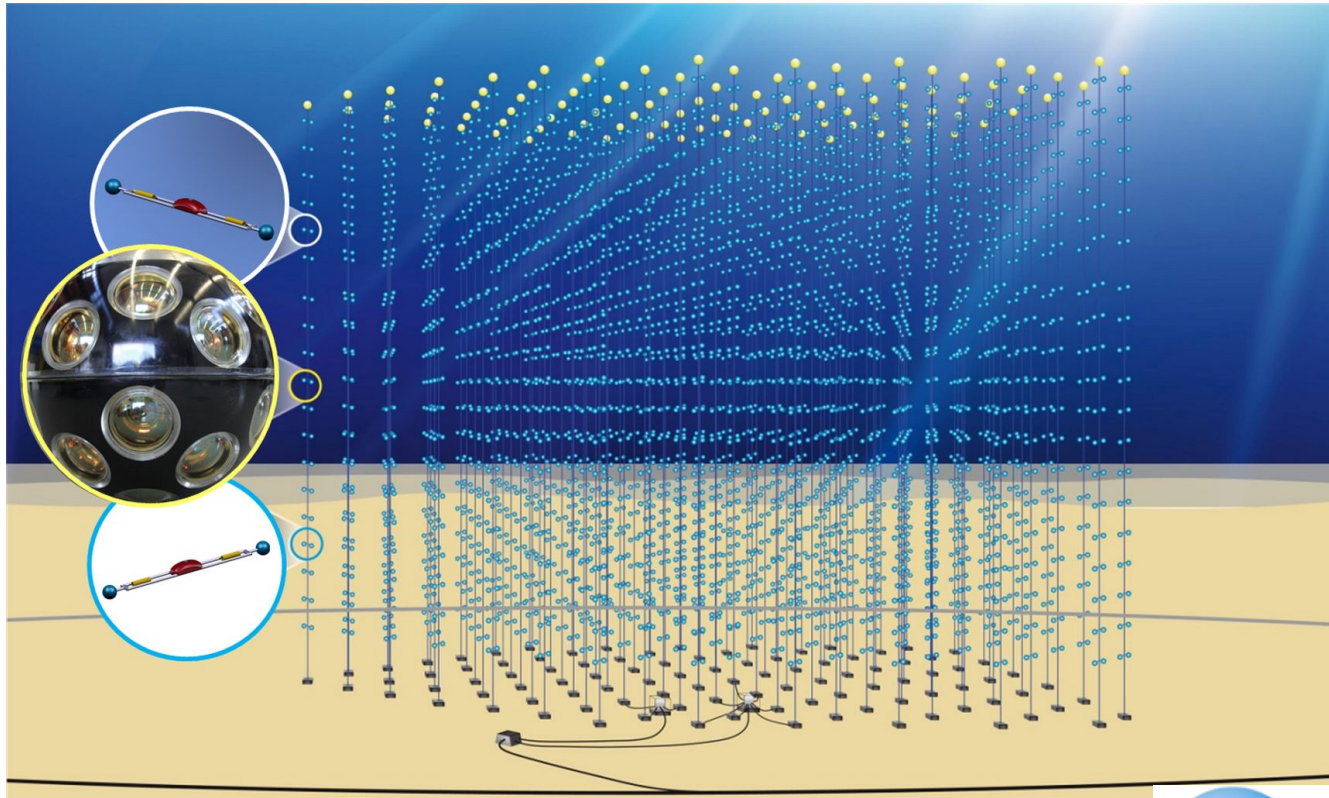
- messengers: **photons, ν , grav. waves, VHE γ**
- multi- λ : 

gamma ray X-ray ultraviolet visible infrared microwave radio
- transient source astronomy

To make it happen...

