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Category: [Departmental News](#)

[Promotional video: Theoretical Condensed Matter Physics \(UAM\)](#)

International Day of Women and Girls in Science - 11 February

Merry Christmas And Happy New Year 2019

Best Theoretical Doctoral Thesis in Condensed Matter Physics 2018

FET Open Project CATCH-U-DNA: Capturing non-Amplified Tumor Circulating DNA with Ultrasound Hydrodynamics

Physics Degree at UAM No. 1 - "El Mundo" Universities Ranking 2018

Merry Christmas And Happy New Year 2018

Best Theoretical Doctoral Thesis in Condensed Matter Physics 2017

Francisco J. Garcia-Vidal included in Clarivate 2017 Compilation of Most Influential Authors

Winner of the IUPAP Young Scientist Prize in Atomic, Molecular and Optical Physics 2017

Thesis Defense - Entropy, Order and 2D Confinement of Hard Particles

Physics Undergraduate Student Research Awards - 2017

International Day of Women and Girls in Science - 11 February

Merry Christmas And Happy New Year 2017

Thesis Defense - Reaching Quantum Polaritons

Thesis Defense - Generation of Non Classical States of Light

ERC Starting Grant Obtained by Johannes Feist

Informal Seminars: 2015-2016 Series

Physics Undergraduate Student Research Awards - 2016

Thesis Defense - Characterizing Real-life Graphene Through The Latest First-principles Methodological Developments

APS Announces Outstanding Referees for 2016

Thesis Defense - Theoretical Description of Wave Propagation in Magnetoplasmonic Nanostructures

Prof. Carlos Tejedor - Café Scientifique

Physics Undergraduate Student Research Awards - 2015

Thesis Defense - Dynamics of the Formation of Rings of Protein Filaments

Francisco J. García-Vidal included in Thomson Reuters 2014 Compilation of Most Influential Authors

Elections to the Head of Department

Thesis Defense - Minimal Models for Finite Particles in Fluctuating Hydrodynamics

Prof. Pedro Tarazona Lafarga - Medal of the Royal Spanish Society of Physics

Thesis Defense - Frontiers in Plasmonics: Transformation Optics, Magnetic Plasmons, Brownian Ratchets and Quantum Phenomena

Jorge Bravo-Abad - MIT Technology Review Innovadores

Category: Funded Projects

Category: International Projects

MESOPLAS - FP7 Marie Curie Career Integration Grants

SQUIRREL - Sensing Quantum Information Correlations

PLASMONANOQUANTA – Frontiers in Plasmonics: Transformation Optics, Quantum and Nonlinear Phenomena

ACRITAS – Actuation and Characterisation at the Single Bond Limit

POLAFLOW – Polariton Condensates: From Fundamental Physics to Quantum Based Devices

SE2ND – Source of Entangled Electrons in Nano Devices

Category: National Projects

Classical and Quantum Electrodynamics of Light-matter Coupling

Protein-based Electronics

Strongly Correlated Electrons in Quantum Materials and in Far from Equilibrium Nanostructures

Quantum and Nonlinear Phenomena in Plasmonics

NANOQUO – Nanostructures for Quantum Optics

Correlated Electrons in Hybrid Nanostructures: From Transport Properties to Quantum Information Processing

Theoretical Description of Wave Propagation in Magneto-Plasmonic Nanostructures

Self-Assembling Materials: Theory and Simulation

Force-for-Future – Advanced Force Technology for Future Nanomechanics and Nanomedicine

Structure and Dynamics of Complex Fluids and their Interfaces

Category: Job Opportunities

Category: Closed Jobs

PhD Position in Nanoscale Thermal Transport – Closed

HPC Systems Administrator at CCC-UAM – Closed

Postdoctoral Position at UAM-IFIMAC in Electron Transport Through Proteins and Peptides – Closed

IFIMAC's Master Grants for 2017-2018 – Closed

Postdoctoral Position Available at IFIMAC and FTMC on Classical and Quantum Electrodynamics of light-matter Coupling – Closed

Pre-doctoral Training Program at IFIMAC – Center of Excellence Severo Ochoa 2015 – Closed

PhD Studentship Funded by the EU-FP7 Marie Curie Career Integration Grants – Closed

