

University of Valladolid

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Mathematical Physics Research Group
Department of Theoretical, Atomic and Optical Physics,
University of Valladolid

ET-Spain Meeting
October 8 2021



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Mathematical Physics Group: <http://mathphys.uva.es/>



- Consolidated Research Unit, Ref. UIC011 (Junta de Castilla y León).
- Institutions with partnership: U. de Burgos, U. de Salamanca and U. de Valladolid.
- A wide range of topics are covered: Astrophysics, Cosmology, Gravitation, Mathematical physics methods, Quantum Field theories, Supergravity...etc.
- Active projects: 3 National and 1 Regional (associated to the UIC), which includes:
 - “*Galactic Edges and Euclid in the Low Surface Brightness Era*”. PI: F. Buitrago. Ref. Ministry of Science: PID2020-116188GA-I00. From September 1, 2021 to December 31, 2023.
 - “*New strategies for testing gravity in strong-field regimes*”. PI: D. Sáez-Chillón Gómez. Ref. Ministry of Science: PID2020-117301GA-I00. From September 1, 2021 to December 31, 2024.
 - “*New Developments in Mathematical Modeling of Quantum Phenomena*”. PI: L.M. Nieto y M.A. González-León. Ref. Ministry of Science: PID2020-113406GB-I00. From September 1, 2021 to December 31, 2023.

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Work-team (Valladolid pole): 8 Faculty members, 3 Senior postdocs (+1 incoming), 5 (+2 incoming) PhD students and 4 associated members:

Faculty members and senior postdocs

Fernando Buitrago
Manuel Donaire
Manuel Gadella
José M. Izquierdo
Justo López-Sarrión
José M. Muñoz-Castañeda
Javier Negro
Luismi Nieto
Mariano del Olmo
Diego Sáez-Chillón Gómez
Mariano Santander

PhD students

César Romaniega
Julio Sánchez Cánovas
Carlos San Millán
Lucía Santamaría
Marcos Tello

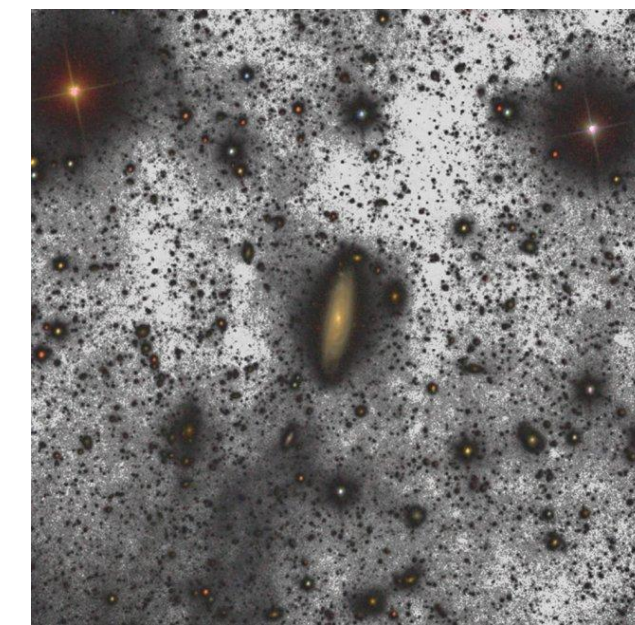
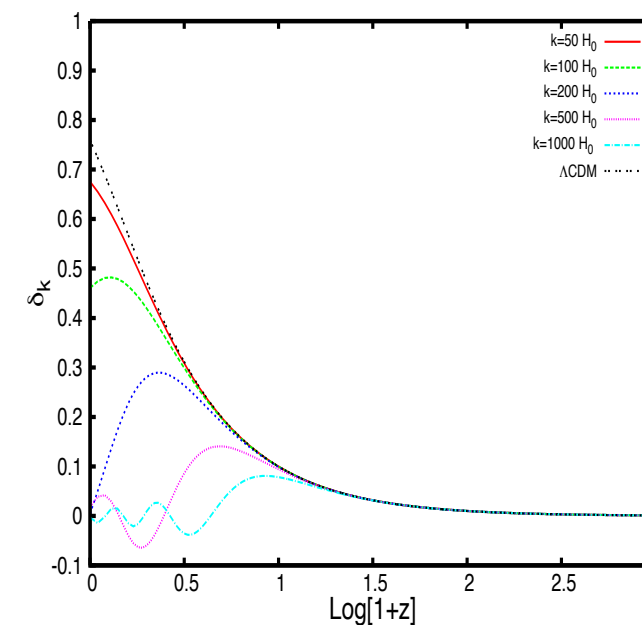
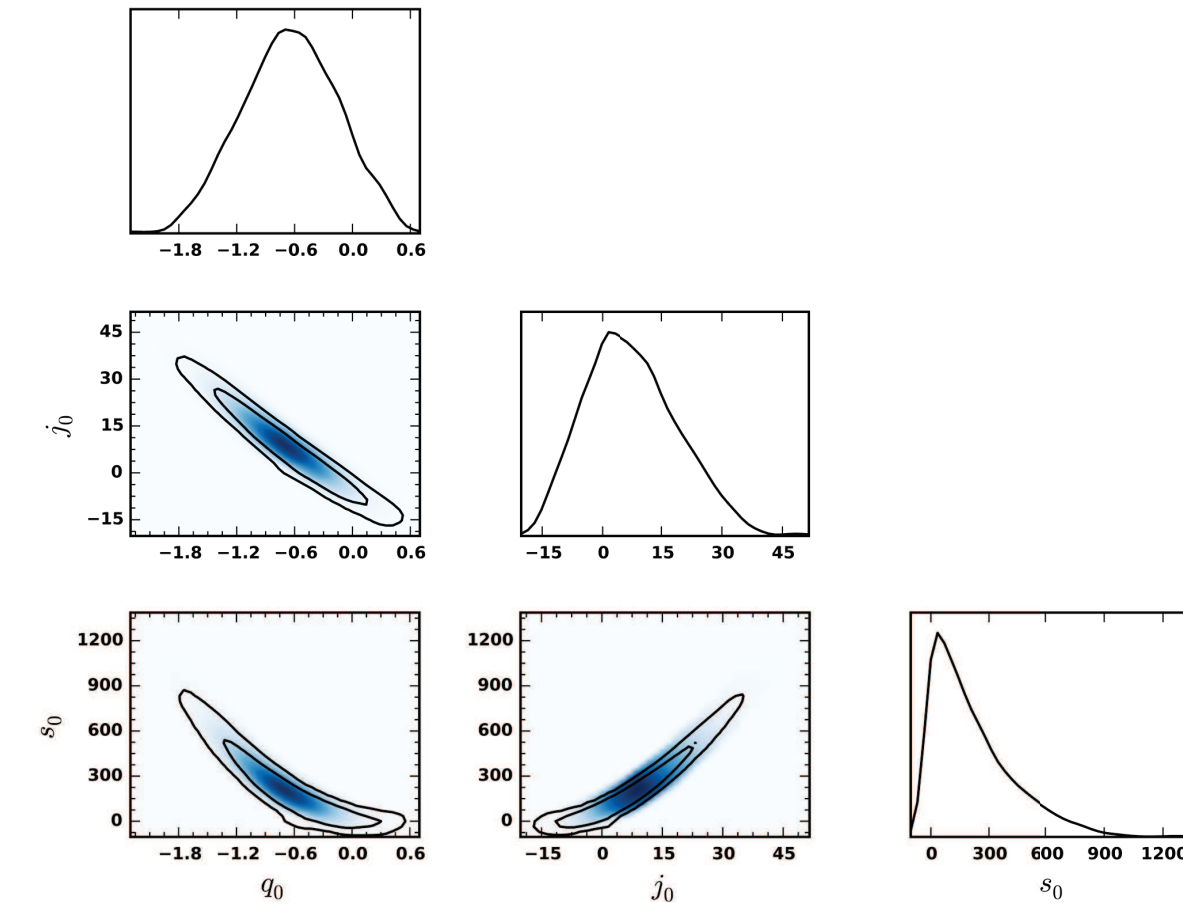
Associated members

Juan J. Álvarez-Sánchez
Fernando M. Gómez-Cubillo
Guillermo López-Reyes
J. Francisco Sanz-Requena

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Previous work and experience:

- Analysis of cosmological solutions in modified gravities.
- Propagation of Gravitational Waves.
- Non-trivial Black holes solutions in some scalar-tensor theories.
- Growth of cosmological perturbations.
- Inflationary models.
- Cosmological singularities.
- Progressive assembly of galaxies through cosmic time: low surface brightness regime.
- Analysis of Massive Black holes in the galaxies centres studied via pulsar timing array technique.



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Interests and synergies for the ET(-Spain) mission.

- Perturbations in static and rotating spacetimes in some extensions of General Relativity.
- Modelling the Gravitational Waves emission during the *ringdown* phase of binary systems merges.
- Inner structure of relativistic stars.
- Critical Collapse in extensions of GR.
- Shadows shapes around compact objects.
- Analysis of most massive black holes of the Universe with dynamical modelling with 3D spectroscopy.