- Interoperability, VO, Open Data
- Scalability – processing and analysis
- Big Data, Data mining
- Streaming and timing

KM3NeT

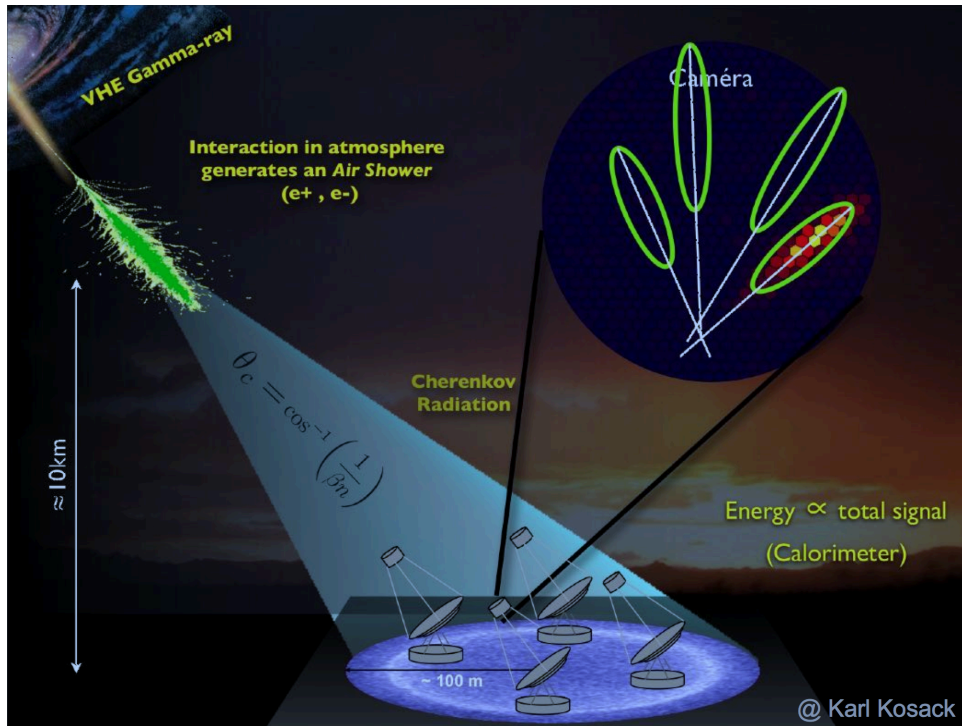


- ***A multi-km³ neutrino telescope***
- Exploring our galaxy for high energy neutrino sources
- KM3Net2 on timescale of 2020



