ET activities @ University of Salamanca and future plans

Ángeles Pérez-García
on behalf of REDONGRA node

University of Salamanca, Spain

VNiVERSiDAD D SALAMANCA
CAMPUS DE EXCELENCIA INTERNACIONAL

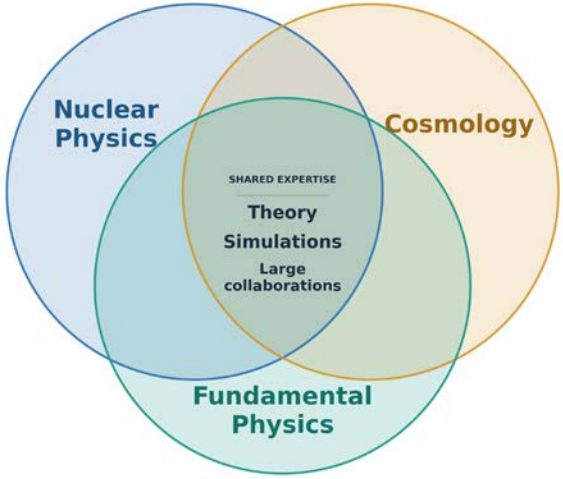
800 AÑOS
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REDONGRA
Red Española de Física de Ondas Gravitacionales
Spanish Network of Gravitational Wave Physics

MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES

AGENCIA ESTATAL DE INVESTIGACIÓN





- Additional **synergies with national ICTS** such as local CLPU at Campus de Villamayor-Salamanca and Canary Island Observatories OOCC, SCAYLE @ RES

Low and high-energy multimessengers complementary probes of Universe



Ultraprecision attosecond physics and timing







SCAYLE at RES

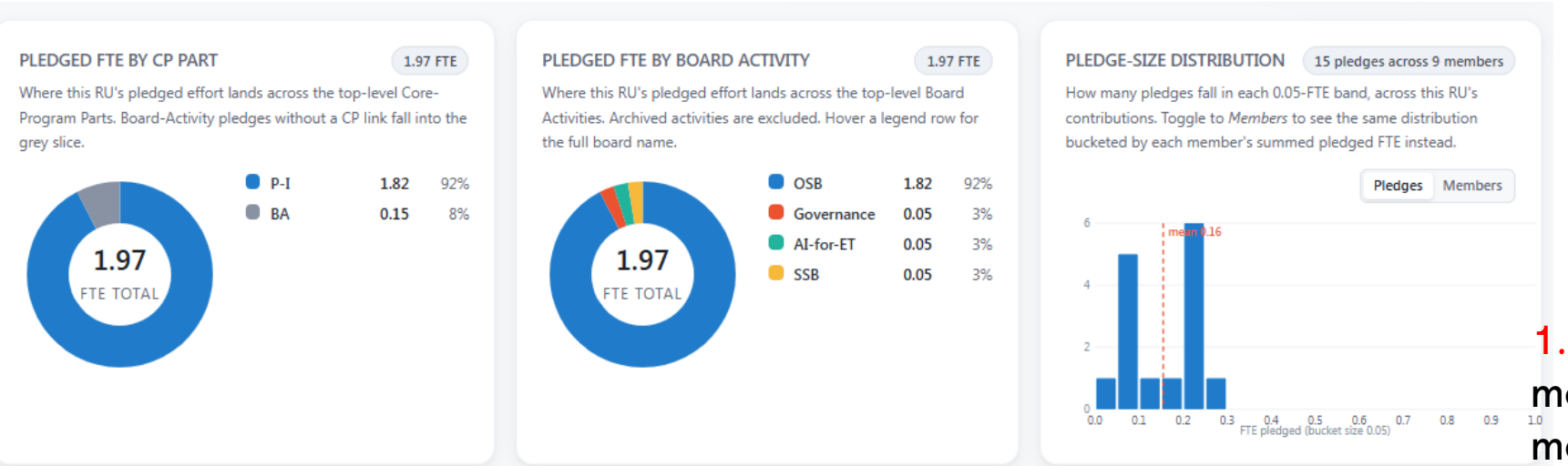
Research Unit (RU): Fundamental Physics: astrophysics and cosmology includes members in:

- Div 1: fundamental physics
- Div 2: cosmology
- Div 6: nuclear physics
- Div 7: stellar collapse and neutron stars

Structure of ET RU

Local expertise include: div 1, 2, 6 and additional div 7 and computing

- **University of Salamanca-IUFFyM & León:** C. Albertus, J. Beltrán, D. Bettoni, A de la Cruz-Dombriz (Outreach resp), I de Martino (RU Leader), M. Musso and Ángeles Pérez García (7 faculty). D. Barba González, P. Char , R. della Monica, Ruchika (4 postdocs).



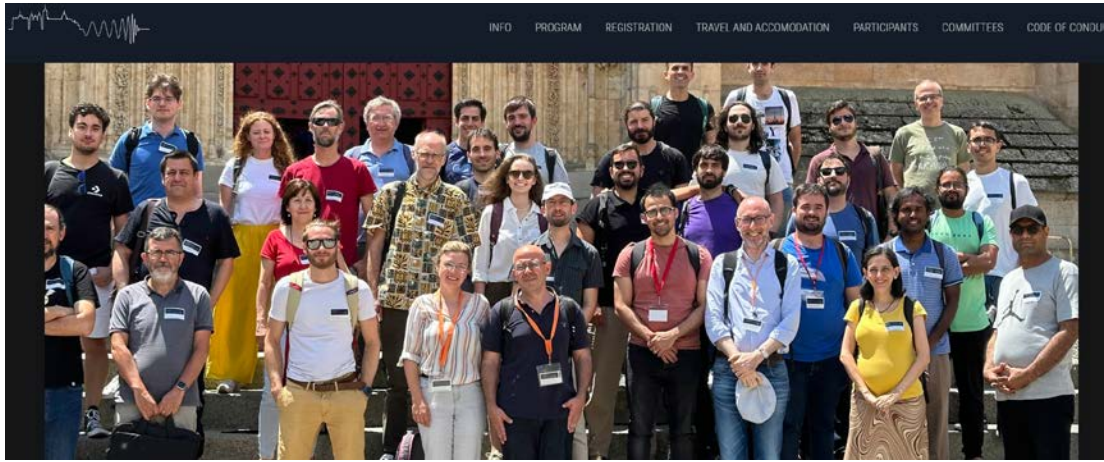
1.97 FTE, most CORE members

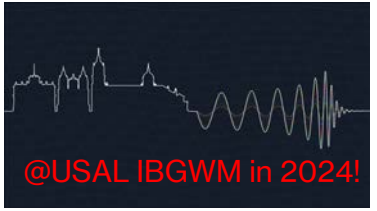
Structure of ET RU

Local expertise include: div 1, 2, 6 and additional div 7 and computing

Organization of scientific meetings:
IBGW2024, Multidark 2025, EREP, Ibericos,etc

Funded Network REDONGRA:
Ángeles Pérez García (PI Local node),
RENATA, MULTIDARK, SEGRE,
EU-COST actions





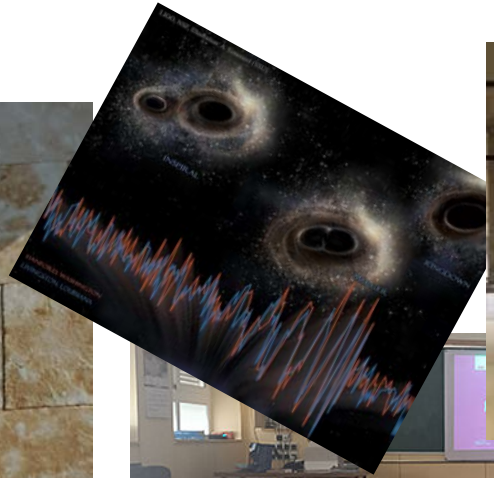
and other RU: UNINA, Roma2, Valencia and many others.

