



# INSTITUTO DE ASTROFÍSICA DE CANARIAS

## Introduction to IAC's Science and Infrastructures

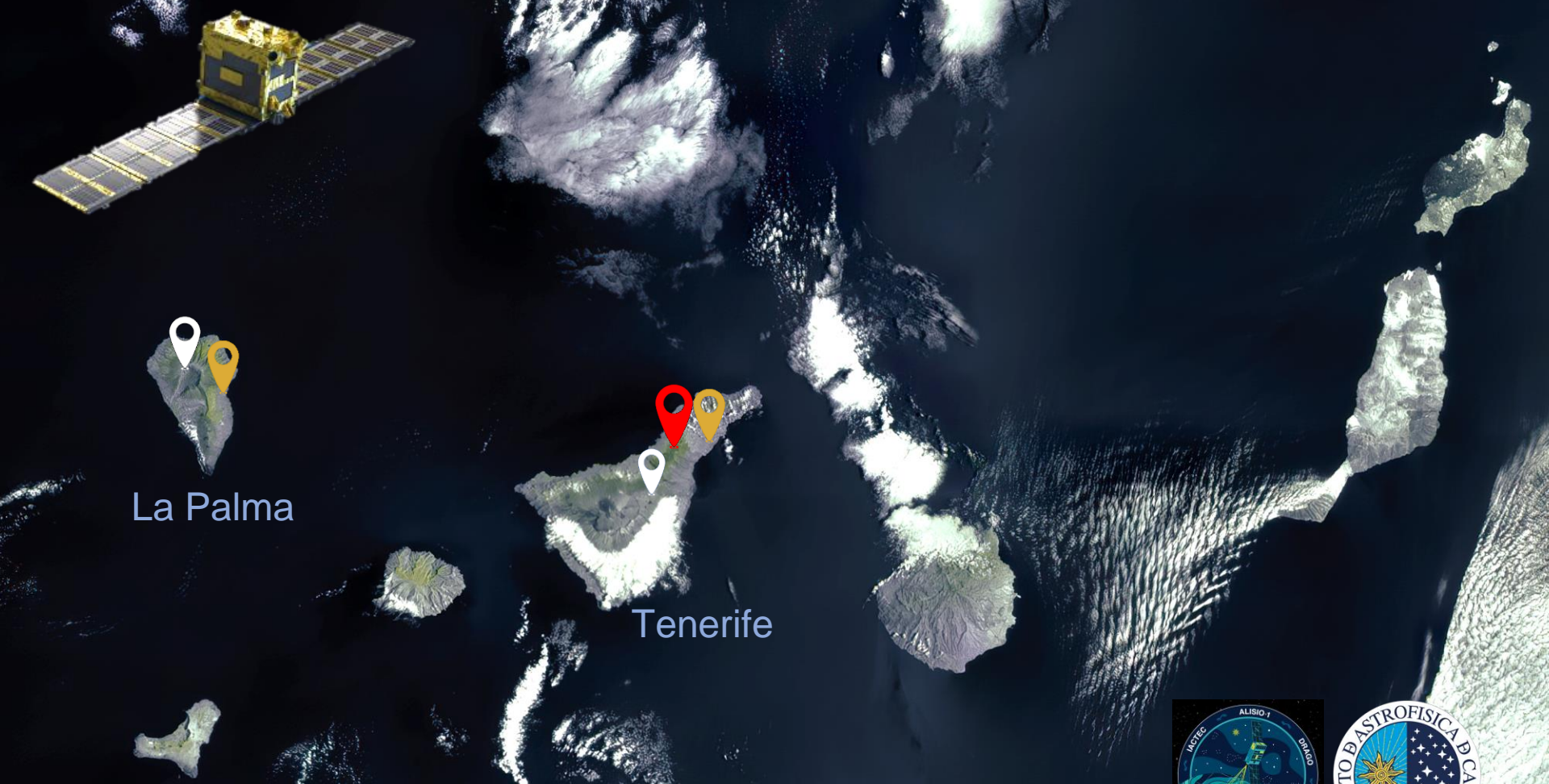


UNDARK Kick-off meeting  
Oct 8th. 2024. IAC. La Laguna

Anselmo Sosa. OTAI/IAC



Funded by  
the European Union



La Palma

Tenerife

**Science from an Outermost Region of EU**

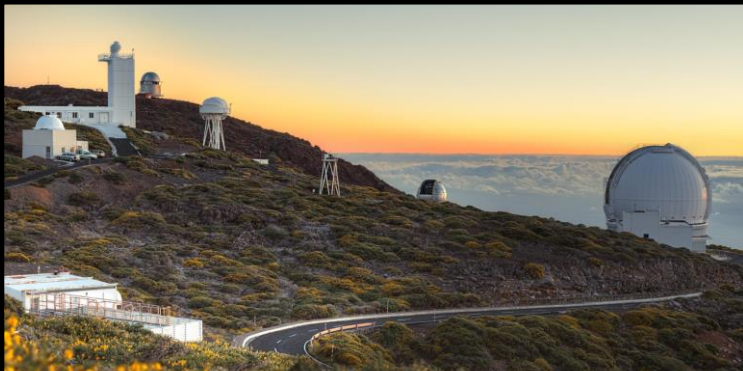




Public Research Organisation



Headquarters. La Laguna. Tenerife



OT



CALP. Breña Baja. La Palma



ORM



IACTEC. La Laguna. Tenerife



# IAC' structure and governance



GOVERNING COUNCIL

DIRECTORATE



*Prof. Valentín  
Martínez Pillet*

SUBDIRECTORATE

*Prof. Eva  
Villaver*



Secretary

OCAN OBSERVATORIES

INSTITUTIONAL ACTION  
AND TRANSFER OFFICE

Science Communication  
and Outreach Unit

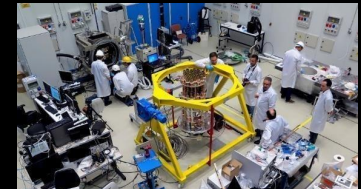
IACTEC

GENERAL SERVICES  
ADMINISTRATION UNIT

RESEARCH DIVISION

POSTGRADUATE TRAINING DIVISION

INSTRUMENTATION DIVISION



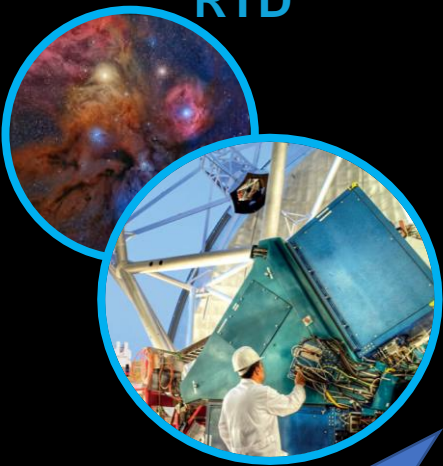
# INSTITUTO DE ASTROFÍSICA DE CANARIAS

# Mission



EXCELENCIA  
SEVERO  
OCHOA

Excellent  
RTD



Advanced  
Training



Public  
Outreach



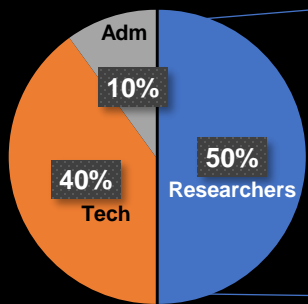
Observatories



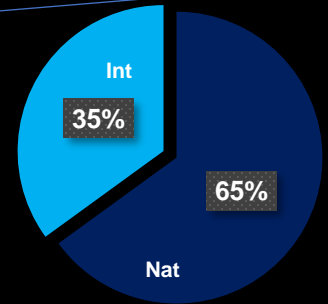
Scientific & Tech leadership // Co-creation of socio economic value. // Astronomical reserve

# Human capital ( 475 persons)

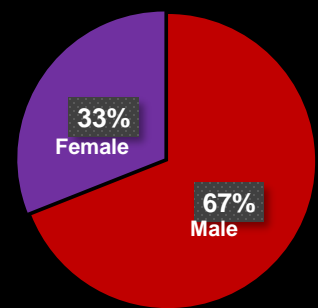
## Profiles



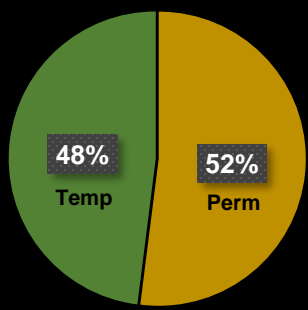
## International Researchers



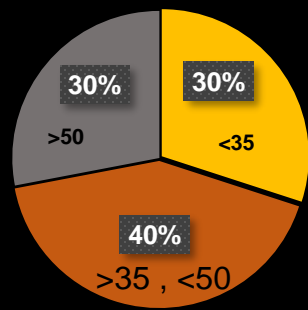
## Gender



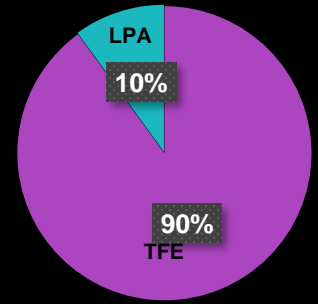
## Positions



## Age



## Location



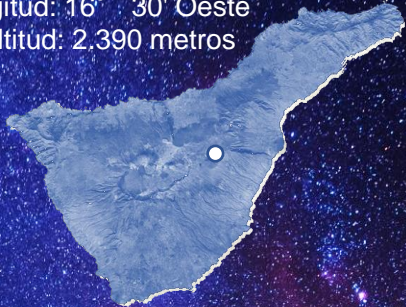
# Direct Access to the best astronomical observatory in the EU

