



Jornadas de Introducción a la Investigación 2022

The Institute of Particle and Cosmos Physics

Fernando Arqueros





Becas Máster

Ayudas para TFM (cursos 2020-21 y 2021/22)

<https://www.ucm.es/iparcos/ayudas-para-tfm>

El Instituto de Física de Partículas y del Cosmos (IPARCOS) ha financiado cada curso 8 becas de 2000 € para estudiantes de Máster que realicen su TFM en temas relacionados con los objetivos científicos del Instituto.

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Se anunciarán más adelante.



Background 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

Application submitted to the UCM and evaluated by the Spanish Research Agency (AEI) as Very Positive.

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 Udiás

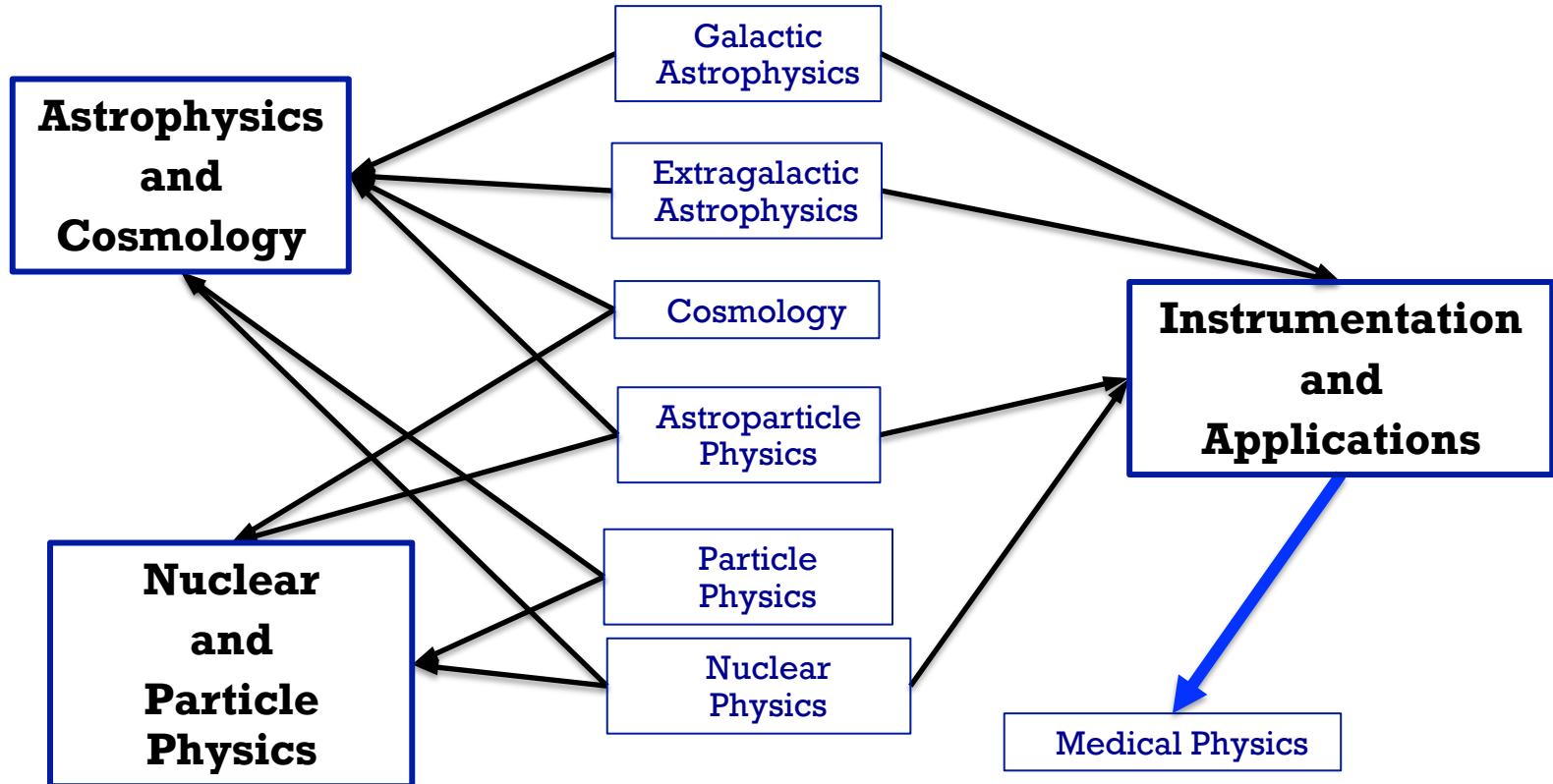
Scientific Advisory Committee

- **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.