Category: Research Highlights

Category: Articles

Nanocavity-modified Ground State Chemistry

Steering of Chiral Valley Photons in Transition Metal Dichalcogenides

Quasichiral Interactions between Quantum Emitters at the Nanoscale

Impact of Detuning and Dephasing on a Laser-corrected Subnatural-linewidth Single-photon Source

Towards Deciphering the Physical Code of DNA
Molecular Identification and Bonding Information from High-resolution AFM
Spin-Orbit Splitting of Andreev States Revealed by Microwave Spectroscopy
A Single Hydrogen Molecule as an Intensity Chopper in an Electrically Driven
Plasmonic Nanocavity
Cooling By Cooper Pair Splitting
Radiative Heat Transfer
Frequency-resolved Monte Carlo
First Observation of the Quantized Exciton-polariton Field and Effect of
Interactions on a Single Polariton
Resonant Tunneling in Protein-based Junctions
Peltier Cooling in Molecular Junctions
Weakly Trapped, Charged, and Free Excitons in Single-Layer MoS₂ in the
Presence of Defects, Strain, and Charged Impurities
Triggering Many Molecular Reactions With a Single Photon
Solving the Mystery of the Strikingly Different Mechanical Response of Nucleic
Acids
Enhancing Radiative Heat Transfer With Silicon Metasurfaces
Zero-energy Pinning from Interactions in Majorana Nanowires
Computational Simulation of Photochemical Reactions in DNA
Quantized Thermal Transport in Single-Atom Junctions
Radiative Heat Transfer in Ångström and Nanometer-sized Gaps
A Bright Nanolight for Plasmonic Circuitry
Exploiting Vibrational Strong Coupling to Make an Optical Parametric Oscillator
out of a Raman Laser
Intermittent Chaos for Ergodic Light Trapping in a Photonic Fiber Plate
Quench Dynamics in Superconducting Nanojunctions: Formation of Andreev
Bound States and Quasiparticle Trapping
When Quantum Light Meets Matter
Suppressing Photochemical Reactions Through Strong Coupling
Attosecond Correlation Dynamics
Uncoupled Dark States Can Inherit Polaritonic Properties
Transformation Optics Approach to Plasmon-Exciton Strong Coupling in
Nanocavities
Polaritonic Rabi and Josephson Oscillations
Atomically Resolved Three-dimensional Structures of Electrolyte Aqueous
Solutions Near a Solid Surface
The Electric Field of CO Tips and Its Relevance for Atomic Force Microscopy
Solid-state Lasers Go Nano
Quantum Statistics of Bosonic Cascades
Self-Interfering Wave Packets

Enhanced Two-photon Emission from a Dressed Biexciton
Real-space Collapse of a Polariton Condensate
Radiative Heat Transfer In The Extreme Near Field
Nonequilibrium Phase Transition in a Two-Dimensional Driven Open Quantum System
Quantum Interference in a Cooper Pair Splitter Makes Entanglement Production Plausible
Pronounced Photovoltaic Response from Multilayered Transition-Metal Dichalcogenides PN-Junctions
Cavity-Induced Modifications of Molecular Structure in the Strong-Coupling Regime
Polarization Shaping of Poincaré Beams by Polariton Oscillations
Ultraefficient Coupling of a Quantum Emitter to the Tunable Guided Plasmons of a Carbon Nanotube
Exciting Polaritons with Quantum Light
Coupling of Artificial Atoms to V-groove Plasmonic Waveguides
The Environment Does the Trick
Coherent generation of nonclassical light on chip via detuned photon blockade – published in Physical Review Letters
Excitons do the Long Jump – published in Physical Review Letters
Direct Observation of Josephson Vortex Cores – published in Nature Physics
Enhancement of Near-field Radiative Heat Transfer Using Polar dielectric Thin Films – published in Nature Nanotechnology
Disorder Sets Light Straight – published in Nature Physics News and Views
Detection of Spin Entanglement via Spin-Charge Separation in Crossed Tomonaga-Luttinger Liquids – published in Physical Review Letters
Ultrafast Control and Rabi Oscillations of Polaritons – published in Physical Review Letters
Long-range Charge Transport in Single G-quadruplex DNA Molecules – published in Nature Nanotechnology
Emitters of N-photon bundles – published in Nature Photonics
A Current-driven Single-Atom Memory – published in Nature Nanotechnology
Heat Dissipation in Atomic-Scale Junctions – published in Nature

Category: Projects

Condensed Matter Physics Center has been awarded with a “María de Maeztu” