

ET in Italia: scienza e tecnologia per la candidatura

18 - 19 marzo 2025 - Cagliari

# IL CONTRIBUTO DI INAF ALLE ATTIVITÀ DI ET

FEDERICA GOVONI

INAF - Istituto Nazionale di Astrofisica

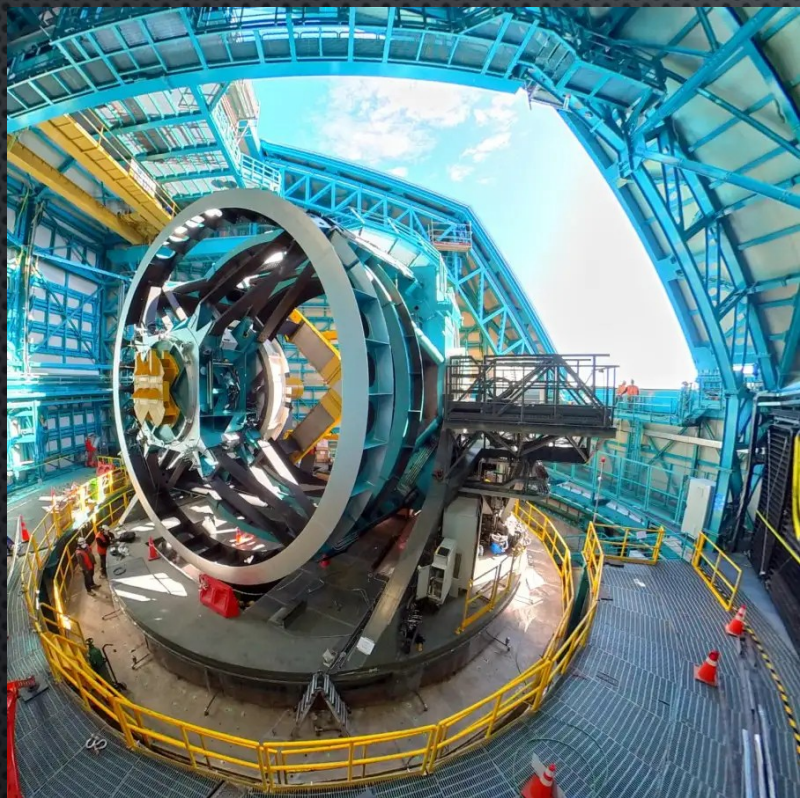
---

# INAF MULTILINE PLAN TO SUPPORT ET

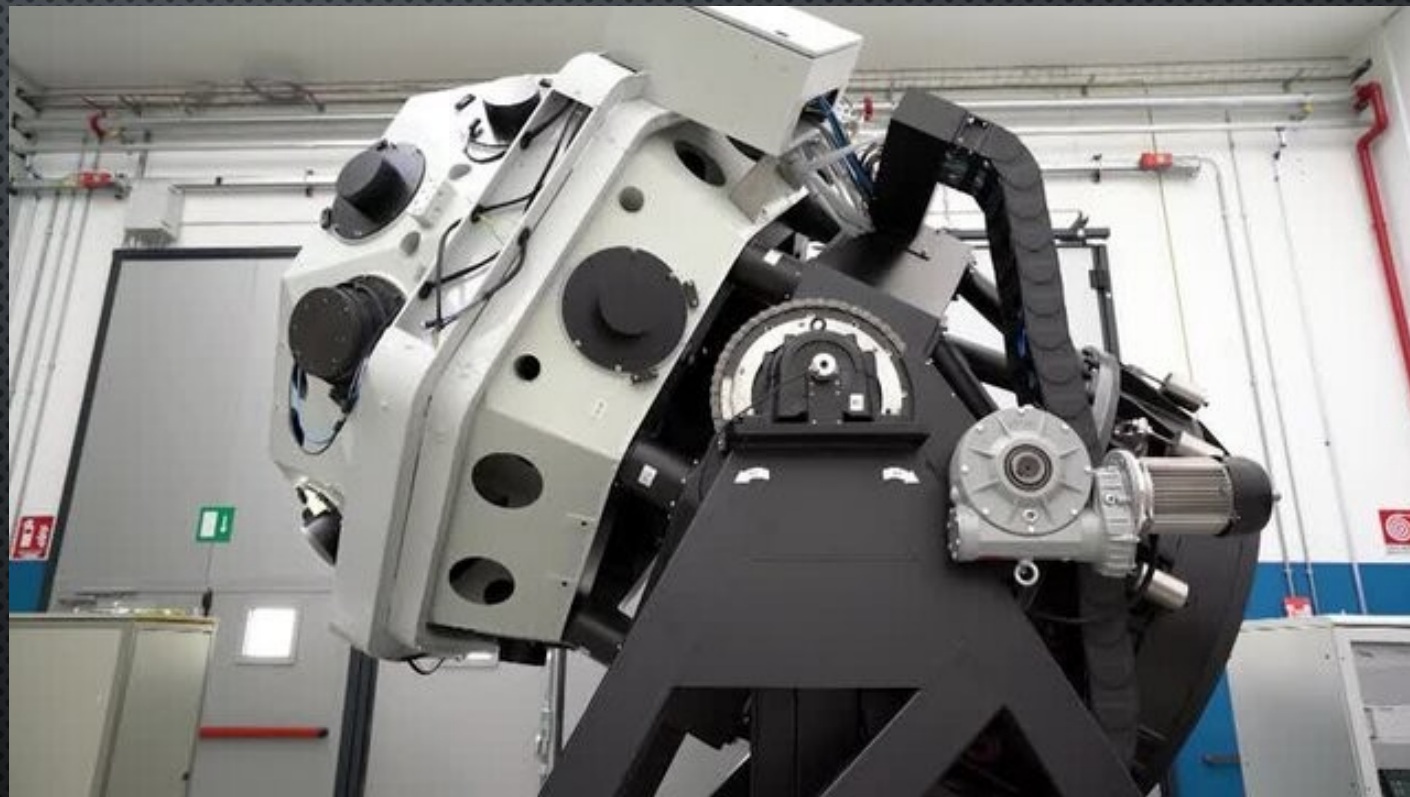
- MULTIMESSENGER: IDENTIFICATION OF GW SOURCES AND STUDY OF THEIR ELECTROMAGNETIC MULTIWAVELENGTH COUNTERPARTS.
- ASTROPHYSICS FOR GW
- ASTROPHYSICS TECHNOLOGIES FOR ET
- OUTREACH AND DISSEMINATION