Research Lines

- Astrophysics and Cosmology
 - Our Galaxy and the Local Universe
 - Galaxies and Cosmology
- Nuclear and Particle Physics
 - Studying the Nuclei
 - Particle physics
- Advanced Instrumentation
 - Instrumentation for Science
 - Medical Physics



Resources: Personnel

- 51 Senior researchers (37 permanent + 14 non-permanent)
- 42 Pre-doc students / Post-doc trainees



Faculty of Physics (UCM) Building

Resources: Equipment

- 62 Offices
- 8 Laboratories ($> 1500 \text{ m}^2$)
 - LICA
 - Nuclear Physics
 - Astroparticle Physics (electronics)
 - Astroparticle Physics (RAMS)
- 3 Clusters:
 - Fiswulf
 - Astroparticle Physics
 - Particle Physics and Cosmology



Networks

National

- FNUC
- REECL
- Hadronic Physics
- REG
- EXONET
- RENATA
- CPAN
- Multidark
- Mægnet
- Tec2Space
- Particle Physics
- -----

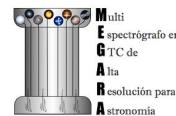
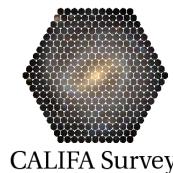
International

- EPLANET
- MEDINET
- COST:
 - QSPACE
 - PHAROS
 - VBSCAN
 - CANTATA
 - The string theory Universe
- -----



