



Jornadas de Introducción a la Investigación 2021

The Institute of Particle and Cosmos Physics

Fernando Arqueros



Becas Máster

Ayudas para TFM (curso 2020-2021)

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

El Instituto de Física de Partículas y del Cosmos (IPARCOS) financia 8 becas de 2000 € para estudiantes de Máster del curso 2020-2021 que realicen su TFM en temas relacionados con los objetivos científicos del Instituto. Plazo de solicitud hasta el 16 de noviembre de 2020.

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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 Udías

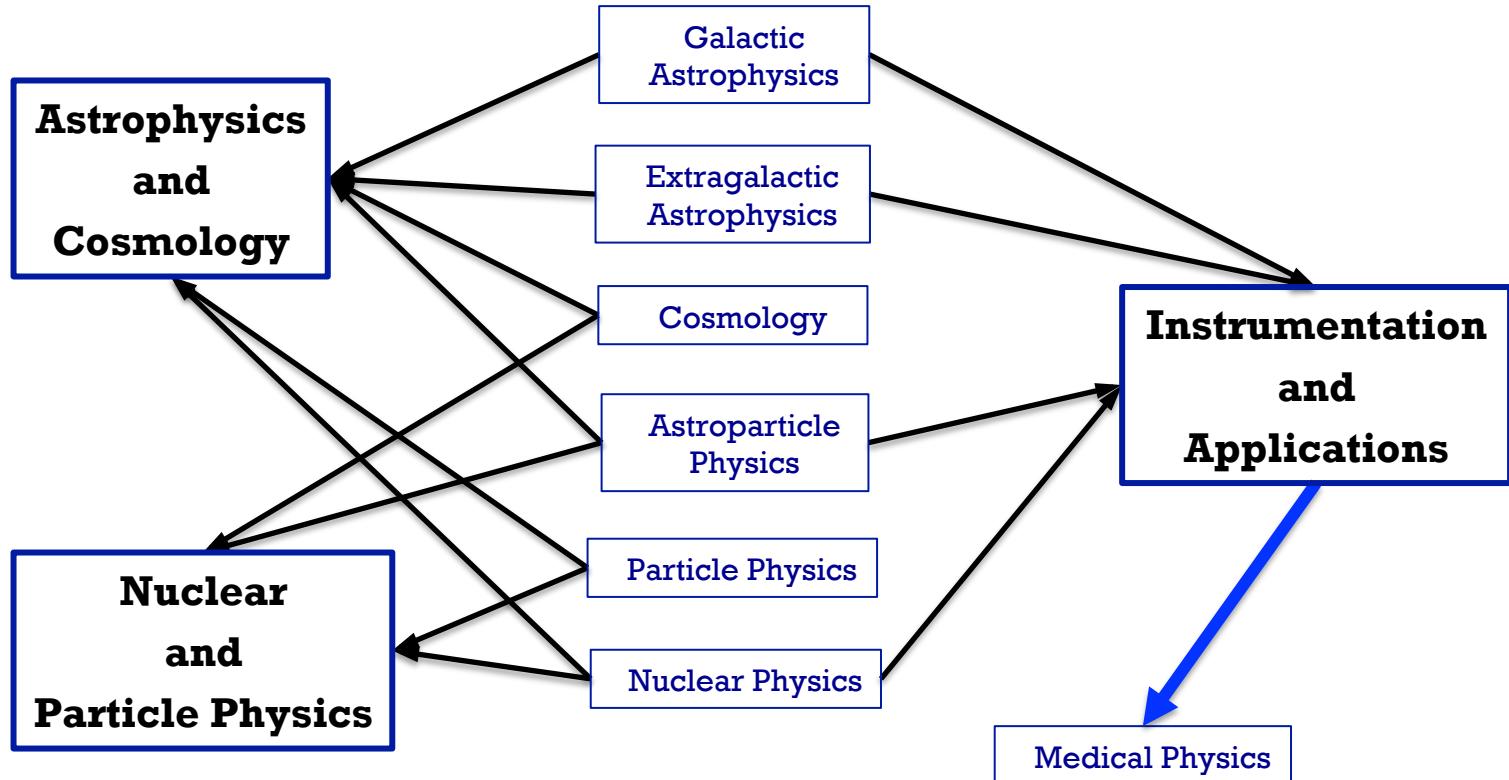
Scientific Advisory Committee

- **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:** European Organization for Nuclear Research (CERN). Switzerland.
- **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

