



Wed. May 29th, 2024

(Conference Room 01.00.IC.307, Module 00, Fac. Sciences)

09:00 **Opening**

**Session 1: Line 1. Biophysics and Statistical Physics of Complex Systems**

Chair: CA

09:10 Carla Alejandre Villalobos  
*Modeling a primordial, non-enzymatic RNA replication in the early Earth*

09:30 Arin Escobar  
*Transport of active colloids in structured environments*

09:50 Juan Luengo Márquez  
*Impact of flexibility and link chirality on the structural properties of 2D chainmails of interlocked ring copolymers*

10:10 Samuel Martínez Alcalá  
*Non-equilibrium dynamics of viral quasispecies under Darwinian evolution*

10:30 Luis Serrano Fernández  
*Unraveling perceptual biases: Insights from spiking recurrent neural networks*

10:50 **Coffee break**

**Session 2: Line 2. Experimental Characterization Techniques for Molecular, Nanometric and Biological Systems**

Chair: Beatriz Viña Bausá

11:10 Alicia Aparicio Millán  
*Mass and mechanical properties characterization of individual bacteria by multimode tracking of squared nanomechanical resonators*

11:30 Julio Esparza Ibáñez  
*Topological analysis of hippocampal representations*

11:50 Manuel Gómez-Moreno  
*Sensitivity and Resolution of Nanomechanical Spectrometry for Infectious Virus Detection*

**Session 3: Line 3. Physical Properties of Molecular, Nanometric and Biological Systems**

Chair: Julio Esparza Ibáñez

12:10 Miguel Cantero Reviejo  
*Coming clean with coronavirus: Real-time monitorization of TGEV coronavirus structure in presence of disinfectants*

12:30 Adrián García Abenza  
*Monte Carlo simulations of electron transmission for the evaluation of benzene electron scattering cross sections*



12:50 Julieta Lucía Baciredo  
*Development of novel bio-detection methodologies based on spectroscopy for the detection of HPV+ OPC in liquid biopsies*

13:10 Estrella Sánchez Viso  
*Angle dependent ferromagnetism in Fe<sub>3</sub>GeTe<sub>2</sub> thin layers*

13:30 **Lunch break**

**Session 4: Line 5. Nanoplasmonics, Nanoelectronics, and Quantum Optics**

*Chair: Carlos José Sánchez Martínez*

15:00 José Balduque Picazo  
*Scattering theory of thermal and thermoelectric rectification*

15:20 Blas Durá-Azorín  
*Geometrical anticorrelations: changing the photon statistics with the geometry of the electromagnetic environment*

15:40 Julia García Pérez  
*The beats of MoS<sub>2</sub> micro-drum resonators*

16:00 Tomás Levy-Yeyati Franzé  
*Conditional photonic phase gate in topological waveguide QED*

**Session 5: Line 7. Theory and Simulation in Condensed Matter (Biological Structures, Disordered Systems, Nanostructures, etc.)**

*Chair: Julia García Pérez*

16:20 Eduardo Bernal Molinero  
*Following the non-thermal phase transition in NbO<sub>2</sub> by time-resolved high-harmonic spectroscopy*

16:40 Miguel del Cañizo Nadal  
*Theoretical study of 2D materials: Mechanical, electronic, and thermodynamic properties from classical and quantum atomistic simulations*

17:00 Manuel Fernández López  
*Signatures of spinon Fermi arcs in the Weyl-Mott insulator*

17:20 Guillermo Parra Martínez  
*Excitonic insulators in monolayer transition metal dichalcogenides*

**Session 6: Flash presentations of posters**

17:50 **(Conference Room 01.00.IC.307, Module 00, Fac. Sciences)**

*Chair: Juan José de Miguel*

18:30 **Poster Session**  
**(Multipurpose Room 01.09.IC.202, Module 09, Fac. Sciences)**



**Thu. May 30th, 2024**

**(Conference Room 01.00.IC.307, Module 00, Fac. Sciences)**

**Session 7: Line 6. Physical Properties of Materials at Low Temperatures  
(Superconductivity, Superfluidity)**

*Chair: Anna-Luisa Römling*

- 09:20 Francisco Jesús Matute Fernández-Cañadas  
*Quantum circuits with multiterminal Josephson-Andreev junctions*
- 09:40 Gabriel Moraes Oliveira  
*Switching currents limited by the inverse proximity effect in a flux-tunable superconductor*
- 10:00 Daniel Michel Pino González  
*Minimal Kitaev-transmon qubit based on double quantum dots*
- 10:20 Pablo Tuero  
*Unravelling spin texture and spin-orbit coupling contributions in spin triplet superconductivity*
- 10:40 David Rodríguez  
*Integration of superconducting circuits and magnetic molecules for quantum technologies*