- 45 RIs (25 countries). [ *International Treaty* ]
- Solar and night time observations.
- Considered ICTS at national level.
- Protected by Law since 1988
- More than 600 scientific publications /year.
- Host site for next generation of major RIs



# Teide Observatory

Latitud: 28° 18' Norte  
Longitud: 16° 30' Oeste  
Altitud: 2.390 metros







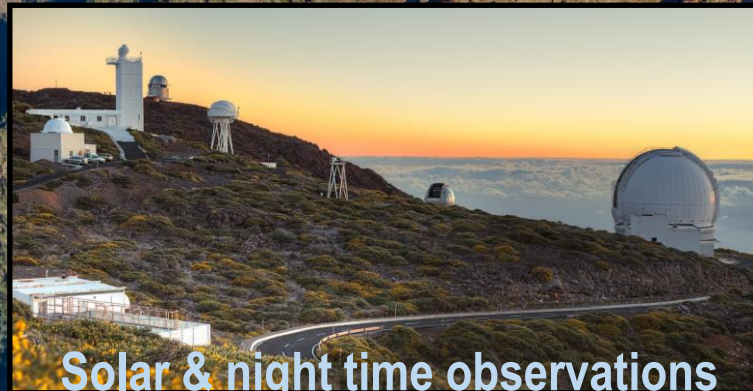
# Teide Observatory



# Roque de los Muchachos Observatory



Latitud: 28° 45' Norte  
Longitud: 17° 53' Oeste  
Altitud: 2.396 metros



Solar & night time observations



Major international collaborations



# Roque de los Muchachos Observatory



# Telescopes installed in the Canary Islands Observatories (OCAN)

DIAMETER	TELESCOPE	INSTITUTION
	CILBO	ESA
	AMOS-CI	Univ. Bratislava
	ASTMon	IAC
11	TIZON	IAC
20	Automatic Seeing Monitor (DIMMA)	IAC
40	GroundBIRD	GroundBIRD collaboration
43	COAST	Open University
50	MONS	IAC
61	PIRATE	Open University
70	Vacuum Tower Telescope	Inst. Kiepenheuer
50, 43, 8	Optical Telescope Array	Telescope Society
80	IZN-1	ESA
80x2	TTT	Light Bridges
82	IAC-80	IAC
90	THEMIS	CNRS
100	SONG	Univ. Aarhus, IAC
100	OGS	ESA
100	Artemis	Univ. Liega, MIT, IAC
100x2, 40x2	LCOGT	LCOGT Network
120x2	STELLA	Inst. Postdam
150	GREGOR	Inst. Kiepenheuer, MPS, Inst. Postdam
152	Telescopio Carlos Sánchez	IAC
225x2	QUIJOTE I – II	IAC, Univ. Cambridge, Univ. Manchester, IFCA, Univ. Cantabria
400	ASTRI	Inst. N. de Astrofísica
	Laboratorio Solar: Mark-I, GONG	IAC, Univ. Birmingham, NSO

DIAMETER	TELESCOPE	INSTITUTION
	CILBO	ESA
	AMOS-CI	Univ. Bratislava
12x4	SuperWASP	Univ. Warwick
20	Automatic Seeing Monitor (DIMMA)	IAC, Univ. Niza
30	Automatic Seeing Monitor (DIMMA)	STFC, ING
36x16	CLASP	Univ. Warwick
40x16	GOTO	Univ. Warwick
97	Swedish Solar Tower	Univ. Estocolmo
100	Jacobus Kapteyn Telescope	IAC, SARA
100	Super-WASP Alsubai Follow-up Telescope	Univ. Warwick
120	Mercator Telescope	Inst. Sterrenkund, Univ. Leuven
200	Liverpool Telescope	Univ. John Moores Liverpool
250	Isaac Newton Telescope	IAC, ING
256	Nordic Optical Telescope	NOTSA
300	First G-APD Cherenkov Telescope	FACT Collaboration
350	Telescopio Nazionale Galileo	INAF
420	William Herschel Telescope	IAC, ING
1040	Gran Telescopio Canarias	GRANTECAN, Univ. Florida, INAQUE-UNAM
1700x2	MAGIC I y II	MAGIC Collaboration
2300	LST-1	LST Collaboration



# Capabilites of some Telescopes installed at the OCAN

	Optical			Near IR			Med IR		Special							
	Img	MRS	HRS	Img	MRS	HRS	Img	MRS	AO	Opt WFI	IR WFI	WF Spec	Polar Img	Polar Spec	Fast Phot	Coro
GTC	X	X	X	X	X	X	X	X	X				X	X	X	X
WHT				X	X		X	X					X			
TNG	X	X	X	X	X	X									X	
NOT	X	X	X	X	X								X	X		
INT	X	X								X						
LT	X	X											X			
Mercator	X	X	X													
TCS	X															X
Stella	X		X							X						
SONG			X													X
OGS	X															
JKT	X															
LCOGT										X						
IAC80	X															

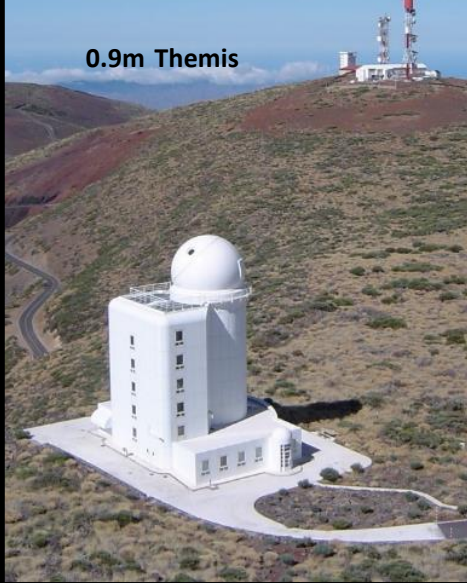
Img: image, MRS: med-res. spec., HRS: high-res. spec., AO: adapt. Opt., WFI: wide field image, Polar: polar., Phot: photom., Coro: coronagraphy