- 54 Senior researchers (38 permanent + 16 non-permanent)
- 30 Pre-doc students / Post-doc trainees



Resources: Equipment

Faculty of Physics (UCM) Building

- 62 Offices
- 8 Laboratories (> 1500 m²)
 - 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
- -----

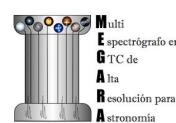
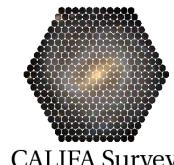
International

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



International collaborations

Ground based optical and infrared telescopes



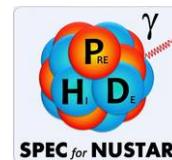
High Energy Observatories



Space Missions



Nuclear and Particle Physics



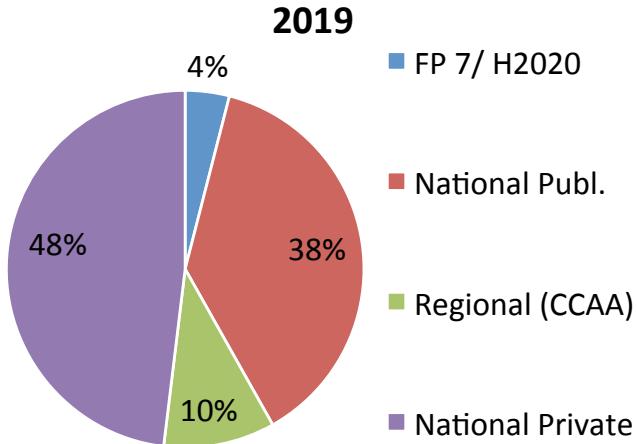
Scientific Production

- > 100 Papers / year
- > 80% Q1
- 2017-20: 496 Papers
- 4235 citations

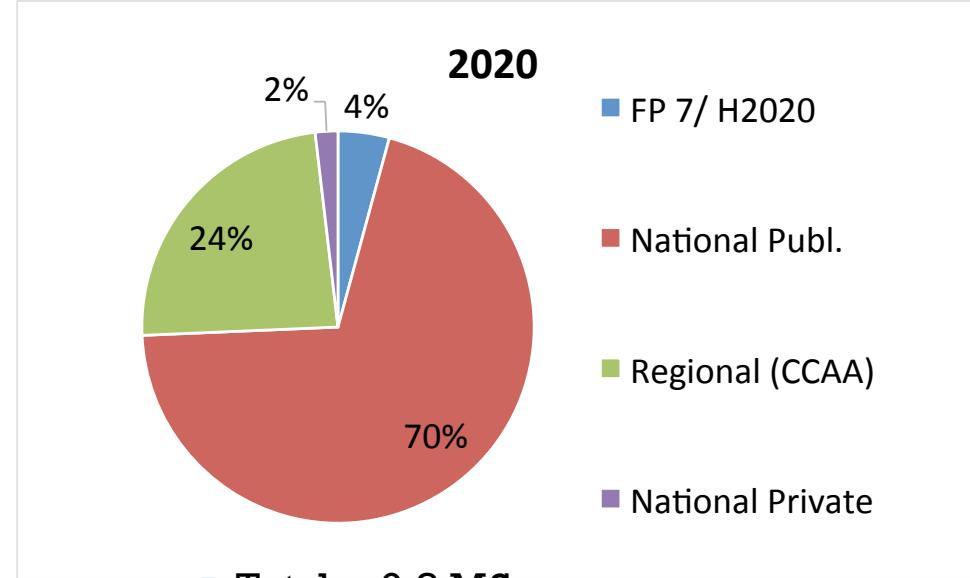
Some examples

Paper	Cit.	Paper	Cit.
JHEP 6 (2020) 137	14	Phys. Rep. 658 (2016) 1	146
Science 361 (2018) eaat1378	345	PRL 123 (2019) 041601	7
Nature 563 (2018) 365	54	PRL 120 (2018) 052501	38
ApJS 234 (2018) 18	5	ApJS 247 (2020) 33	116
Science 362 (2018) 1031	37	General Relativity and Gravitation 52 (2020) 81	24

Funding



- **Total = 1.9 M€**
 - National (AYA + FPN+..) $\approx 0.7 \text{ M€}$
 - Regional (CM) $\approx 0.2 \text{ M€}$
 - FP7/H2020 $\approx 0.1 \text{ M€}$
 - 0.9 M€ Private funding from MEGARA