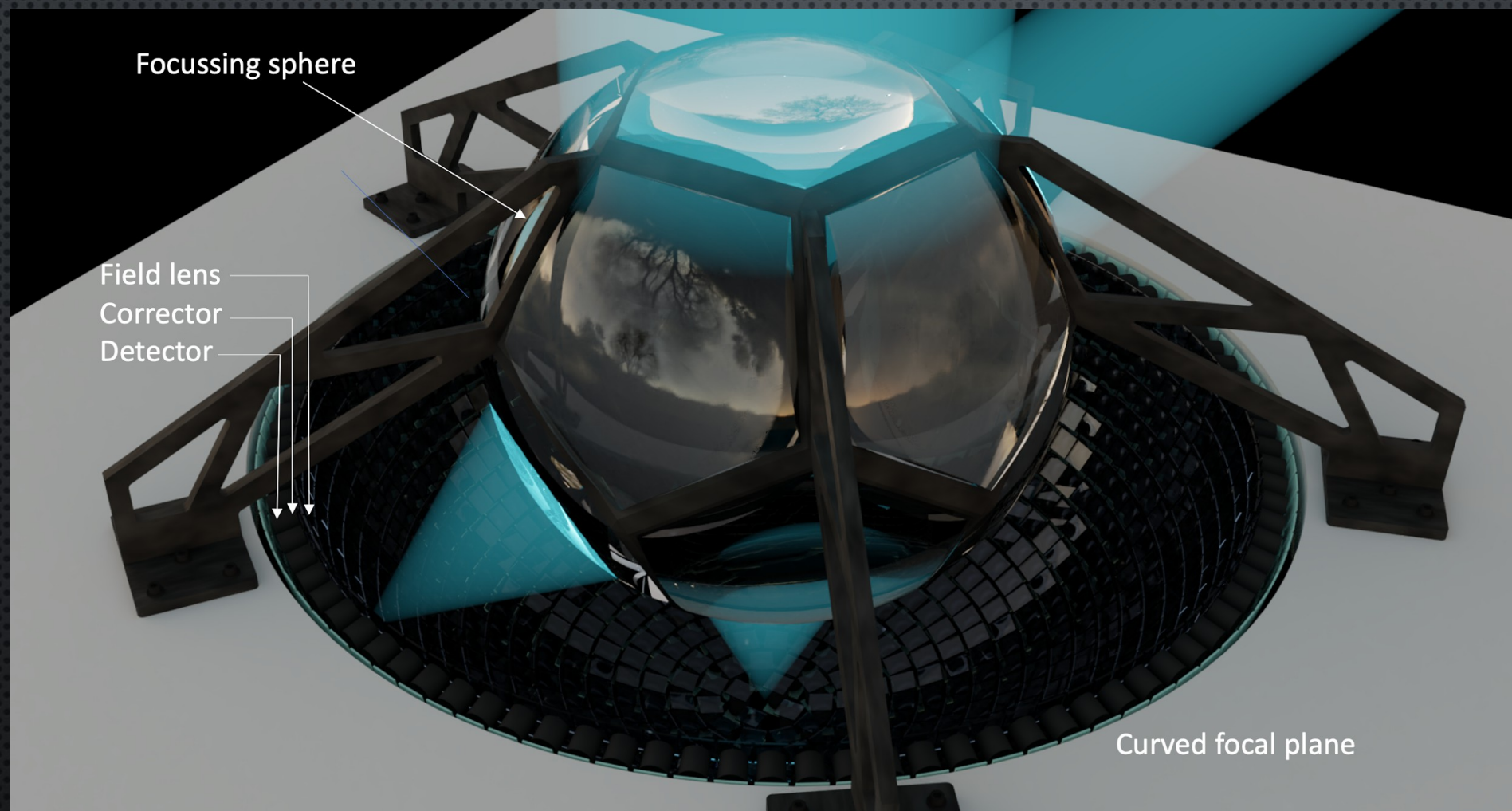
# WIDE FIELD TELESCOPES

3.5 sqdeg



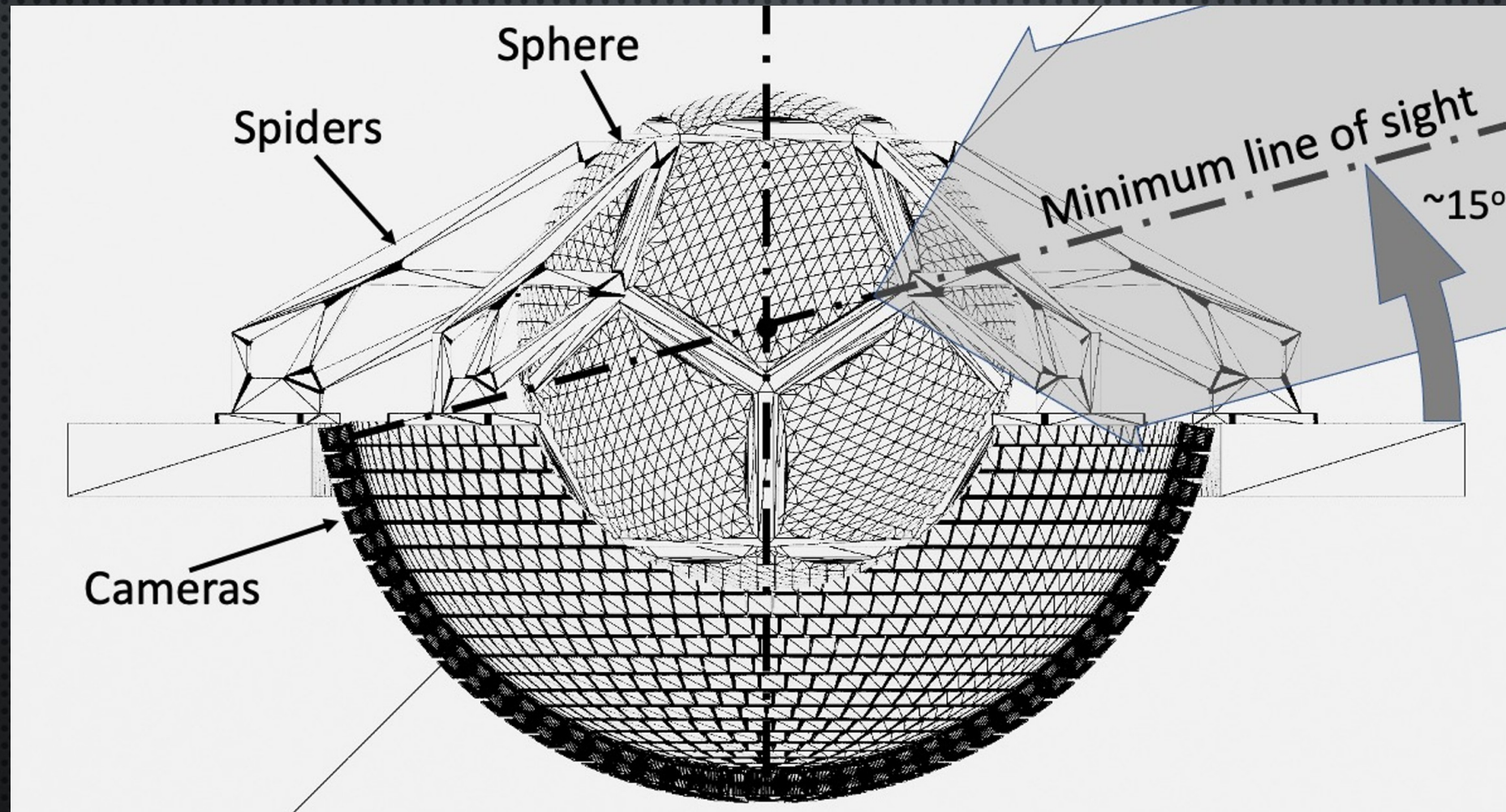
40 sqdeg





Goal

10.000 sqdeg



Goal

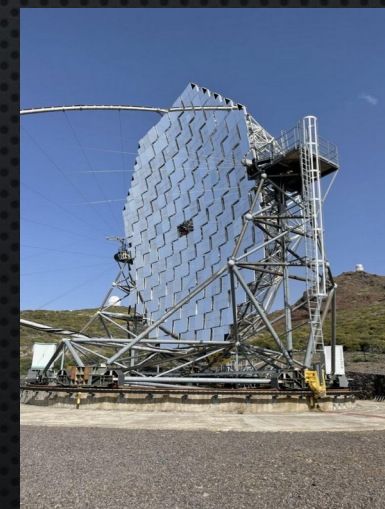
10.000 sqdeg



Sos Enattos, 5 Feb. 2025

# FROM GAMMA-RAYS TO RADIO FROM GROUND AND FROM SPACE

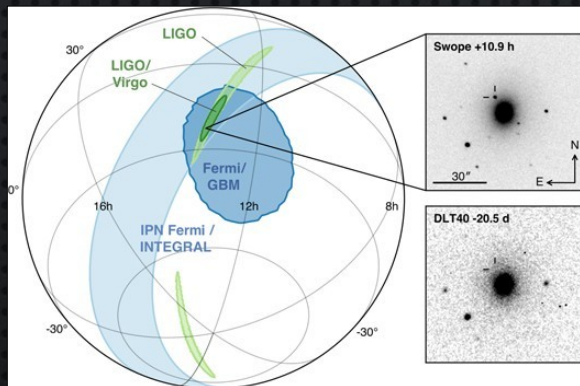
SRT