SDO/A4 171 2020-01-15 00:12:10 UT

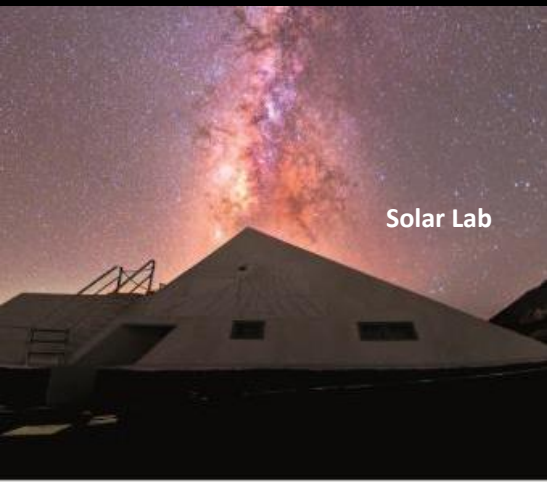
0.9m Themis



# Solar Telescopes



1.5m Gregor



Solar Lab

0.7m VTT





# Night-Time Telescopes

4.2m WHT

3.6m TNG



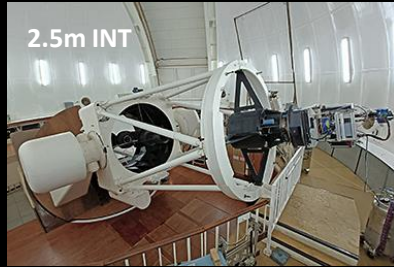
1m SONG



2.56m NOT



2.5m INT



1.56m TCS



1.2m Mercator

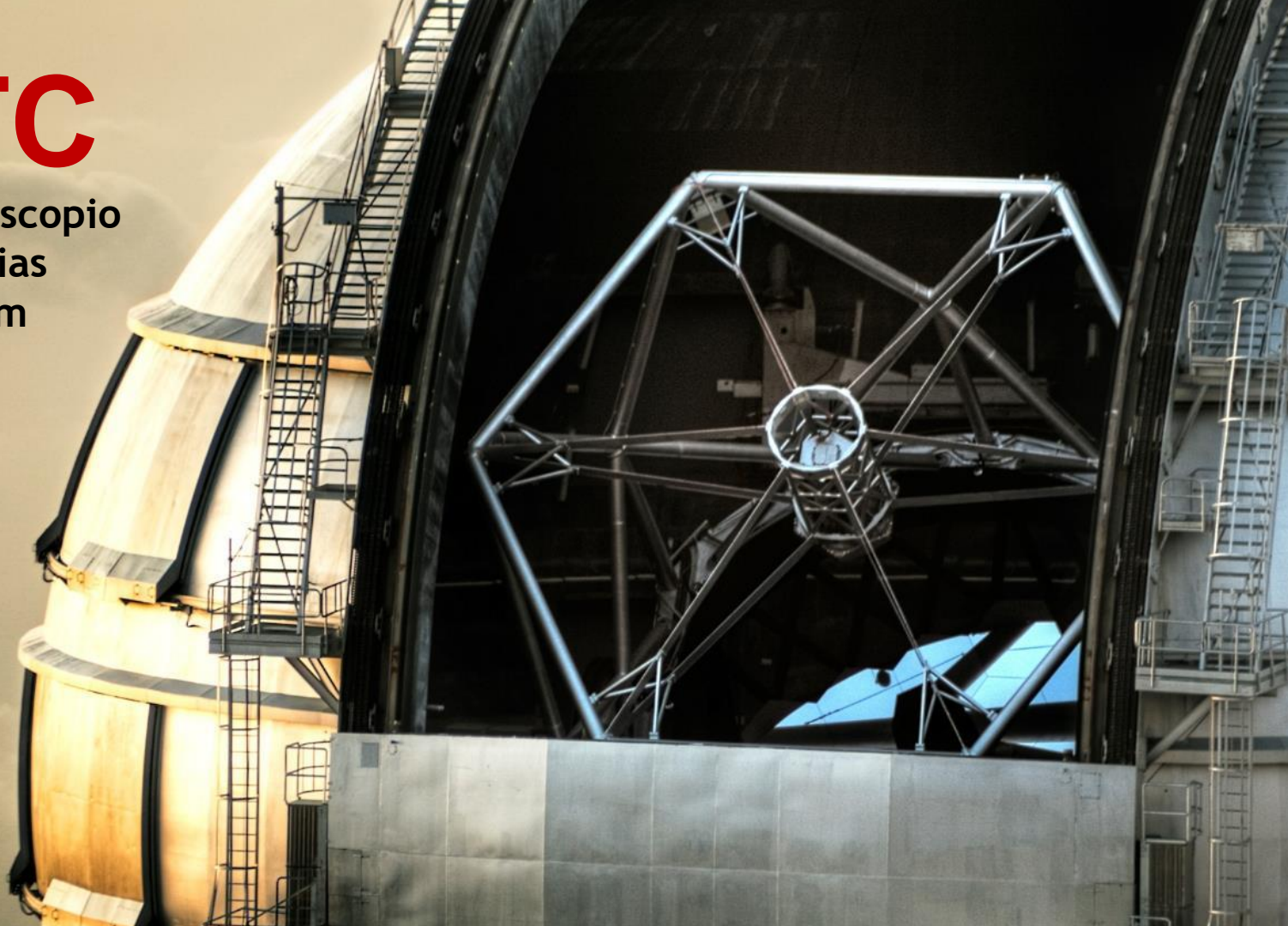


0.82m IAC80



# GTC

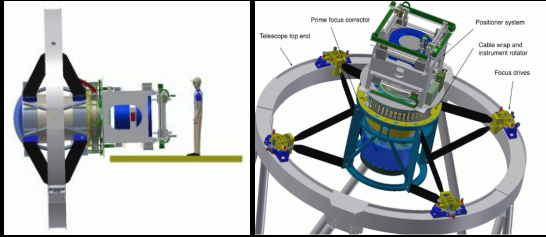
Gran Telescopio  
Canarias  
10.4m



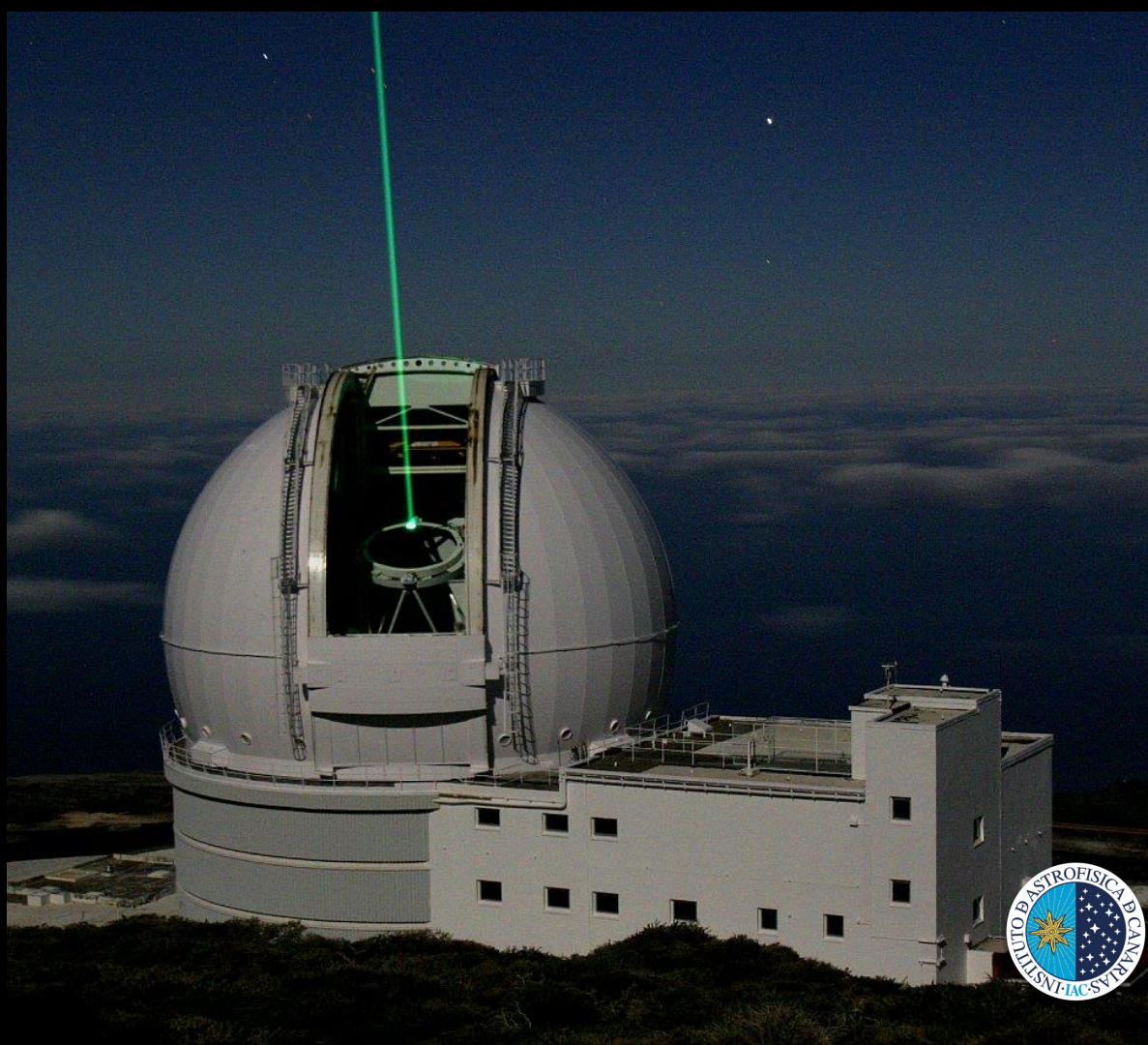




# Observatorios de Canarias



Strong support for major upgrades & new developments



UNIÓN EUROPEA

Fondo Europeo de Desarrollo Regional (FEDER)

*Una manera de hacer Europa*



# WEAVE Instrument.

Co-funded by *ERDF*



# GTCAO-LGS.

*Co-funded by ERDF*



GTC



# GTCAO-LGS.

*Co-funded by ERDF*

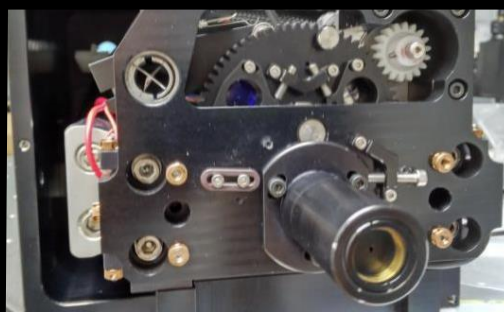
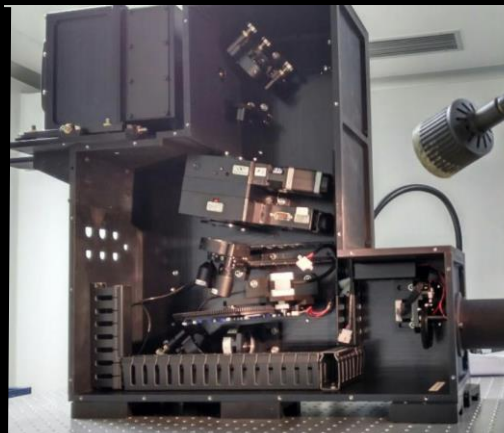
Canarias  
OBJETIVO de PROGRESO