International collaborations

Ground based optical and infrared telescopes



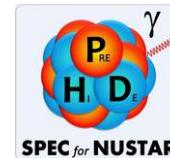
High Energy Observatories



Space Missions



Nuclear and Particle Physics



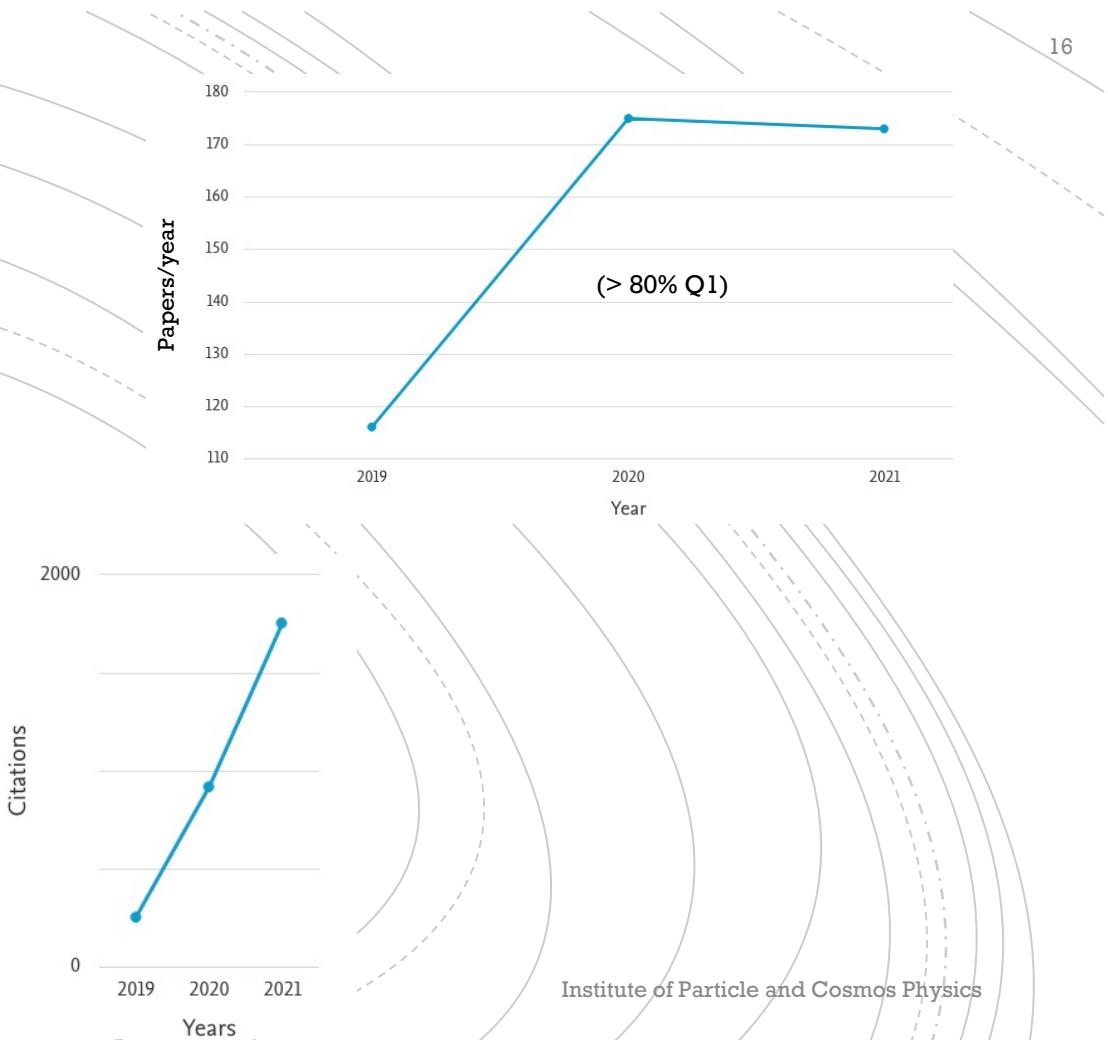


www.ucm.es/iparcos/publications

SCOPUS ID: 60268514

Scientific Production

Fernando Arqueros





IPARCOS

Scientific Production

www.ucm.es/iparcos/publications

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Some examples

17

A candidate super-Earth planet orbiting near the snow line of Barnard's star

Ribas, I and 62 more

Nature 563, 365-368 (2018)

Citations: 40 (ADS); 15 (SCOPUS)

Impact factor: 15.21

The 60 pc Environment of FRB 20180916B.

S.P. Tendulkar, A. Gil de Paz, et al. (21 authors in total)

The Astrophysical Journal Letters, Feb. 2021, Vol. 908, Issue 1, id. L12, 11 pp.

Citations: 39 (NASA-ADS), 33 (Google Scholar)

Impact factor: 7.413

Detection of the Geminga pulsar with MAGIC hints at a power-law tail emission beyond 15 GeV

MAGIC collaboration, Acciari et al., Astron. & Astrophys. 643 (2020) A14

Citations: 10 (ADS), 19 (Google Scholar), 7 (Scopus)

Impact factor: 5.602

Measurement of the Extragalactic Background Light (EBL) using MAGIC and Fermi-LAT gamma-ray observations of blazars up to $z=1$

MAGIC collaboration, Acciari et al. Mon. Not. R. Astron. Soc. 486 (2019) 4233-4251

Citations: 48 (ADS), 56 (Google Scholar), 36 (Scopus)

Impact factor: 5.356

Analysis of vector boson production within TMD factorization

I.Scimemi, and A. Vladimirov

Eur.Phys.J.C 78 (2018) 2, 89

Citations: 102 (inSPIRE), 75 (Scopus)

Impact factor: 4.843

Transverse momentum dependent distributions with jets

D. Gutierrez-Reyes (Ph.D. of I. Scimemi), I. Scimemi, W. J. Waalewijn, L. Zoppi

Phys.Rev.Lett. 121, 162001 (2018)

Citations: 43 (inSPIRE), 33 (Scopus)

Impact factor: 8.64

Unruh Effect without Thermality

Carballo-Rubio, R., Garay, L.J., Martín-Martínez, E. y De Ramón, J.

Phys.Rev.Lett. 123 (2019) 4, 041601

Cites: 23 cites (inSPIRE), 13 cites (WoS), 14 cites (SCOPUS)

Impact factor: 8.385

Angular momentum generation in nuclear fission

Wilson, J.N. et al. (including L.M. Fraile)

Nature 590 (2021) 566-570, published 25 Feb 2021

Citations: 14 (Scopus)

Impact factor: 49.962

Quasifree (p,p) Reactions on Oxygen Isotopes: Observation of Isospin Independence of the Reduced Single-Particle Strength

Atar, L. et al. (including L.M. Fraile), R3B Collaboration

Phys Rev Lett. 2018;120(5):052501.

Cites: 51 (Scopus)

Impact factor: 9.161

Stellar structure models in modified theories of gravity

Olmo, G. J., Rubiera-García, D., Wojnar, A., et al. (including UPARCOS members)

Phys. Rept. 876 (2020) 1-75

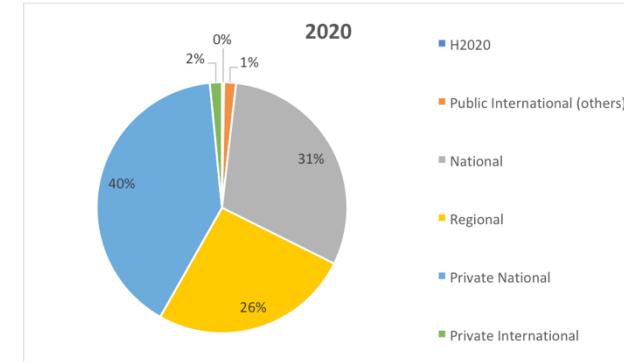
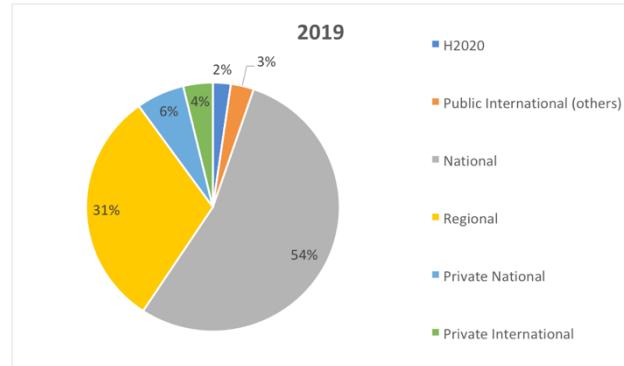
Cites: 92 cites (inSPIRE), 51 cite (WoS), 50 cites (SCOPUS)

Impact factor: 25.6

Institute of Particle and Cosmos Physics

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



Training

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



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

Becas Máster

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Grupo de Física Nuclear

Experimentos para Estructura y Astrofísica Nuclear,
 José Antonio Briz, Javier Rodríguez Murias y Marcos Llanos
 Seminario Dpto. EMFTEL, 218.B (3^a Planta, Módulo Central).
 Jueves 2 de junio a las 10:00

Física para la Medicina y la Biología

Mailyn Pérez Liva, Paula Ibañez, Daniel Sanchez Parceriza,
 Joaquín López Herraiz, Pablo Galve Lahoz, Samuel España
 Seminario Dpto. EMFTEL, 218.B (3^a Planta, Módulo Central).
 Jueves 2 de junio a las 10:30

Grupo de Física de Altas Energías

Investigación en Astropartículas en la UCM
 José Luis Contreras González
 Seminario Dpto. FTA de la planta 4.
 Martes 31 mayo a las 12:30

Grupo de Teorías efectivas, Física de Partículas y Cosmología

Investigación en Física de Partículas, Gravedad y Cosmología
 Mercedes Martín Benito y Juan José Sanz Cillero.
 2 de Junio, 13:00 horas.
 Seminario del Departamento de Física Teórica (2^a planta).



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IPARCOS

Grupo GUAIX (Grupo UCM de astrofísica instrumental y extragaláctica):

Estudiando la tierra de noche desde el espacio: Un puente entre la astrofísica y las ciencias de la tierra

Alejandro Sánchez de Miguel

Lunes 30 de mayo a las 10:00

11:30 *TARSIS, espectroscopía integral de gran campo para el Observatorio de Calar Alto*

Armando Gil de Paz

12:00 *El instrumento MOSAIC para el telescopio gigante europeo ELT de 39m: Demostración de un prototipo y oportunidades para los estudiantes*

Jesús Gallego, África Castillo, Pedro Tarancón, Eva Besadas

Miércoles 1 junio de 11:30

Sala entre cúpulas del Observatorio, Quinta planta de la Facultad (acceso desde planta 4)



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Astrofísica estelar y exoplanetas (Grupo UCM: Sistemas Estelares, Espectrometría y Fotometría):

De las estrellas frías a los exoplanetas: Gaia y CARMENES

David Montes

Códigos para la determinación de parámetros estelares

Hugo Tabernero (Postdoc colaborador del Dpto)

Descifrando los parámetros atmosféricos estelares de estrellas M con CARMENES"

Emilio Gómez Marfil (Postdoc colaborador del Dpto)

La metalicidad de las estrellas M"

Christian Duque Arribas (doctorando del Dpto)

La relación Litio-edad

Marta Lúthien Gutiérrez Albarrán (postdoc del Dpto, online)

Actividad cromosférica y relaciones flujo-flujo en las estrellas M de CARMENES"

Fernando Labarga (doctorando del Dpto, online)

Fecha y hora: Miércoles 1 junio a las 16:00

Lugar: Seminario Dpto. FTA de la planta 4^a

Online: <https://meet.google.com/cni-dkgh-wcj>