11:00 **Coffee break**

**Session 8: Line 4. Surface Physics (Characterization, Structuralization,  
Functionalization and Interaction with Atoms)**

*Chair: Francisco Jesús Matute Fernández-Cañadas*

- 11:20 Lenka Černá  
*Molecular surgery by Scanning Tunneling Microscopy*
- 11:40 Manuel González Lastre  
*Molecular Identification via Molecular Fingerprint extraction from Atomic Force  
Microscopy images*
- 12:00 Rosalía López-Méndez  
*Monitoring nanoscale temperature in 3D tumor cells during photothermia via X-ray  
nanothermometry*
- 12:20 Shanmugasibi K. Mathialagan  
*Designing organolanthanide sandwich complexes by on-surface synthesis*
- 12:40 Iván Martínez Ibarburu  
*Unveiling the interlayer interaction in 1H/1T-TaS<sub>2</sub> van der Waals heterostructure*

- 13:00 David Caldevilla-Asenjo  
*Characterization of planar Al-based Josephson Junctions proximitized by a  
ferromagnetic insulator*

13:20 **Lunch break**



**Session 9: Line 5. Nanoplasmonics, Nanoelectronics, and Quantum Optics**

Chair: Diego Fernández de la Pradilla Viso

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| 15:00 | David Mateos Roncero<br><i>Directional picoantenna behavior of tunnel junctions in the presence of atomic-scale defects</i>   |
| 15:20 | Eva Ortiz Mansilla<br><i>Deep Reinforcement Learning applied to Radiative Heat Transfer</i>                                   |
| 15:40 | Cristian Tabares López<br><i>A variational toolbox for analog quantum simulators</i>  |
| 16:00 | Anna-Luisa Römling<br><i>Resolving nonclassical magnon composition of a magnetic ground state via a qubit</i>                 |
| 16:20 | Juan R. Deop-Ruano<br><i>Coupled transfer of energy and momentum induced by the fluctuations of the electromagnetic field</i> |
| 16:40 | Alejandro Vivas-Viaña<br><i>Quantum metrology through spectral measurements in quantum optics</i>                             |

**Session 10: Line 7. Theory and Simulation in Condensed Matter (Biological Structures, Disordered Systems, Nanostructures, etc.)**

Chair: Cristian Tabares López

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| 17:00 | Carlos Payá<br><i>Phenomenology of Majorana zero modes in full-shell hybrid nanowires</i>          |
| 17:20 | Carlos Roldán Piñero<br><i>Efficient Electron Hopping Transport through Azurin-Based Junctions</i> |
| 17:40 | Jorge Vega Martín<br><i>Simulating Proton Transport through Peptide Nanotubes</i>                  |



## Posters list

- Lyra Zumeta Sánchez**  
P1 *"How temperature impacts the activity of the mitochondrial replisome, a single-molecule approach"*
- Luis Serrano Fernández**  
P2 *"Representation of a Perceptual Bias in the Prefrontal Cortex"*
- Diego Alonso Aldave**  
P3 *"Stability of tobacco mosaic virus under high temperatures"*
- María Ortiz Rodríguez**  
P4 *"Single-molecule manipulation of genome integrity guardians"*
- Beatriz Viña Bausá**  
P5 *"Controlling magnetic interactions between  $S=1/2$  spins at unusually large distances"*
- Samuel Míguez Amil**  
P6 *"Macromolecular complexes in mtDNA replication processes: Molecular and structural mechanisms by cryo-EM"*
- Ana Galindo-Bernabeu**  
P7 *"Wettability AFM study on biological surfaces"*
- Gonzalo Pérez Serrano**  
P8 *"Designing model photosystem for tracking protein dynamics in chromophore's light harvesting properties"*
- Fernando Chacón Sánchez**  
P9 *"On the road for sustainable structural colors based on Bismuth plasmonics: nanostructured metasurfaces vs Fabry-Perot cavities"*
- Julia Rubio Loscertales**  
P10 *"Single Molecule Tracking to unravel the role the bilayer plays in FtsZ active assembling"*
- Claudia Flórez Echavarría**  
P11 *"Studying photosystem conformation landscape by protein loop engineering"*
- Hamida Goidria**  
P12 *"Study of 2-dimensional chiral hybrid organic-inorganic metal halides"*
- Miguel Varea**  
P13 *"Light-matter interaction of field emission resonances in a scanning tunneling microscope"*
- Sergio Jiménez Fernández**  
P14 *"From  $\beta$ -SnSe to  $Au_2Sn$  through atomic hydrogen etching"*
- José María Gómez**  
P15 *"On-surface synthesis of photoactive BOPHY-based 2D networks on two coinage metals"*