Unión Europea  
Fondo Europeo  
de Desarrollo Regional



Gobierno  
de Canarias



# MAP OF UNIQUE SCIENTIFIC AND TECHNICAL INFRASTRUCTURES



UNIÓN EUROPEA  
Fondo Europeo de Desarrollo Regional

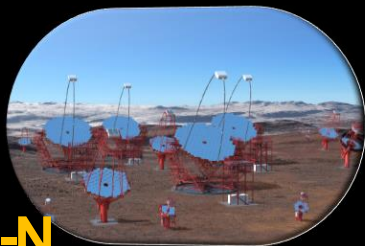


"Una manera de hacer Europa"

ICTS WITH A SINGLE LOCATION NETWORK OF ICTS DISTRIBUTED ICTS



# O CAN: Site selected for new RIs



**CTA-N**



**SELF**



**ATLAS node**



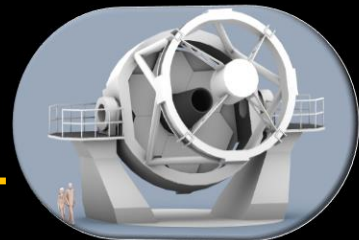
**EST**



**NG EHT**



**TTT2m**



**NRT**



**IACLINK**



**ASTRI mini array**

# New astronomical facilities

## CTA. CHERENKOV TELESCOPE ARRAY

### CTA Norte:

- ❖ 4 LST: 23, 5 mill Euros
- ❖ 5 MST: 9,9 mil Euros



canarias  
OBJETIVO de PROGRESO



Unión Europea  
Fondo Europeo  
de Desarrollo Regional





# LST2/ LST3/ LST4

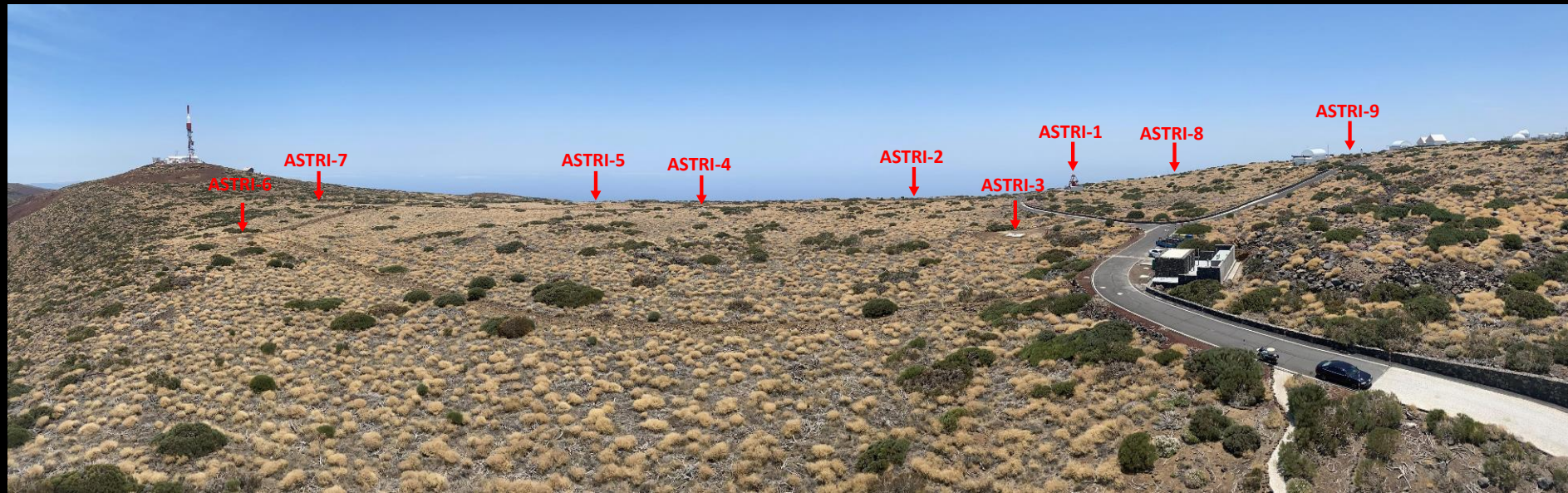
*Under construction*



# ASTRI

THE ASTRI MINI-ARRAY

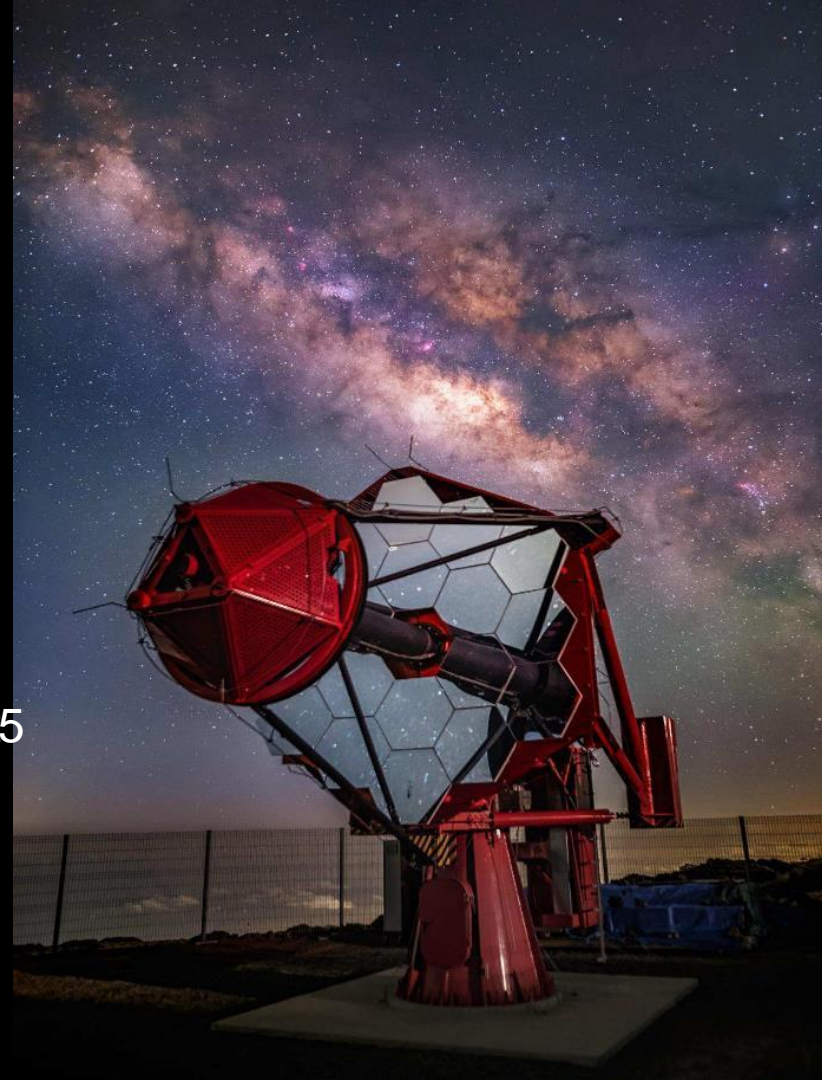
Contact – Giovanni Pareschi (giovanni.pareschi@inaf.it)



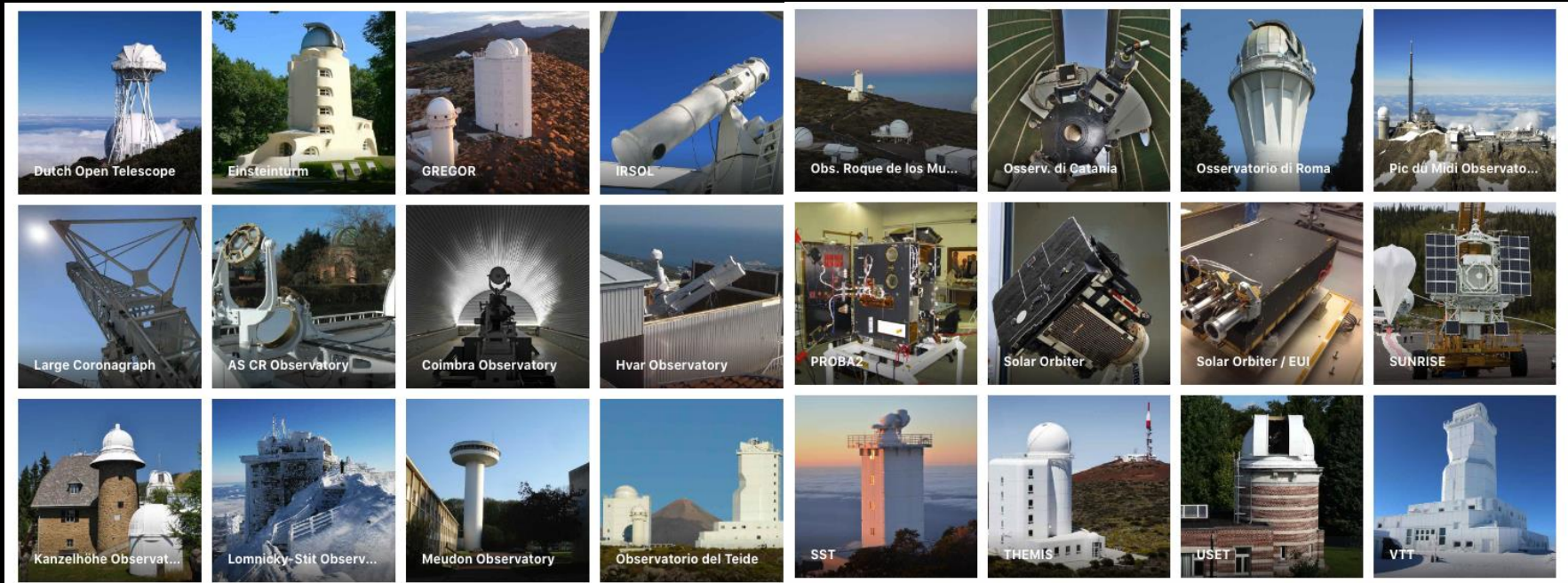


## CURRENT MASTER SCHEDULE

- Teide infrastructure completed
- ASTRI-1 telescope accepted October 2023
- ASTRI-3 delivered September 2024
- ASTRI-8 & ASTRI-9 telescopes delivered December 2024
- First camera (engineering camera) on ASTRI-1 July 2024
- Two more cameras completed by end of 2024 (Goal)
- ASTRI Mini-Array ready for commissioning late summer 2025
- Early observations will start already with three telescopes
- Scientific observations start end 2025



# European Solar Physics



# European Solar Telescope(EST)



canarias  
OBJETIVO de PROGRESO



**Unión Europea**  
Fondo Europeo  
de Desarrollo Regional



# EST Interim Phase (2023-2025)



## European Solar Telescope **Canarian Foundation**

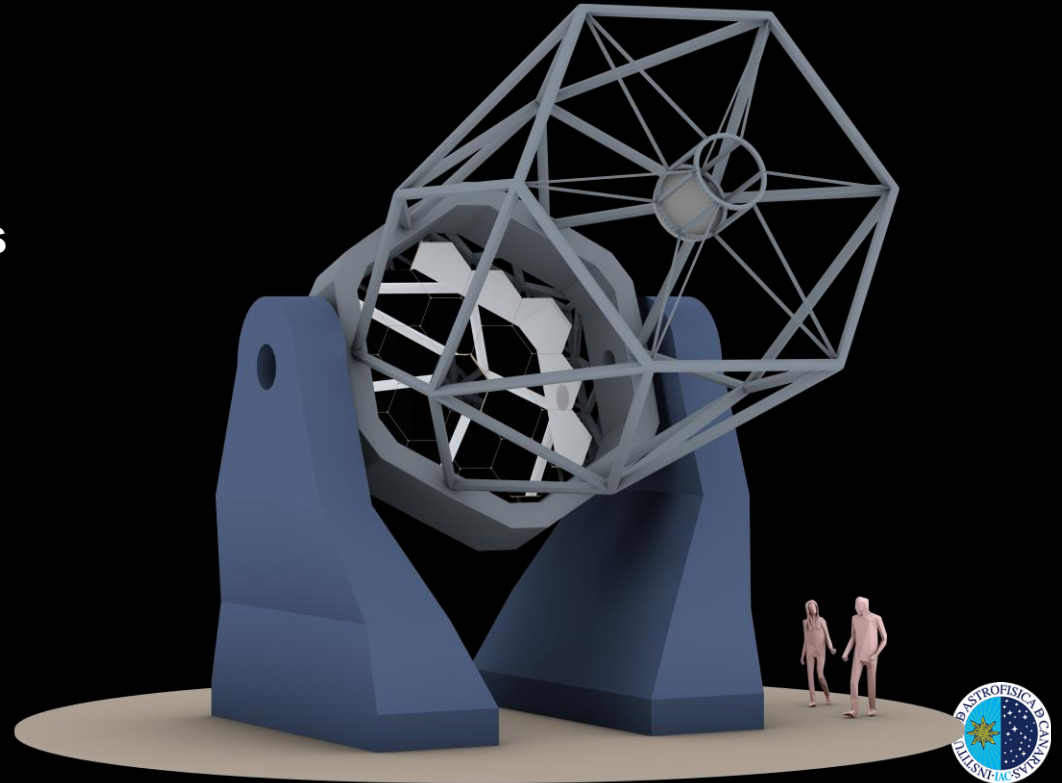
- ✓ Application for ERIC creation
- ✓ Pass Preliminary Design Review
- ✓ Preparation of construction calls for tender
- ✓ Construction permits and associated studies (environmental impact study, ...)



# NRT. New Robotic Telescope

Automated astronomical observations with a focus on **time-domain** astrophysics, enabling rapid and precise data collection to capture transient and dynamic celestial events.

- **2017 Preliminary Design begins.**
- **2021 Preliminary Design review is completed.**
- **2022 Detailed Design begins.**
- **2025 Civil works begin.**
- **2025 Optical fabrication starts.**
- **2027 First light.**
- **2029 End of construction and commissioning.**



# Science at IAC

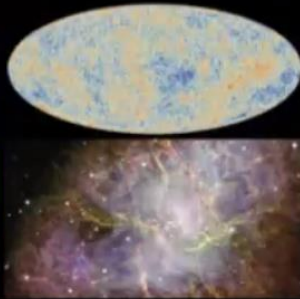
Formation and Evolution of Galaxies



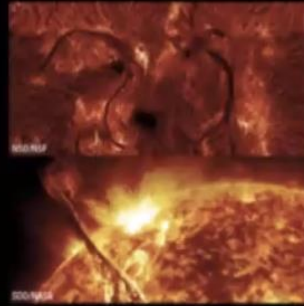
Exoplanetary Systems and Solar System



Cosmology and Astroparticles



Solar Physics



Stellar and Interstellar Physics



The Milky Way and the Local Group







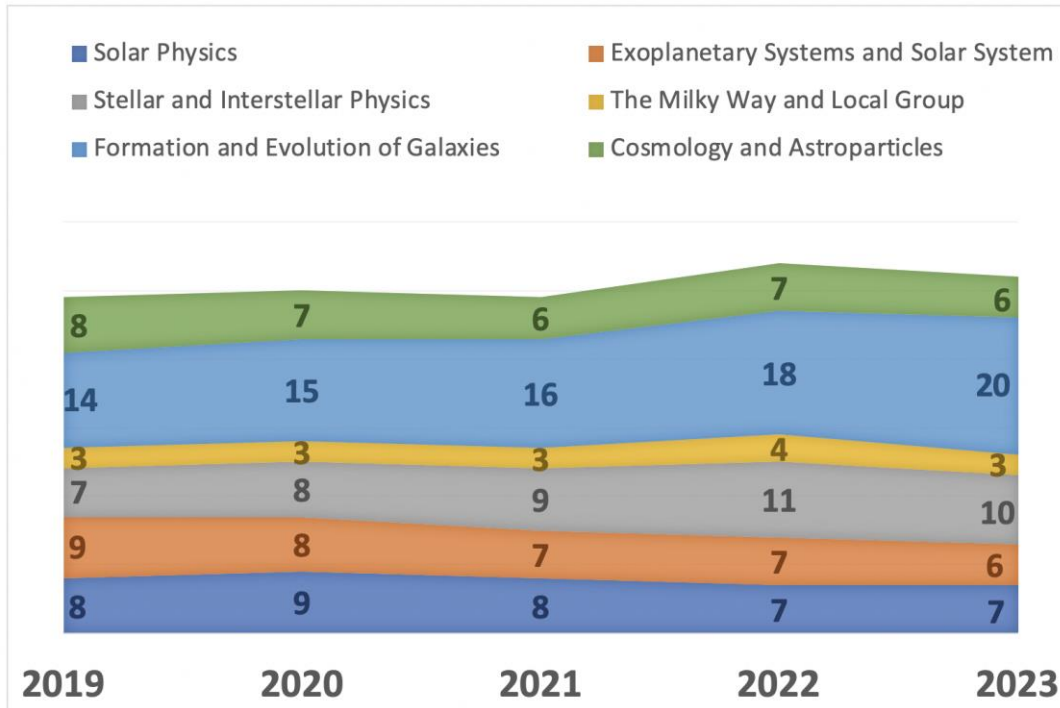
# PhD and post-doctoral training program



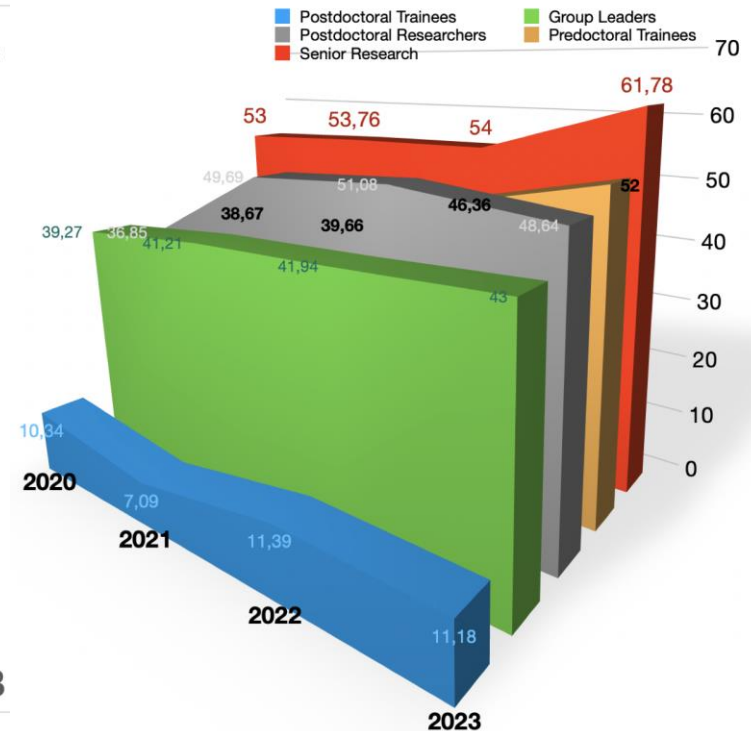


# PhD and post-doctoral training program

## Nº of PhD Students 2019-2023



## Research Staff and Trainees Evolution 2020-2023 (FTEs)



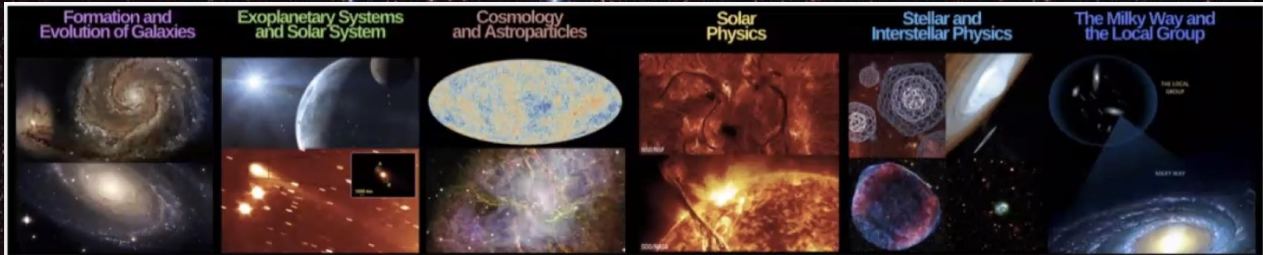
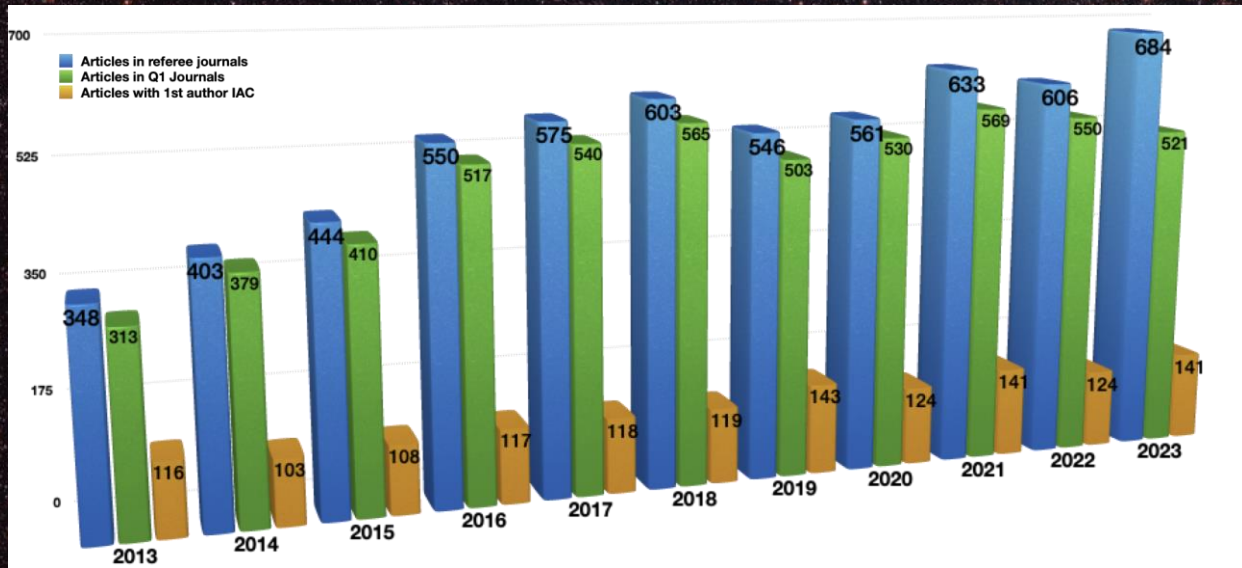
# Experience in hosting visitors and arranging international consortia.



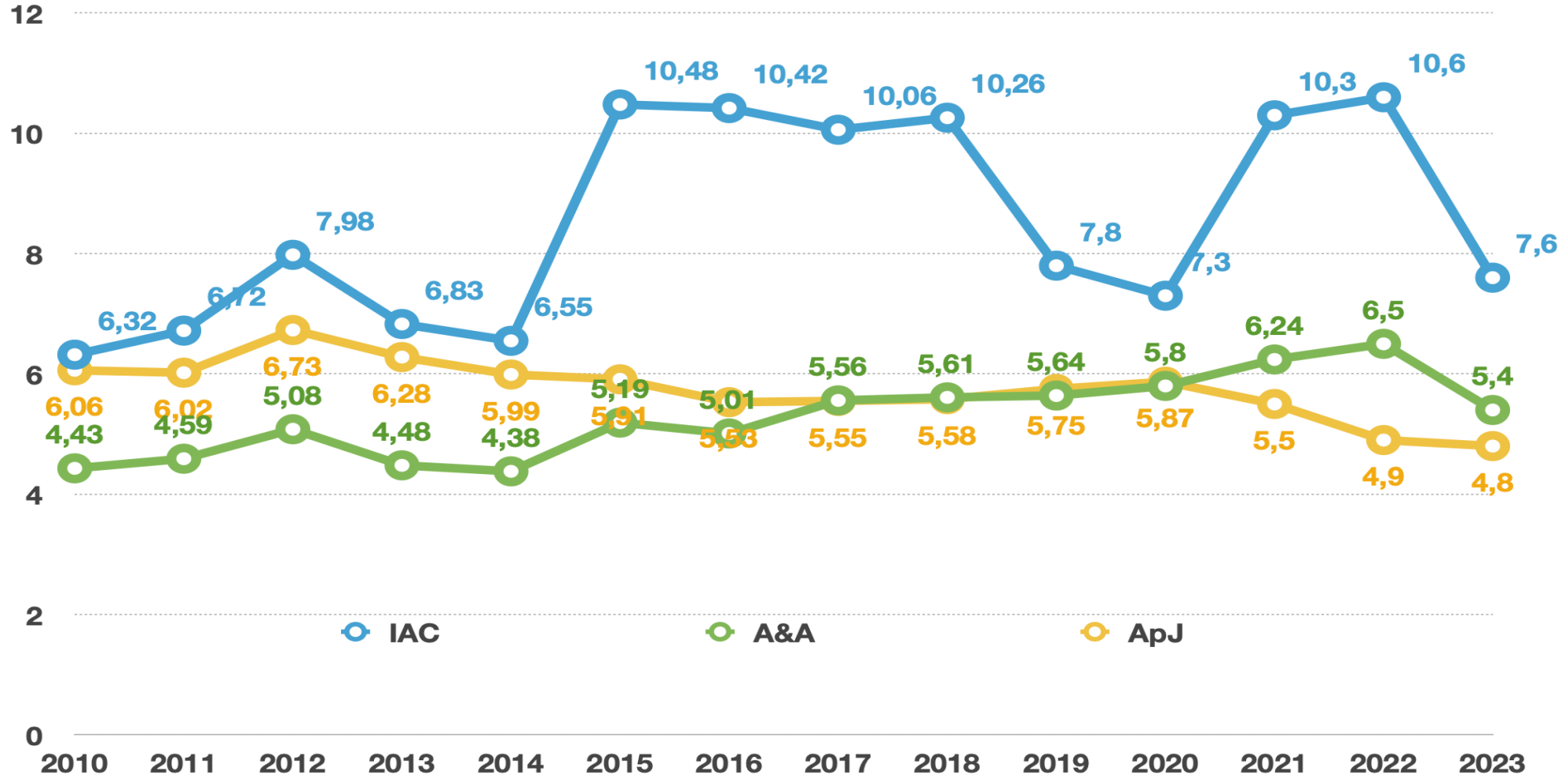
# Scientific outcomes



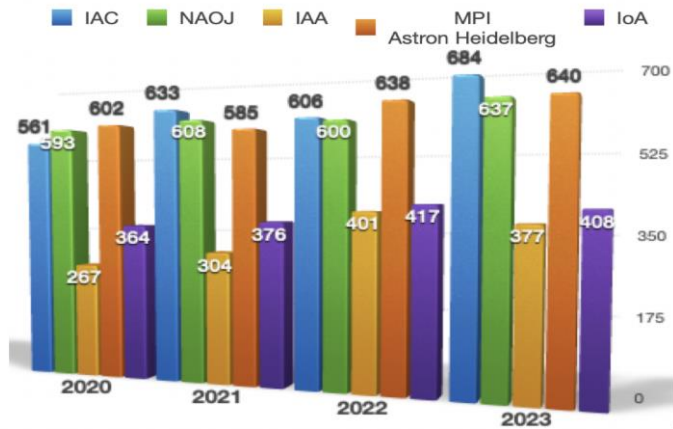
SEVERO  
OCHOA



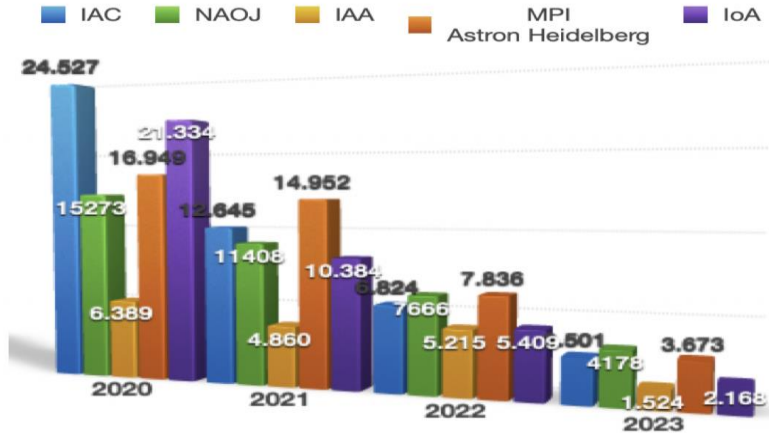
# IAC IMPACT FACTOR



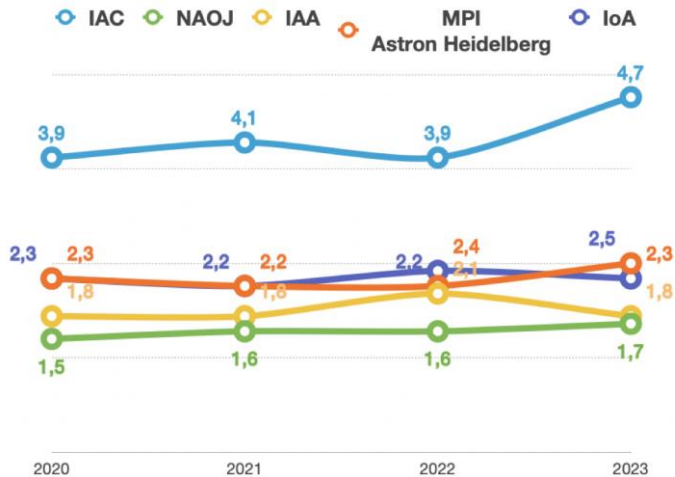
## Numbers of papers published by IAC



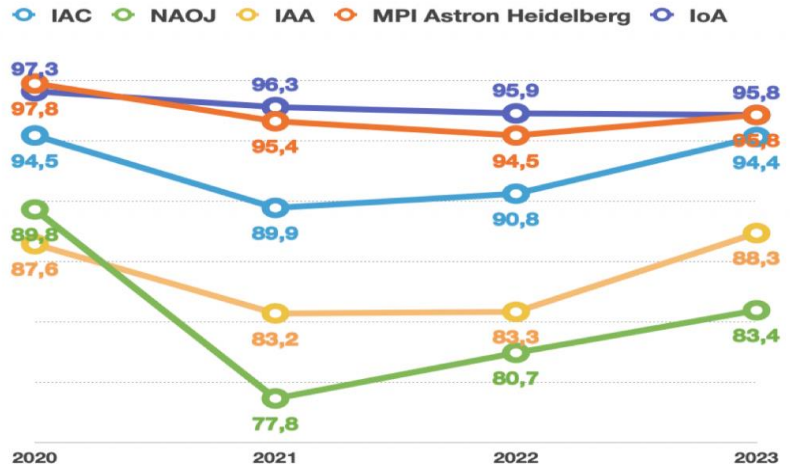
## Number of Citations (up to Jan 2024) for the total number of articles published on a given year by each centre



## IAC Production of Research Articles per Researcher



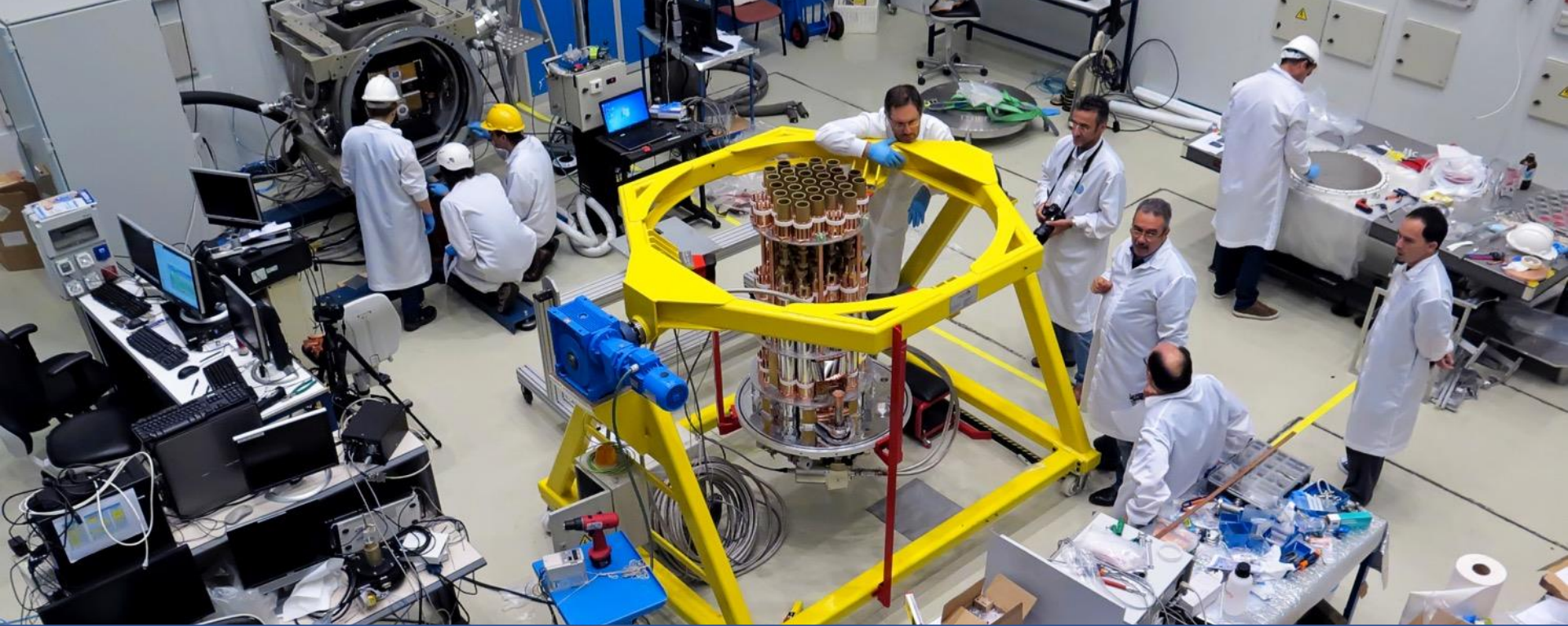
## Percentage of Q1 publications



# Instrumentation Division

- Optical system design and testing
- Optical manufacturing
- Mechanical and opto-mechanical system design and development
- Cryogenic and vacuum system design and development
- Precision mechanics
- Adaptive optics
- Fibre optics
- Control systems
- Sensor characterisation
- Project management
- Systems engineering
- Electronic systems
- Software design and Laser communications