KM3NeT

Opens a new window on our universe

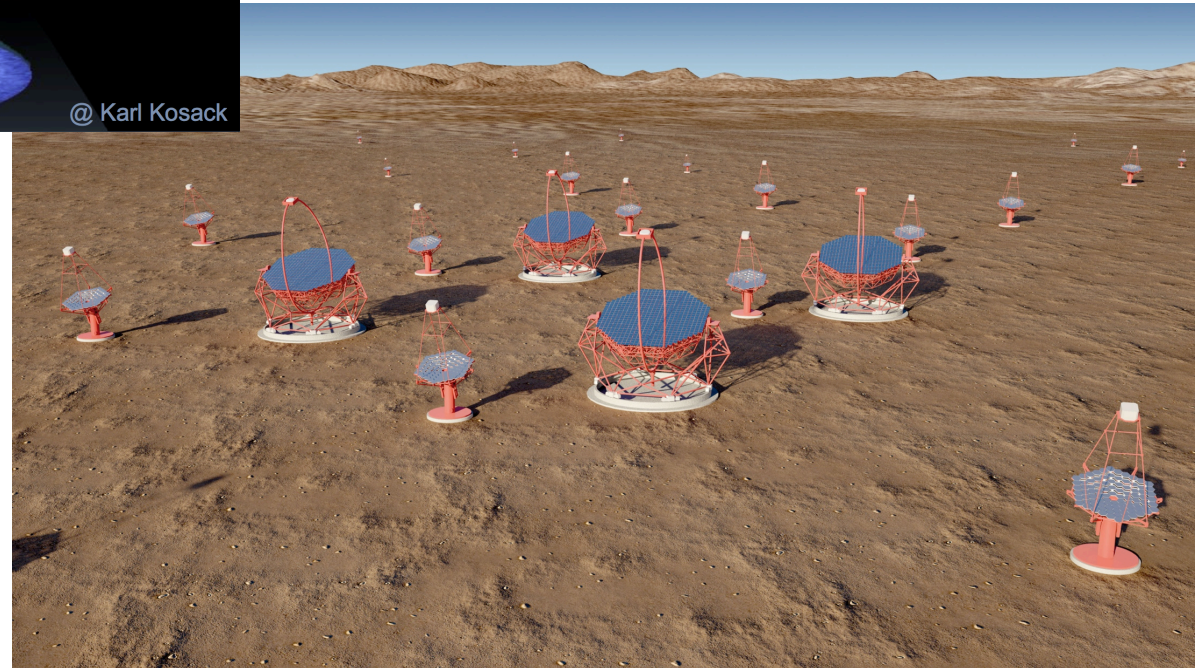


CTA

- Very high energy γ -ray observatory
- Event re-construction
- Streaming and processing challenges
- Precursors: MAGIC and HESS



Production phase 2018-2023





SKA-LOW, Australia

Phase 1: 130,000 dipoles over 80 km
Phase 2: 500,000 dipoles over 250 km

SKA-MID, South Africa

Phase 1: 200 dishes over 150 km
Phase 2: 2500 dishes over 3500 km

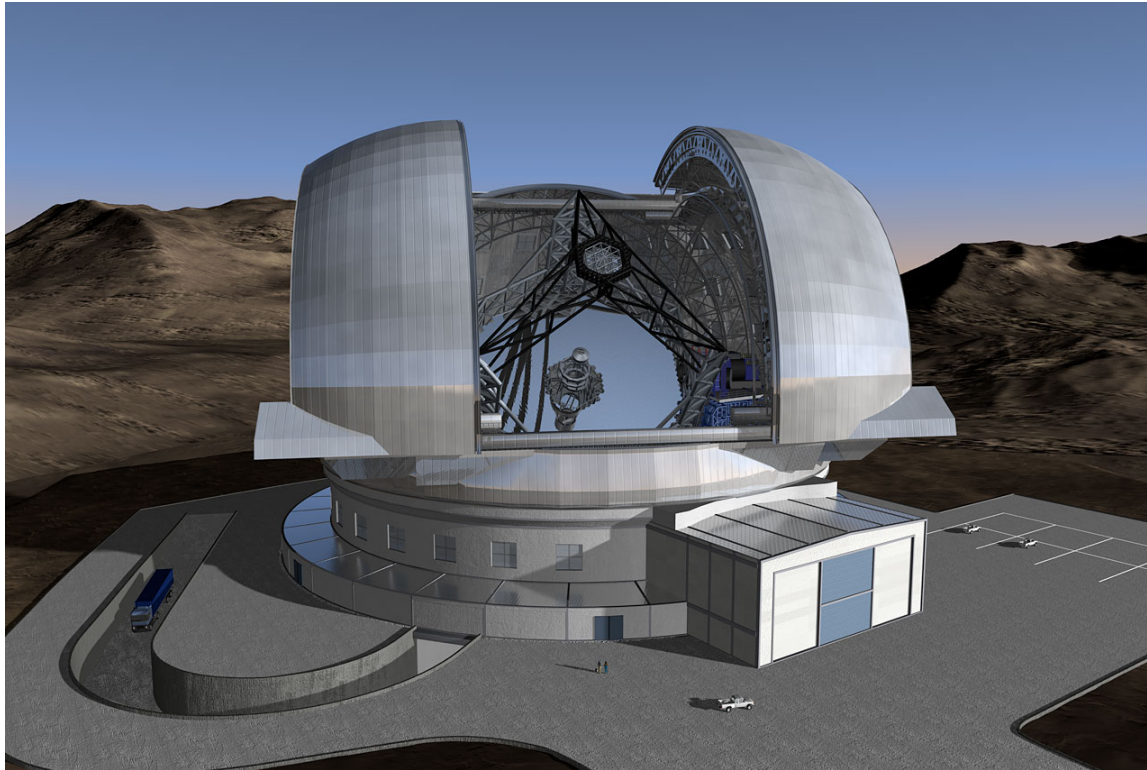
Phase 1 (2018-2023)

Phase 2 (2025-2033)

Challenges everything...



E-ELT



General purpose optical/infrared telescope

- Several scientific instruments (fast switching)

Science areas include:

- high redshift galaxies
- star formation
- exoplanets
- protoplanetary systems



39m European-Extremely Large Telescope
First Light targeted for late 2024

Includes other world class facilities and ESFRI pathfinders

- Connecting real facilities now as path to connected future facilities



CLEOPATRA: *Connecting Locations of
ESFRI Observatories and Partners in
Astronomy for Timing
and Real time Alerts)*



Management



DADI: *Data Access,
Discovery and
Interoperability*

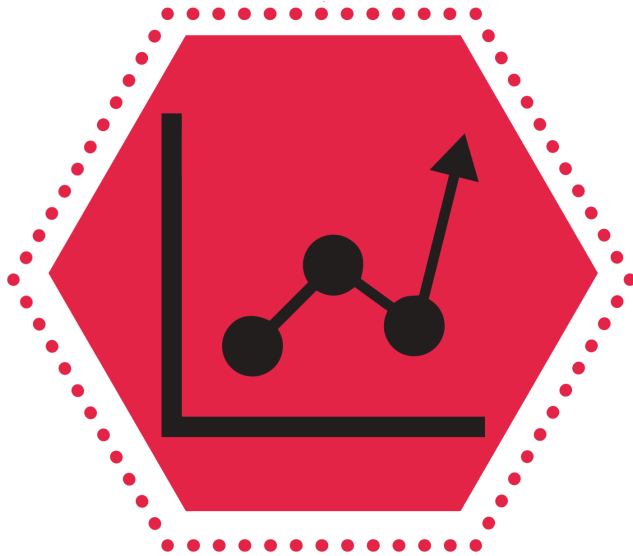


DECS: *Dissemination,
Engagement and
Citizen Science*



OBELICS: *OBservatory E-
environments LInked by
common ChallengeS*

OBservatory E-environments LInked by common Challenges (OBELICS)



FR:

LAPP (Work Package Lead, G. Lamanna)

IAP, APC, CPPM, CEA

***Interoperability and software re-use
for data generation, integration and
analysis***

- Open innovation environment

Developing common solutions for:

- Streaming data processing
- Extremely large databases
- Advanced analysis algorithms
- Software frameworks

Data Access, Discovery and Interoperability (DADI)



FR:

CDS (Work Package Lead, F. Genova)

Observatoire de Paris/LUTH (**CTA**)

APC (**EGO/VIRGO/ET**)

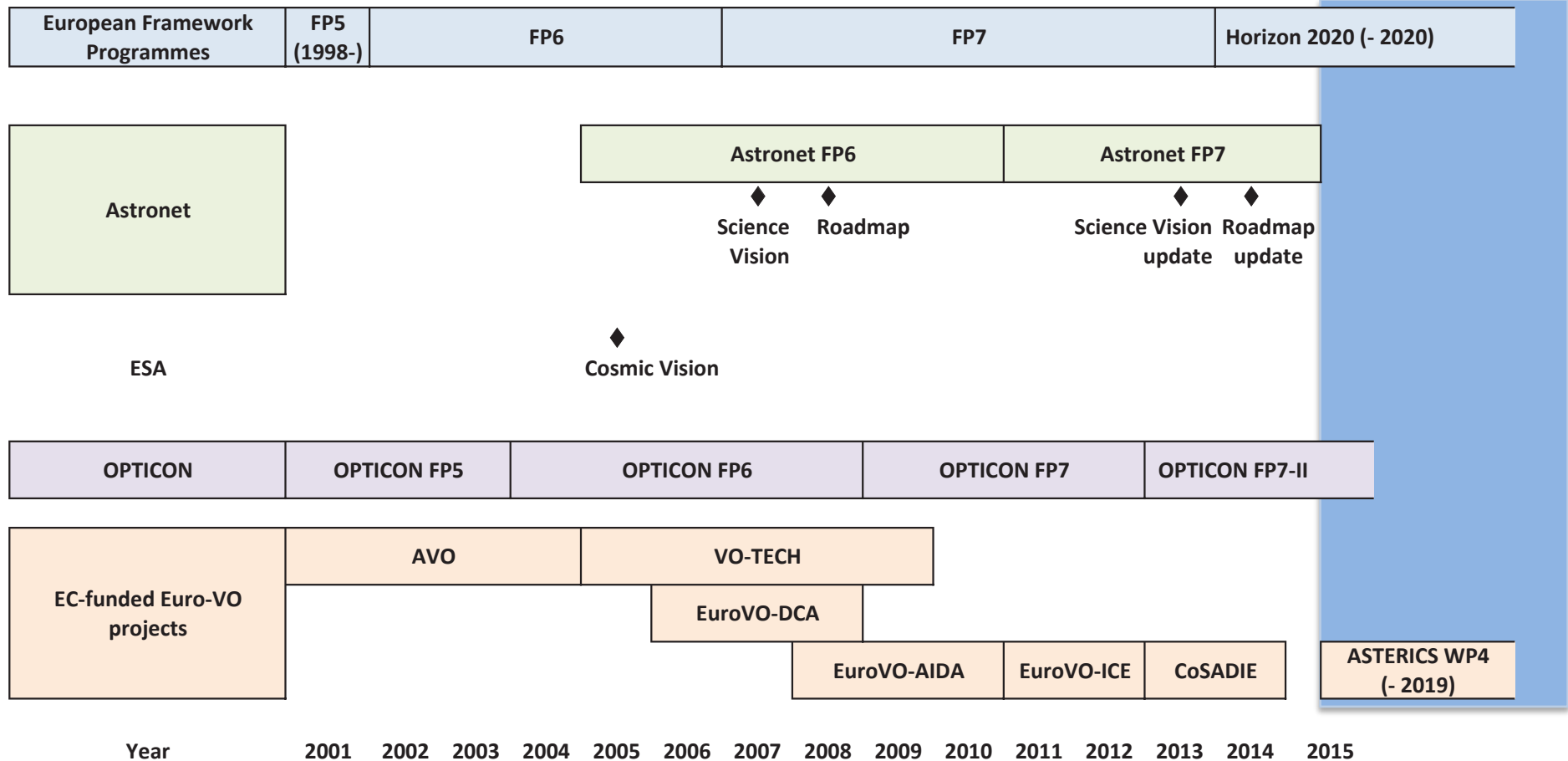
CPPM (**KM3Net**)

Make the ESFRI and pathfinder data available for discovery and use by the whole astronomy community

Interoperable in Virtual Observatory framework

- Train and support ESFRI in use and implementation of VO
- Train and support wider community in scientific use of VO
- Adapt VO framework for ESFRI needs