Structure of ET RU

Outreach: active in the media, seminars, talks at secondary schools in declared member research lines. Some RU members promoted Vítor to Domingo de Soto and 500th aniversary Escuela de Salamanca











REDONGRA

Reseach lines and synergies

- Fundamental Physics
  - Tests of BH nature. Stacking Methods [I. De Martino]
  - Effects of baryonic, DM and MG on NS properties, degenerancies, and redshift from tidal deformability [I. De Martino]
  - Dark matter in astrophysical environments [C. Albertus, D. Barba, Ángeles Pérez]
  - Multimessenger signatures of axions in stellar scenarios [C. Albertus, D. Barba, Ángeles Pérez]
  - Search for signatures from exotic compact objects with solid features. [J. Beltrán, P Char]
  - Search for ultralight boson clouds in binary systems with ET [R. Della Monica]
  - Boson stars and junction conditions in extended theories [A. de la Cruz-Dombriz]
  - Collab. synergies: Cosmic Explorer[Á. Pérez], MAAT@GTC, LPQI [C. Albertus, A. Pérez], Athena, and SKA. Redshift determination [I. De Martino] , SKA Gravitational Waves WG [A. de la Cruz-Dombriz]. Astroparticle physics in neutrinos.

- Cosmology
  - Forecast of DMcandidates (PBH) through population studies. Dark sirens [I. De Martino]
  - Bright sirens: electromagnetic counterpart from cross-correlation of GW-LSS data, or GRB [J. Beltrán, I. De Martino, M. Musso, Ruchika]
  - Models of PBH abundance and bias [M.Musso]
  - Signatures from cosmologies with non-trivial realisations of the CP [J. Beltrán]
  - BSSN formulation for f(R) gravity theories. Dynamics of close hyperbolic encounters [A. de la Cruz-Dombriz]
  - Signatures of charged DM models [D. Bettoni]

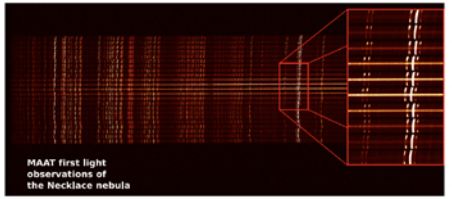
Reseach lines and synergies

- Astrophysics and Nuclear Physics
  - Tests equation of state (EoS). Ordinary vs DM [C. Albertus, Ángeles Pérez]
  - Neutron star properties from GW emission. GW in stellar collapse (div 7)
  - Elasticity and excitation of vibrational models in NS crust [C. Albertus, D. Barba, Ángeles Pérez]
  - Microscopic simulations of tidal stress [C. Albertus, D. Barba, Ángeles Pérez]
  - Multimessenger signatures of axions , electromagnetic counterparts in Kilonova and mergers. [C. Albertus, D. Barba, Ángeles Pérez]
  - Fermi signatures and DM interpretation of galactic center excess [C. Albertus, Ángeles Pérez]

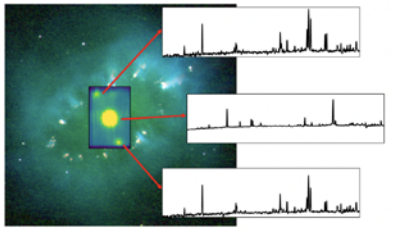
  - Collab. synergies: Div 6 and Div 1 task forces, Div 7 stellar collapse. Collaboration with La Palma telescopes in MAAT (first light may '26) and LPQI in intensity interferometry, recent collab with Fermi and COSI.
  - Open access: python scripts, Zenodo, github available to the cross-comunities: EoS

  - We participated in Blue book arXiv:2503.12263) The Science of the Einstein Telescope JCAP 03 (2026) 081 and additional ET-related papers.

  - THANK YOU!



Top: Raw MAAT/OSIRIS+ CCD frame from the first-light observation of the Neck
Nebula. The 23 horizontal traces correspond to the 0.3" × 10" MAAT slitlets; the i
highlights the nebular emission-line region around [SII] 6731+6717, [NII] 6583,
and [NII] 6548 (red is left, blue right); the central-star continuum is visible in th
central slitlets. Below: PypeIt-reduced [3] reconstructed MAAT first-light image
overlaid on an HST image of the field. Each MAAT spaxel contains a spectrum,
examples extracted for the central star and two nebular knots within the MAAT fi



Source: https://maat.iaa.es/