High qualified human capital







# INFRASTRUCTURES

20 Labs, workshops and clean rooms







# IAC' structure and governance



GOVERNING COUNCIL

DIRECTORATE



*Prof. Valentín  
Martínez Pillet*

*Prof. Eva  
Villaver*



SUBDIRECTORATE

Secretary

OCAN OBSERVATORIES

INSTITUTIONAL ACTION  
AND TRANSFER OFFICE

Science Communication  
and Outreach Unit

IACTEC

GENERAL SERVICES  
ADMINISTRATION UNIT

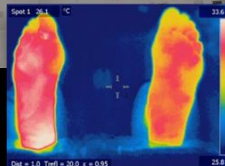
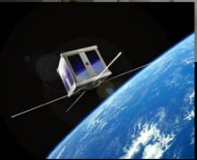
RESEARCH DIVISION

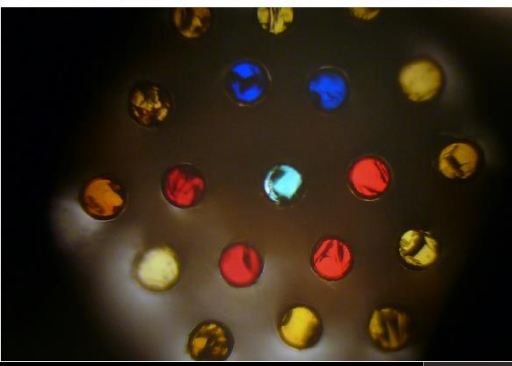
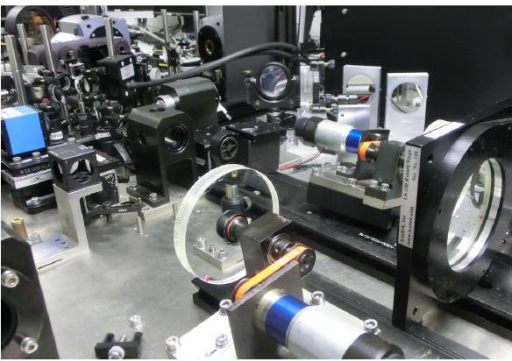
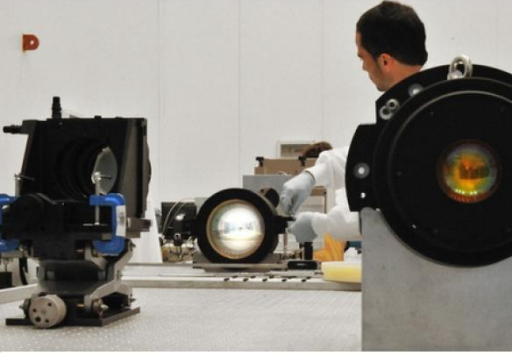
POSTGRADUATE TRAINING DIVISION

INSTRUMENTATION DIVISION



# IACTEC: Closer collaboration with industry





# CENTRO DE SISTEMAS ÓPTICOS AVANZADOS

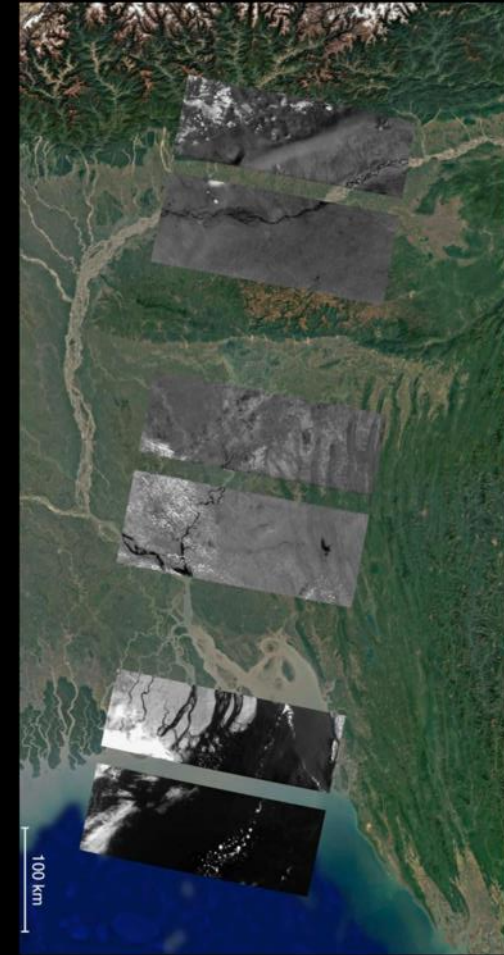
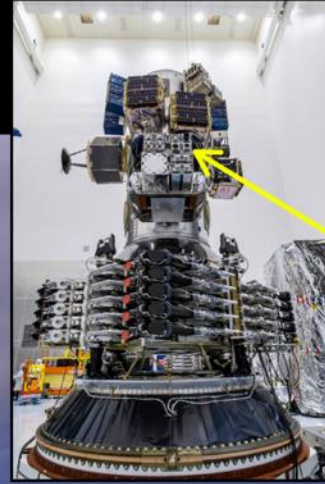
Excelencia en tecnologías ópticas



IACTEC: ESPACIO DE COOPERACIÓN  
TECNOLÓGICO EMPRESARIAL



# IAC Tec-Space



# IAC's Strategic Plan 2025–2028



## Mission

Leading astrophysical research and technological innovations, training next-generation scientists and engineers, and enhancing outreach and international collaborations.

## Vision

To be global RTD & innovation leaders in Astrophysics and Space, reinforcing the capabilities of the Observatorios de Canarias and driving impactful knowledge transfer to society.

## Main Goals

1. Research Excellence: Enhance IAC as a top astrophysical research center.
2. International Collaboration: Foster partnerships with leading global Science & Technology centers, notably those with research interests in the OOCG
3. Training and Impact: Support synergistic, diverse and ethical research talent and maximize the socio-economic impact of IAC's activities.

## SCIENTIFIC AND STRATEGIC GOALS

1

**A FOCUSED RESEARCH PROGRAMME IN FRONTIER ASTROPHYSICS**

### Key Actions

A1: Solar Physics  
A2: Exoplanetary and Solar Systems  
A3: Stellar and Interstellar Physics  
A4: The Milky Way and Local Group  
A5: Galaxy Formation and Evolution  
A6: Cosmology and Astroparticles  
A7: AI for Simulations and Analysis

2

**ENABLING ACCESS TO THE MOST PROMINENT RIs AND ENSURING LEADERSHIP OF THE OOCG**

### Key Actions

A8: Reinforcing 10.4m GTC  
A9: European Solar Telescope  
A10: Cherenkov Telescope Array and ASTRI  
A11: New Robotic Telescope  
A12: Exo-Life Finder  
A13: Next Gen Event Horizon Telescope Antenna  
A14: Advanced Support at OOCG

3

**LEADERSHIP IN TECHNOLOGY DEVELOPMENTS FOR ASTROPHYSICS**

### Key Actions

A15: Reinforcing Tech Division Capacities  
A16: High Spectral Resolution Tech  
A17: High Spatial Resolution Tech  
A18: Space Missions  
A19: Space - Laser Communications  
A20: Cutting Edge Optical/IR Tech  
A21: Microwave Tech for CMBC

4

**VALORIZATION OF TECHNOLOGY, SOCIAL IMPACT, RESPONSIBILITY AND PUBLIC AWARENESS**

### Key Actions

A22: IACTEC: Tech Transfer and Valorization  
A23: Increasing Social Awareness  
A24: Social Responsibility, Sustainability, Scientific Integrity and Ethics  
A25: Public-Private Collaborations

5

**MAXIMIZING ORGANIZATIONAL EFFICIENCY**

### Key Actions

A26: HR Reorganization  
A27: Institutional Relations and Project Management  
A28: Digital Transformation Consolidation

### Key Actions

#### TRAINING AND RECRUITING

A29: Pre-doctoral, Postdoctoral, and Technical Training  
A30: Recruiting Research Staff  
A31: Correction of Gender Inequalities

#### INTERNATIONALIZATION

A32: Strengthening International Scientific Leadership

#### EXPLOITATION AND DIFFUSION OF RESEARCH OUTCOMES

A33: Knowledge and Technology Transfer  
A34: Dissemination of Research Outcomes & Public Outreach

## MAIN EXPECTED RESULTS

1. Increased Scientific Publication and Global Recognition
2. Technological Development towards forefront astronomical facilities
3. European leader in Advanced Astrophysical and Engineering Training
4. Strengthened Industry and Community Engagement
5. Enhanced Gender Equality and Diversity Initiatives
6. Growth in Funding and Resource Acquisition

HORIZONTAL STRATEGIC GOALS

## Main KPIs:

Nr of Scientific publications:	New research recruitments:	129 RTD Milestones linked to the Actions	267 RTD Deliverables: including reports, plans, metrics, ...	Nr of scientific workshops & conferences:	Nr of long incoming research visits:	Installation of new RIs at the OOCG:	Nr of invited talks:	Nr of hightech companies attracted:	Nr of mentions in media:	Visits to OOCG:
2370	62			32	>70	10	50	3	38 k	240 k





**Anselmo Sosa Méndez**

Head of the Technology Transfer and Institutional Actions Office

**Email: [otai@iac.es](mailto:otai@iac.es) Tfn: 922605200 / 199**

**Web: [www.iac.es](http://www.iac.es)**