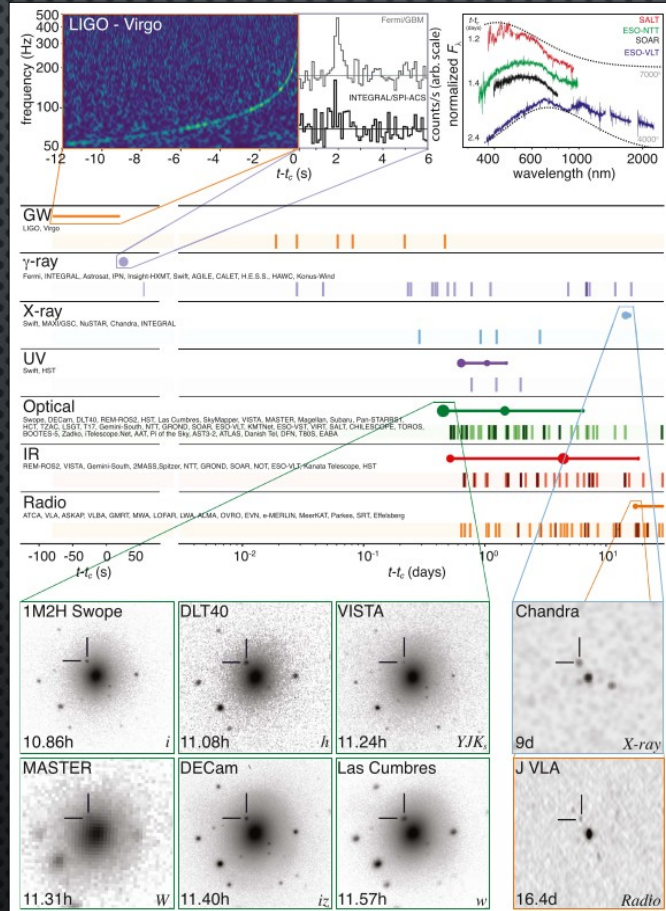
# FROM GAMMA-RAYS TO RADIO FROM GROUND AND FROM SPACE



**GW170817**

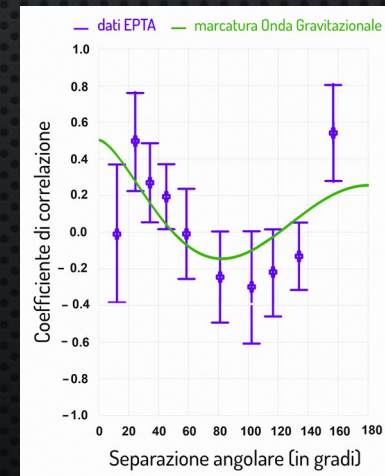


Abbott et al. (2017, ApJL)



SRT Follow-up observations  
(7-19 Sept. 2017)  
Frequency 7.2 GHz  
Flux < 1.2 - 1.8 mJy

## The European Pulsar Timing Array (EPTA)




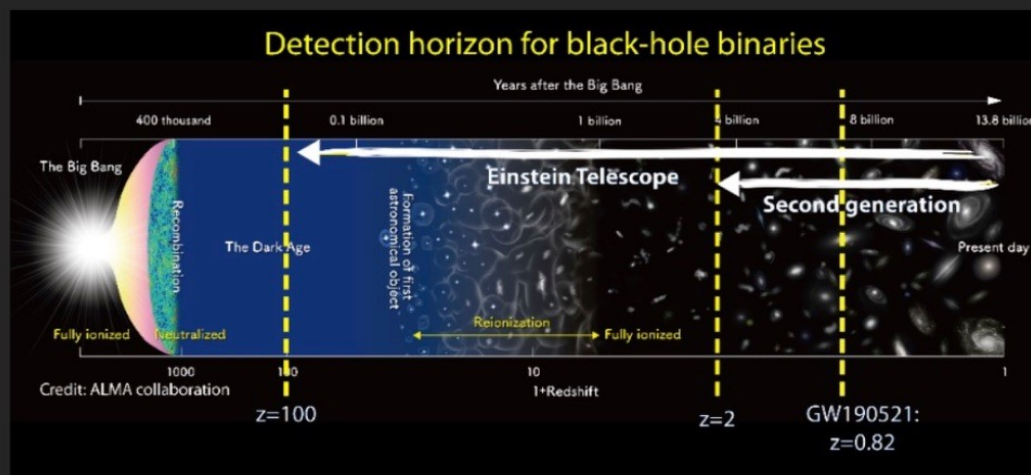
EPTA coll.; (2023, A&A)

# ASTROPHYSICS FOR GW: INAF inside the ET collaboration

## Distant Universe


### ET

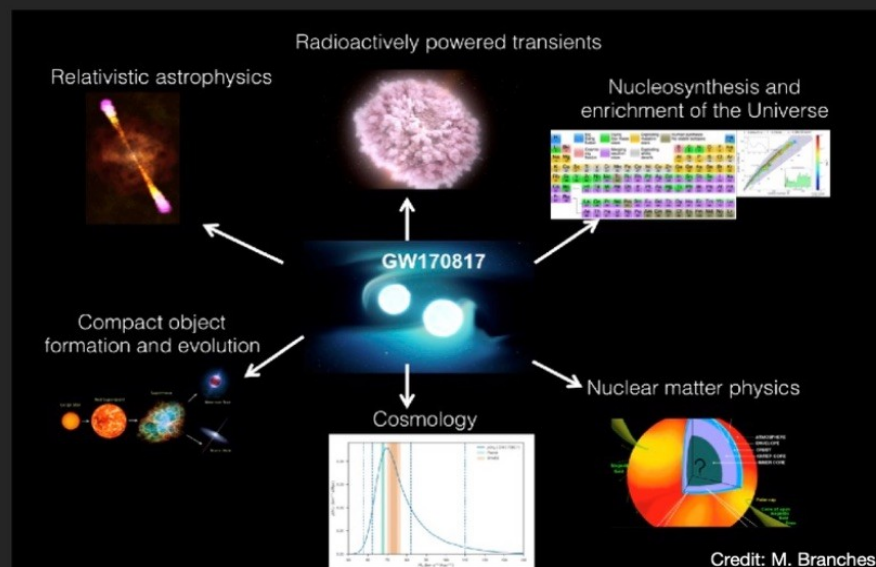
will explore the **Black Hole** properties at large distances back to the early Universe. We will investigate their origin (stellar vs primordial) and evolution ....  
( *sensitivity & statistics*)



## Nearby Universe

### ET

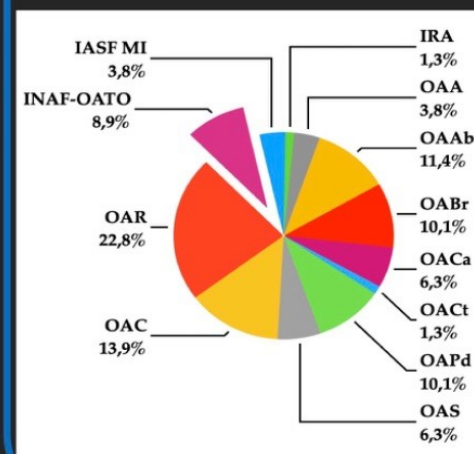
will explore the **Neutron Stars** properties, their formation and evolution, nucleosynthesis of heavy elements, nuclear matter physics in compact object, relativistic astrophysics, kilonove ....  
( *sensitivity & statistics*)



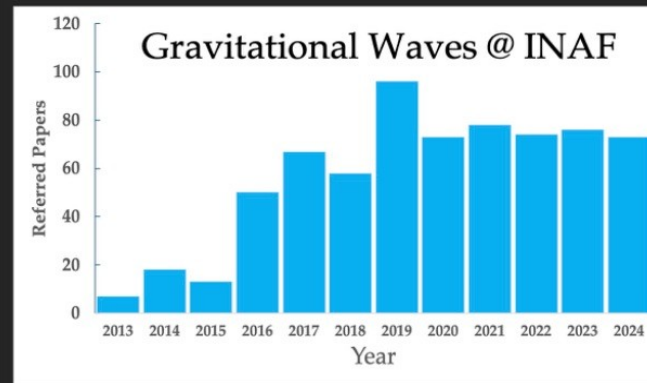
## ET COLLABORATION

**INAF: 96 members**

INAF is the second largest RU in the ET collaboration (5.5% of total)



## Gravitational Waves @ INAF





Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



INAF  
ISTITUTO NAZIONALE  
DI ASTROFISICA

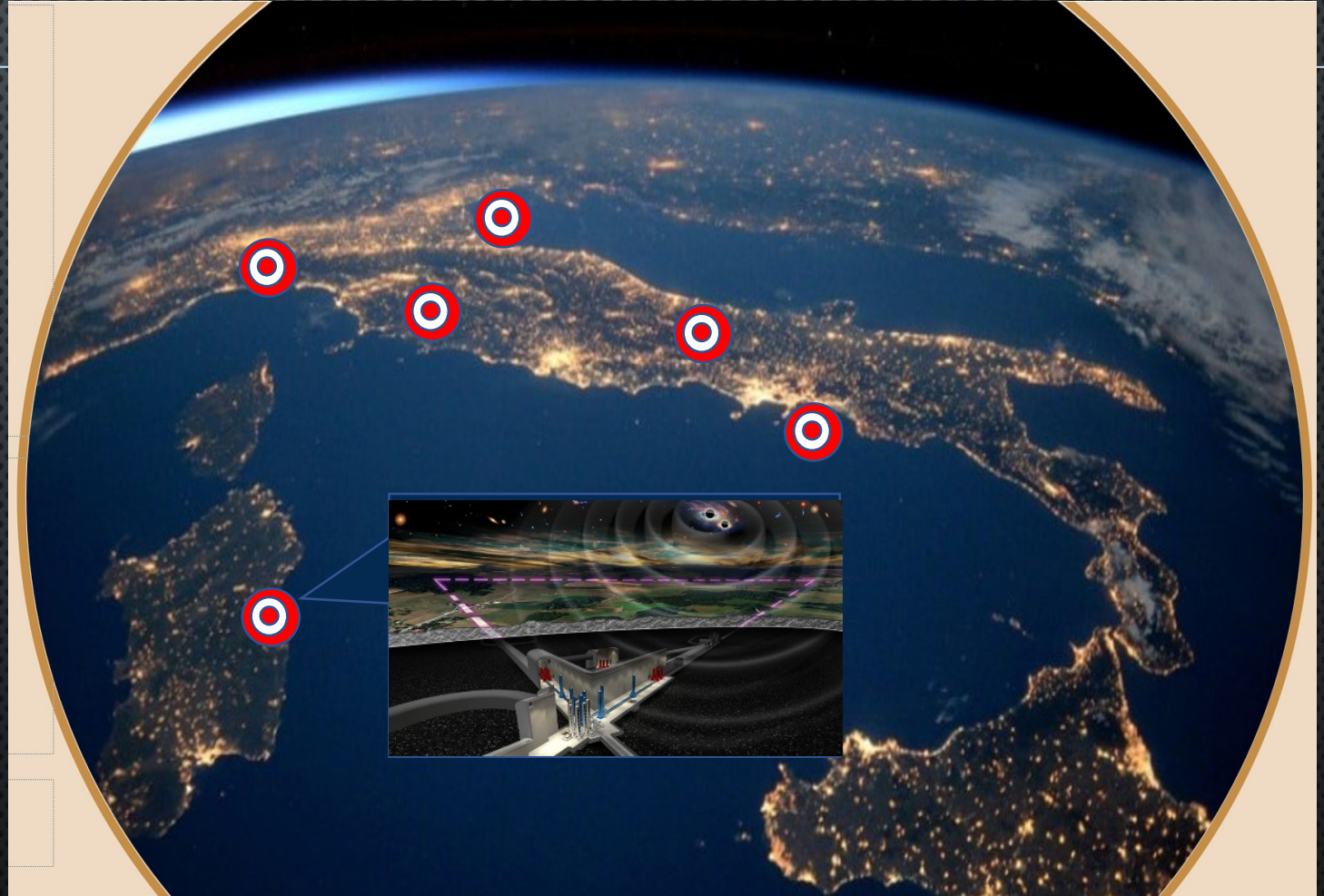
Einstein Telescope Infrastructure  
Consortium  
(ETIC - IR00000004)  
PNRR MISSIONE 4, COMPONENTE 2,  
INVESTIMENTO 3.1

ETIC  
INAF-ADONI



Presented by  
Armando Riccardi

# Astrophysics technologies for ET



INAF: OA Arcetri, OA Brera/Merate, OA Padova,  
OA d'Abruzzo, OA Capodimonte

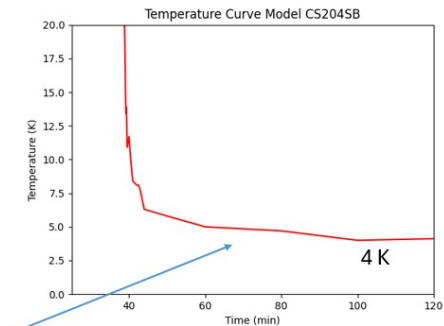
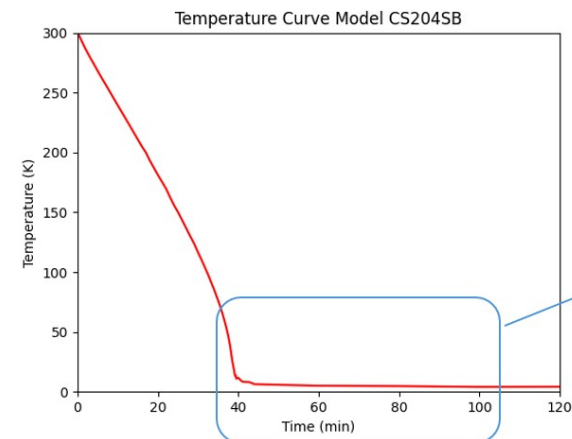
# Astrophysics technologies for ET

## WP3 – T018 Study of Hydrocarbon Condensation Processes in Ultra-High Vacuum (UHV) of interest for the Optics of ET Low Frequency

Closed-Cycle  
Cryostat

Delivered Mar 2024  
(Task deliverable: CLOSED)

Cryostat Integrated and Tested  
in the Pre-Existing UHV System



Presented by  
Armando Riccardi



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



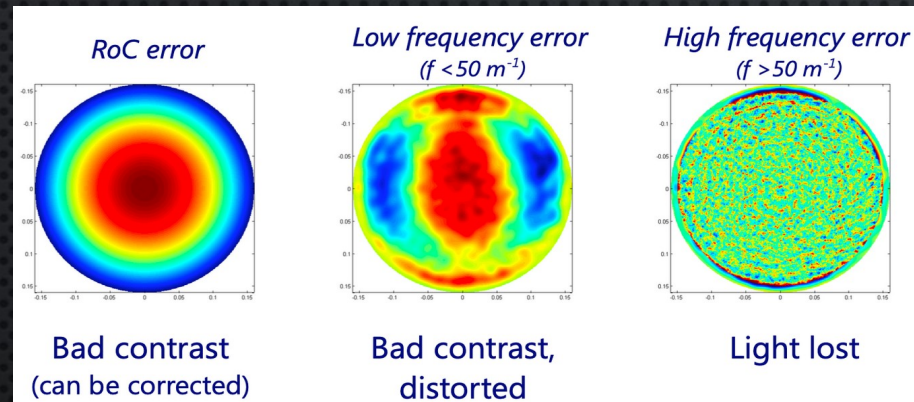
INAF  
ISTITUTO NAZIONALE  
DI ASTROFISICA

Einstein Telescope Infrastructure  
Consortium  
(ETIC - IR00000004)  
PNRR MISSIONE 4, COMPONENTE 2,  
INVESTIMENTO 3.1