- **Total = 0.8 M€**
 - National (AYA + FPN+..) $\approx 0.6 \text{ M€}$
 - Regional (CM) $\approx 0.2 \text{ M€}$

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



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

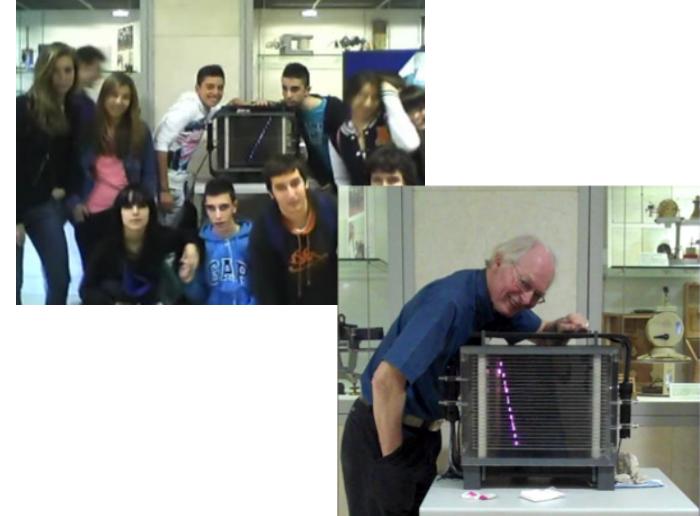
Workshops and Schools



Announc.	Date/Time	Online by	Type	Title	Speaker / Institution	Video available at
-	24 June 2021 16:00h CET	UCMDirecto	IPARCOS colloquium	A Gamma-Ray Wide Field Observatory at the Southern Hemisphere: a new window to the Universe	Mario Pimenta (LIP, Portugal)	YouTube channel
-	25 May 2021 16:00h CET	UCMDirecto	IPARCOS colloquium	Observing the Big Bang	Ana Achucarro (Leiden Univ., Netherlands)	YouTube channel
-	14 May 2021 16:00h CET	UCMDirecto	IPARCOS colloquium	Is the discovered Higgs boson particle the last missing piece of the puzzle?	Stefania De Curtis (INFN, Italy)	YouTube channel

Outreach

- Madrid Science Week
 - *The Spark Chamber*
 - *Gamma-Ray or cosmic-ray. Challenge the AI*
 - *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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IPARCOS

Grupo de Física Nuclear

- *Investigación dentro del Grupo de Física Nuclear*
- Paula B. Ibañez García y Jaime Benito García
- Seminario Planta 3. Local 218A.
- Lunes 10 de mayo, 13:30h
- meet.google.com/oco-iekb-ikn

Grupo de Física de Altas Energías

- *Física de Astropartículas en la Complutense*
- José Luis Contreras González
- Seminario Planta 3. Local 218A
- Martes 11 de mayo, 14:00-14:20
- meet.google.com/ncd-fdsr-idr

Grupo de Teorías Efectivas, Física de Partículas y Cosmología

- *Investigación en Teorías efectivas en Física de partículas elementales y Cosmología en la UCM:*
- Felipe J. Llanes Estrada
- Seminario de Física Teórica (3^a planta Oeste)
- Miércoles 12 de Mayo, 11h-13h
- meet.google.com/nbk-bjmk-jag



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Grupo de 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
- *Determinación espectroscópica de parámetros estelares de estrellas M.* Emilio Gómez Marfil
- *La metalicidad de las estrellas M.* Christian Duque Arribas
- *Lineas espectrales afectadas por actividad cromosferica y campo magnético en estrellas M.* Alvaro López Gallifa
- Seminario Dpto. FTA de la planta 4
- Jueves 13 de mayo, 16:00h
- meet.google.com/ain-sydq-imw

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

- *La batalla de las galaxias: Ordenadores frente a telescopios.*
- Santiago Roca, Mariángeles Gómez-Flechoso, Jesús Gallego
- Jueves 13 mayo a las 14:00
- G-Meet:
 - *Una visita virtual a un gran telescopio profesional:* Conexión online con el telescopio astronómico Gran Telescopio Canarias (GTC), el mayor telescopio óptico del mundo.
 - Jesús Gallego, Cristina Cabello, Antonio Cabrera, Agustín Núñez
 - Martes 18 mayo a las 14:00
 - G-Meet: