

IPARCOS WORKSHOP
Madrid, 16-17 June 2022
Venue: Room M2, Facultad Ciencias Físicas, UCM, Madrid



IPARCOS

INSTITUTO DE FÍSICA
DE PARTÍCULAS Y DEL COSMOS



The Institute of Particle and **Cosmos** Physics

Fernando Arqueros



IPARCOS

Union of five officially recognized UCM groups:

- High Energy Physics (GAE)
- Nuclear Physics (GFN)
- Instrumental and Extragalactic Astrophysics (GUAIX)
- Stellar Systems, Spectroscopy and Photometry (SEEF)
- Effective theories, Particle Physics and Cosmology

The Institute of Particle and Cosmos Physics was approved by the Government Council of UCM on December 18, 2018.

IPARCOS is a Research Institute of UCM



Mission

Research groups of UCM with international recognition in various fields of Particle and Cosmos Physics have shown determination to collaborate and coordinate with each other:

- Synergies → increase scientific productivity.
- Institute → increase the funding capabilities.
- BOTH → talent attraction, increasing scientific productivity and funding capabilities.

Vision

- Studying the Cosmos from the Infinitely Large to the Infinitely Small in a multidisciplinary approach.
- Balanced: Theoretical, Observational, Experimental.
- Contributing to our understanding of the Cosmos in the framework of the Particle Physics and their interactions.
- Platform to return to the society in terms scientific outreach and technological developments.



Communication and Image

- Logo
- Web: www.ucm.es/iparcos/
- Google groups: IPARCOS@ggrupos.ucm.es
- Twitter: @IPARCOS_UCM
- Youtube Channel:
IPARCOS Inst. of Particle and Cosmos Physics - UCM

Structure and Governance

- Institute legally dependent on the University
- Governing Bodies:
 - Institute Council
 - All permanent doctors (63%)
 - Representatives of non-permanents
 - Director (elected by the council)
 - Secretary

Structure and Governance

- **Scientific Strategy Committee (SSC): appointed by the Council to study and submit proposals regarding any activity of the Institute.**

- Fernando Arqueros (Chair)
- José Luis Contreras
- Africa Castillo
- Antonio Dobado
- Jesús Gallego
- Antonio López Maroto
- David Montes
- José Ramón Peláez
- Patricia Sánchez Blázquez
- José Manuel Udías

Scientific Advisory Committee

- **Ana Achúcarro:** Leiden Institute of Physics (LION). Holland.
- **Alberto Carramiñano:** National Institute of Astrophysics, Optics and Electronics (INAOE). Mexico.
- **Stefania de Curtis:** National Institute for Nuclear Physics (INFN). Italy.
- **Gerda Neyens:** KU Leuven. Belgium.
- **Mario Pimenta:** Laboratory of Instrumentation and Experimental Particles Physics (LIP). Portugal.



Scientific Advisory Committee

- **Report on September 2021:** Very positive although they identified some weak points (lack of administrative support, more visibility, increase internationalization...)
- **Meeting April 2022:** They recognized relevant progress in this period (report expected by end of July):
 - IPARCOS Colloquia
 - SCOPUS id
 - International recruitment
 - Administration support (Eva Martín)
 - ...

Research Lines

- Astrophysics and Cosmology

- Our Galaxy and the Local Universe
- Galaxies and Cosmology

- Particle and Nuclear Physics

- Particle physics
- Nuclear Physics

- Instrumentation

- Instrumentation for Research
- Computational Methods
- Medical Physics

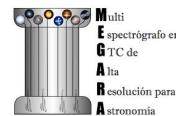
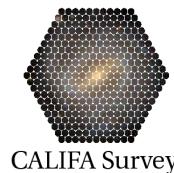
Resources: Personnel

- **51 Senior researchers**
 - 37 permanent
 - 14 non-permanent
- **12 Post-doc trainees**
- **34 Pre-doc students**



International collaborations

Ground based optical and infrared telescopes



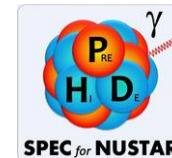
High Energy Observatories



Space Missions



Nuclear and Particle Physics



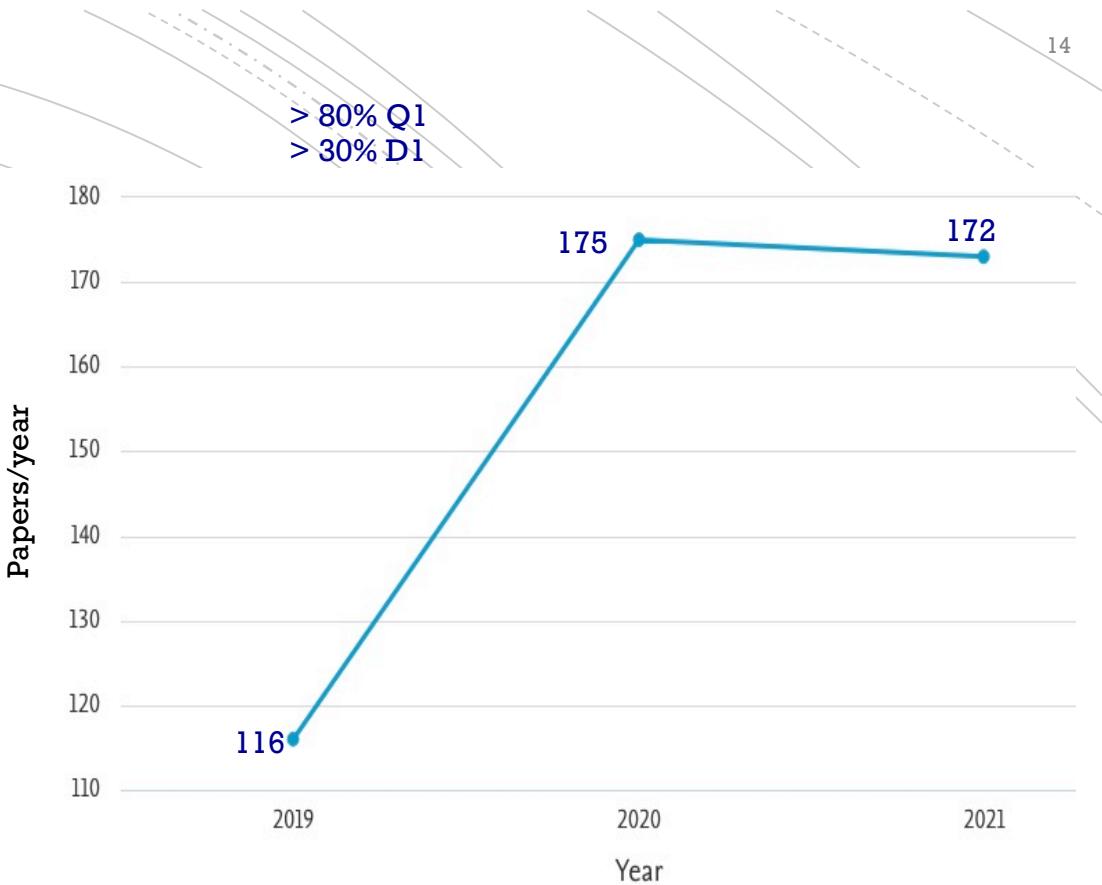


www.ucm.es/iparcos/publications

SCOPUS ID: 60268514

IPARCOS

Scientific Production



Fernando Arqueros

Institute of Particle and Cosmos Physics



Deeply involved in:

- **Master Programs**

- Astrophysics
- Erasmus Mundus in Nuclear Physics
- Erasmus Mundus in Nuclear Fusion
- Biomedical Physics
- Theoretical Physics

- **Doctorate**

- Astrophysics
- Erasmus Mundus Fusion
- Physics

- **≈ 6 Theses /year**

advised by IPARCOS

Training

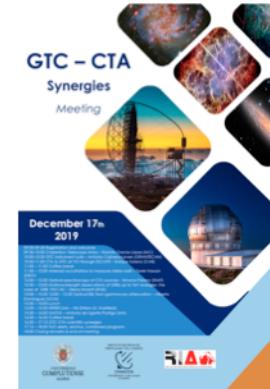


Seminars and Colloquia

www.ucm.es/iparcos/seminars

Fernando Arqueros

Workshops and Schools



- Seminars > 4/month
- Colloquia ≈ 1/month

Outreach

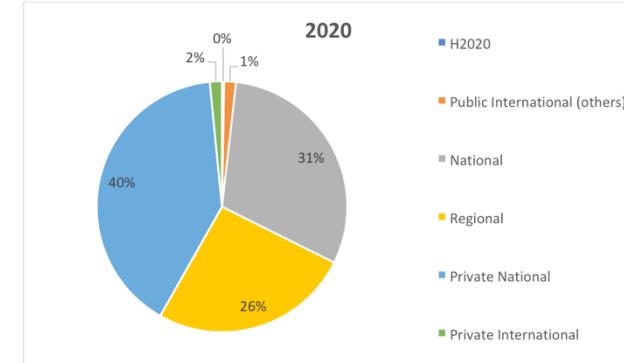
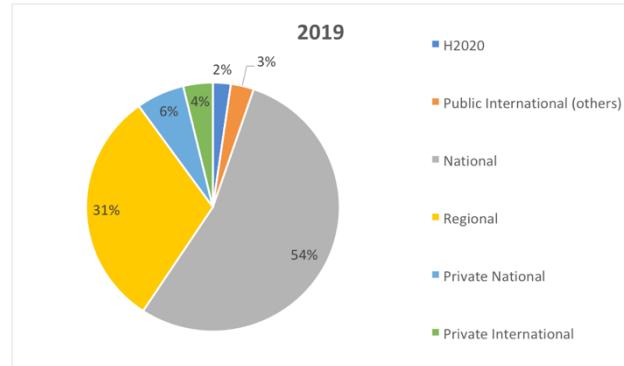
- Madrid Science Week
 - *The Spark Chamber*
 - *Radioactivity and the Cloud Chamber*
 - *Using the mobile phone to see the invisible*
 -
- University for seniors
- Visits to our premises, with up to 500 kids a year
- Activities for exceptionally able children organized by the CM
- Collaboration with popular TV programs



Prof. Alan Watson

Funding

Table 8: INCOME	2017	2018	2019	2020	AVERAGE
PUBLIC FUNDING (TOTAL)	1239677	1434078	1429681	1606032	356842
Competitive sources					
H2020	41875	41875	89556	40658	53491
International sources (excluding H2020)	23013	23013	15933	52514	28618
National	796146	899273	797137	963805	864090
Regional	378642	469917	527055	549055	481167
Others					
Non-competitive sources					
International sources					
National					
Regional					
Others					
PRIVATE FUNDING (Total)	960910	968050	1004826	176980	777692
National	960910	968050	956080	109834	748719
International	-	-	48746	67146	28973
TOTAL FUNDING	2200587	2402129	2434507	1783012	2205059



> 2 M€ /year



Funding

Application for Unit of Excellence María de Maeztu

STATE RESEARCH AGENCY (MINISTERIO DE CIENCIA E INNOVACIÓN)

Submitted 21 February 2022 (decision pending)

- Strategic Research Programme 2022-2025
 - Scientific Strategic Goals (SSG)
 - Transversal Strategic Goals (TSG)
- High Impact Activities

A. Gil de Paz: Thursday session at 15h



Funding

Plan Complementario de I+D+i en el marco del Plan de Recuperación,
Transformación y Resiliencia

MINISTERIO DE CIENCIA E INNOVACIÓN + CM

- Programa: Astrofísica y Física de Altas Energías
- Participantes: CIAFF-UAM+IFT-UAM, IPARCOS-UCM, CIEMAT-FP, CAB-INTA/CSIC



IPARCOS WORKSHOP 16-17 JUNE 2022

The Institute of Particle and Cosmos Physics

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Thursday, 16 June

Current activities of the Institute

10:00	<i>Stellar astrophysics and exoplanets.</i> David Montes (SEEF).
10:20	<i>Activities of the High Energy Physics Group.</i> Juan Abel Barrio (GAE).
11:00	Coffee break
11:30	<i>Activities of GUAIX.</i> Jesús Gallego (GUAIX).
12:10	<i>Nuclear imaging and proton therapy</i> Samuel España (GFN).
12:50	<i>Effective field theories and hadronic structures.</i> Ignazio Scimemi (TEFM).
13:10	<i>Theoretical gravity and cosmology at IPARCOS.</i> José A. Ruiz Cembranos (TEFM)
13:30	Lunch break



Thursday, 16 June

- 15:00 *Strategic program and “high impact” activities on the Mdm application.*
Armando Gil de Paz

SSG1 Session: Dark Matter and Dark Energy

- 15:30 *Indirect dark matter searches with gamma rays.*
Daniel Nieto
- 15:50 *Identifying the main drivers in the evolution of galaxies.*
Maritza A. Lara-López
- 16:10 *Neutrino nucleus interactions for neutrino oscillations.*
José Manuel Udías
- 16:30 Coffee Break

Thursday, 16 June

SSG2 Session: Gravitational-waves and multi-messenger astronomy

- 17:00 *Light ring images of thin accretion disk in regular compact objects.*
Mercè Guerrero
- 17:20 *Galaxy evolution and cosmology using gamma rays observed with Fermi-LAT.*
Alberto Domínguez

SSG3 Session: From high precision hadronic observables to new physics

- 17:40 *Atomic spectroscopy as dark sectors probe.*
Clara Peset
- 18:00 *Dispersion relations and QCD spectra.*
Jacobo Ruiz de Elvira
- 18:20 *Hadron structures through high energy physics in multiple dimensions.*
Alexey Vladimirov
- 18:40 **End of session**

Friday, 17 June

09:30	<i>Nocturnal remote sensing: a bridge between astrophysics and the interdisciplinary world.</i> Alejandro Sánchez de Miguel
09:45	<i>TARSIS, the new IPARCOS-led instrument for the Calar Alto 3.5m telescope.</i> Armando Gil de Paz
10:00	<i>Nuclear instrumentation from spectroscopy to applications.</i> Pablo Galve
10:15	<i>CTA-GAE.</i> Luis Ángel Tejedor
	TSG2 Session: Extreme computing
10:30	<i>From Science Operations to instrument and survey management: exploring ML/AI techniques.</i> Francisco Montenegro
10:45	<i>Data Harmonization for Robust and Generalizable Artificial Intelligence Models.</i> Joaquín López Herráiz
11:00	<i>Machine learning for very-high-energy gamma-ray astronomy.</i> Daniel Nieto
11:15	<i>Faster than light: GPU and DL dose calculations for intrabeam.</i> Paula Ibáñez
11:30	Coffee Break



Friday, 17 June

New lines and activities. Brainstorming Session

- 12:15 *Participation of IPARCOS in the ET project.* **José Luis Blázquez**
- 12:30 *Participation of IPARCOS at EuCPT.* **José A. Ruiz Cembranos**
- 12:45 *Participation of IPARCOS at EIC and CERN ptW/ptZ working group.*
Ignazio Scimemi
- 13:00 *IT common resources, computation.* **Daniel Nieto**
- 13:15 *Possible strategies for the 2022 MdM-CFP.*
Armando Gil de Paz & Fernando Arqueros