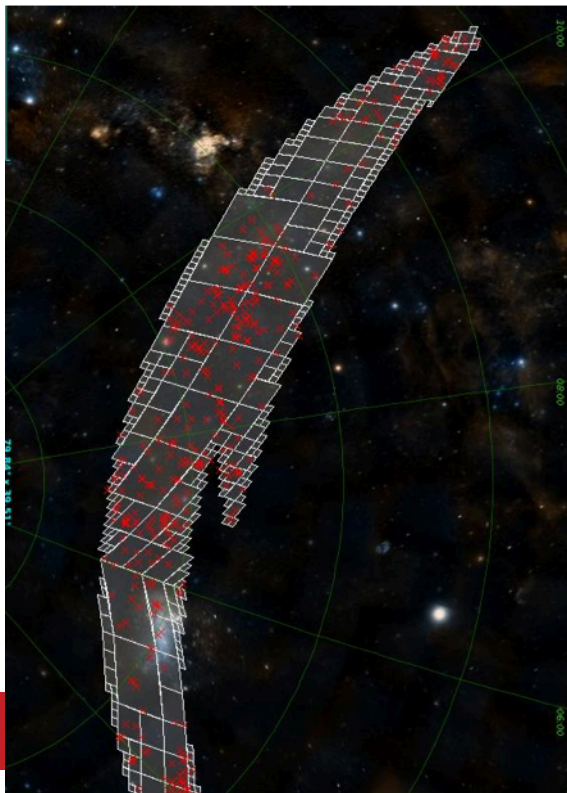
DADI: Building on Euro-VO, Astronet, +





ASTERICS DADI connections: *gravitational waves*

ASTERICS fostered
use of VO for grav
wave EM follow-up



Skymap Viewer

A sky atlas for understanding LIGO-Virgo skymaps. Help [here](#), or watch a [video about Skymap Viewer](#). Plenty simulated skymaps [here](#). If you do not see the big dark sky map, look below and widen your browser. Zoom with the + and - at the right of the sky.



LIGO-Virgo Skymaps

This is skymap
GW150914:LALI.
50% area = 149.0 sq deg
90% area = 616.4 sq deg



Show Weighted Galaxies (or [table](#)).

Time and Place

Universal time
2015-09-14T09:50:45
E Longitude Latitude

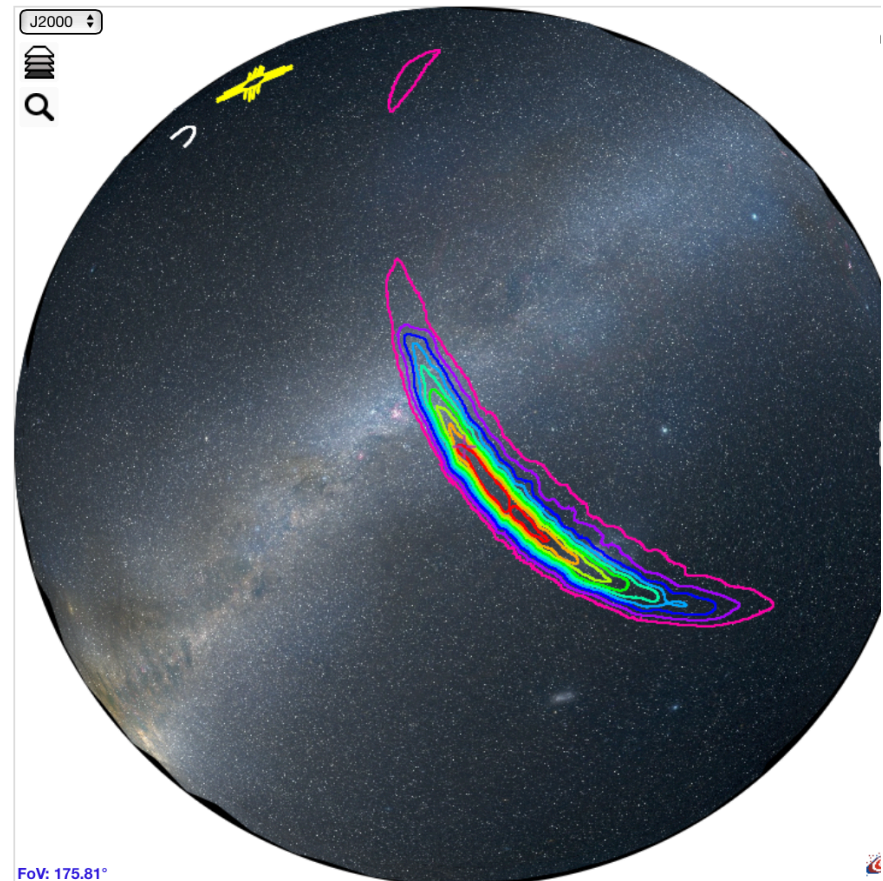
Sun = and = Moon

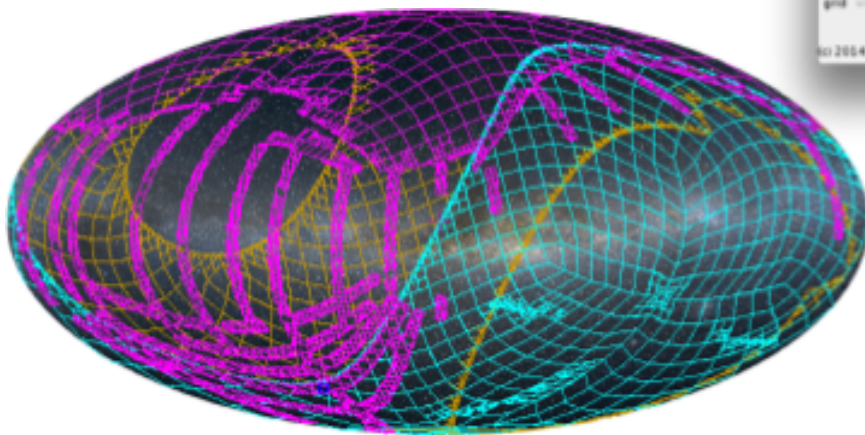
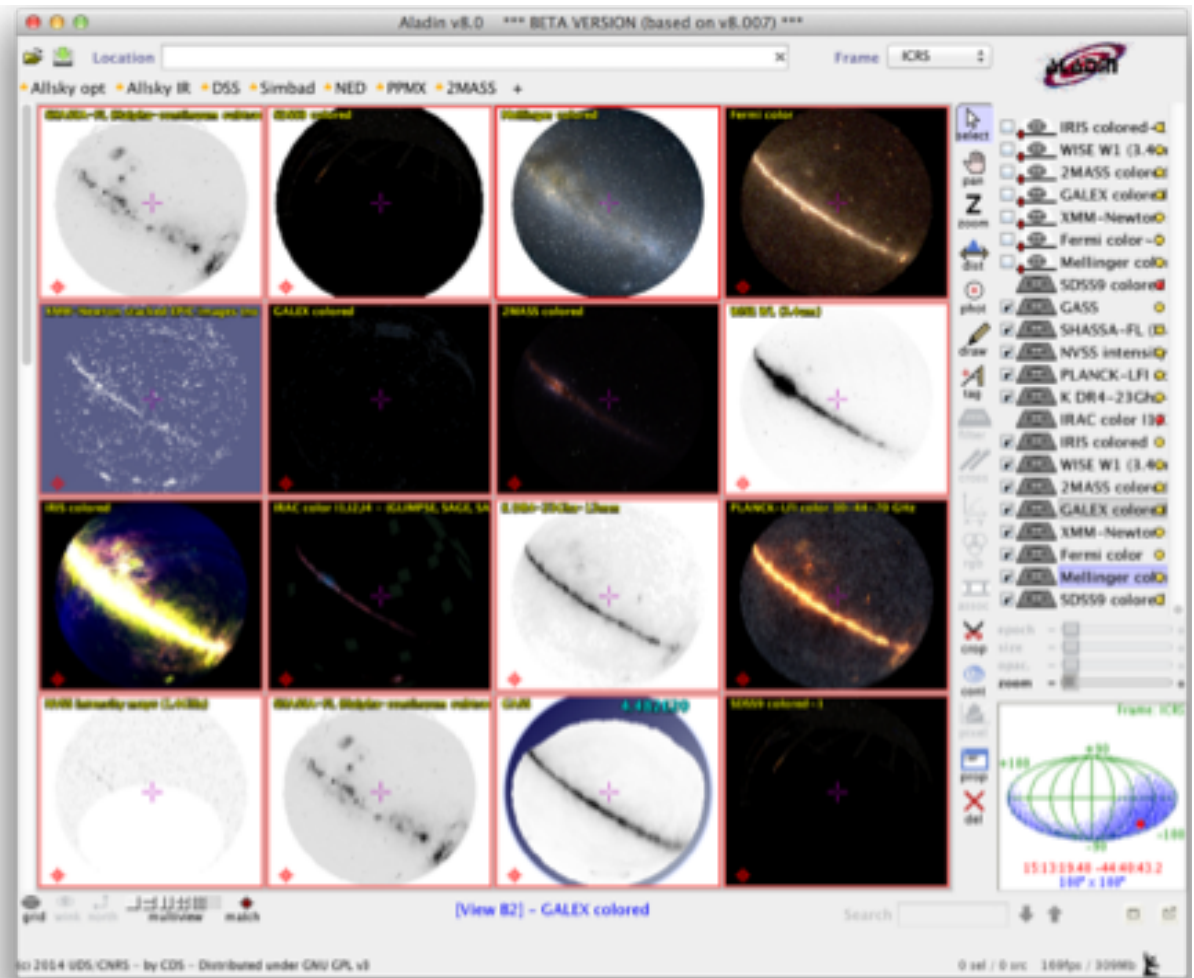
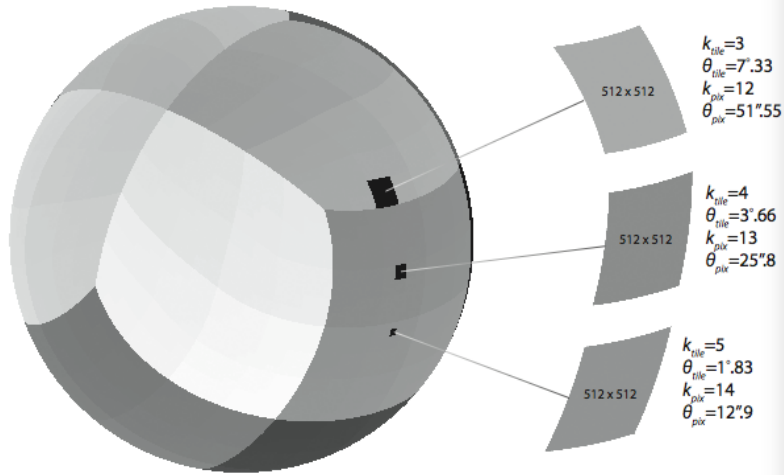
Catalog Sources

Click the Layers icon to switch on catalogs.
If you click on the sources on the sky, information
will appear here with links to Simbad and NED.

Zoomable Multiwavelength Sky

Zoom in on the sky with the mouse or the +/-
icons on the right of the sky. To change the image





- *IVOA standardisation*
- *VO infrastructure and Science tools*

Hands-on Training

- Training and support
 - Science and Infrastructure
 - VO School Madrid, Dec 2015
 - VO School Strasbourg, Nov 2016
 - **VO School Madrid, Nov 2017**



Outcomes in
Europe and beyond

Summary

- ASTERICS project going at full speed
- Part of global VO engagement with big astronomy projects
- Open DADI events, e.g. Schools, Training, Forums
- <https://www.asterics2020.eu>
- <http://www.euro-vo.org>