**Ahlam Saleh H Alamri**

P16 *"Copper Carbon Dots Nanozymes as a Potential Catalyst with Peroxidase-Like Activity for Biosensors Development"*

**Inés García Manuz**

P17 *"Observation of exchange bias in ultrathin  $La_{0.3}Sr_{0.7}MnO_3$  films"*

**Carlos José Sánchez Martínez**

P18 *"A mixed perturbative-nonperturbative treatment for strong light-matter interactions"*

**Pranav Pradeep**

P19 *"Current-driven orbital angular momentum flow from Cu/oxide interfaces"*

**Diego Fernández de la Pradilla Viso**

P20 *"Taming the Bloch-Redfield equation: Recovering an accurate Lindblad equation for general open quantum systems"*

**Maksim Lednev**

P21 *"Lindblad Master Equation Capable of Describing Hybrid Quantum Systems in the Ultrastrong Coupling Regime"*

**João Fradet**

P22 *"Complex two-step magnetisation reversal in bi-modulated cylindrical FeCo Nanowires"*

**Manuel García Pérez de Algaba**

P23 *"Low-depth simulations of fermionic systems on realistic quantum hardware"*

**Haripriya Madathil**

P24 *"Non-linear magnetoresistive phenomena in  $Pt/Y_3Fe_5O_{12}$  from magnon creation/annihilation processes"*

**Juan José García Esteban**

P25 *"Deep Learning for the Modeling and Inverse Design of Radiative Heat Transfer in Data-scarce Situations"*

**Ignacio Sardinero Sánchez**

P26 *"Current-phase relation in Fibonacci Josephson junctions"*

**Alberto Andrino**

P27 *"Preparation and study of potential amorphous topological superconductors of Bi-Sb"*

**Manuel Antonio García Blázquez**

P28 *"Chirality-induced Spin Selectivity In and Out of Equilibrium from a Group-Theoretic Perspective"*

**Ana María Zamora-Vinaroz**

P29 *"Monte Carlo simulation of the water equivalent ratio for therapeutical proton beams in cortical bone"*



- P30 **Beatriz Castillo**  
*“Photonic and phononic characterization of twisted acoustoplasmonic nanostructures”*
- P31 **Miguel Sánchez Sánchez**  
*“Correlated phases and topological phase transition in twisted bilayer graphene at one quantum of magnetic flux”*
- P32 **Miguel Clavero Rubio**  
*“Topological Quantum dissipative phases with trapped ions”*
- P33 **Juan José Esteve-Paredes**  
*“Including electron-hole interactions in non-linear optical responses: workflow to extract the DC shift current”*
- P34 **Joan Bernabeu**  
*“Ultraquantum Limit of Axionic Charge Density Waves”*
- P35 **Philipp Mercebach**  
*“Thermoelectric Signatures of Bogoliubov Fermi Surface in superconducting 3D Topological Insulator Heterostructures”*
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En el siguiente enlace se puede acceder al Libro de Abstracts de la reunión:

[https://dauam-my.sharepoint.com/:b:/g/personal/juanjose\\_demiguel\\_uam\\_es/ETZPZ-mTt1tNjiyfCukOtkoBcibOyNb-il3NV5-E71pacQ?e=sG3eVg](https://dauam-my.sharepoint.com/:b:/g/personal/juanjose_demiguel_uam_es/ETZPZ-mTt1tNjiyfCukOtkoBcibOyNb-il3NV5-E71pacQ?e=sG3eVg)