# Astrophysics technologies for ET

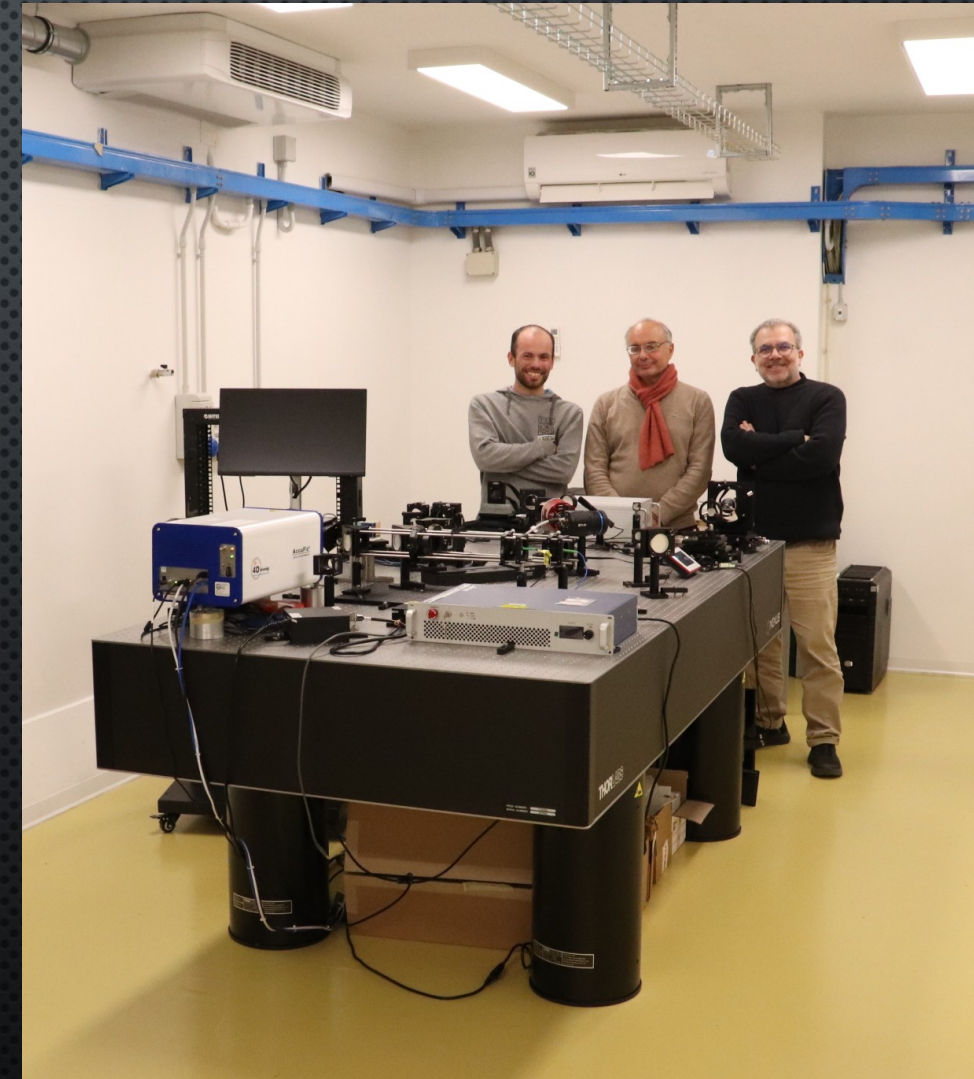
## WP2 – T043/T044/T045 Lab for the Test of Adaptive Optics techniques for the WF control of the ET

Aberrations in the interferometer optics  
reduces the detection SNR of GWs



G. Degallaix, 2013

Test-bench using a  
deformed mirror to  
spatially modulate  
a power laser on a  
correction plate and  
verify the induced  
OPD variation



Presented by  
Armando Riccardi

# OUTREACH AND DISSEMINATION

First meeting on Italian participation in ET: successfully organized by the INAF-ET working group.

Coordination of institutional communication: creation of a team to align communication activities with INFN, led by Marco Galliani, with the collaboration of Paolo Soletta and Chiara Badia.

Local outreach activities: conducted outreach initiatives in Cagliari, particularly with schools, and in Lula, in collaboration with Matteo Serra.

Contribution to the G7 meeting: participation in the exhibition at the Rimisa hangar in Sos Enattos, showcasing multi-messenger astronomy and the role of SRT.

Collaboration with INFN in a documentary: places and people of ET.

Participation in the Festival della Scienza of Rome.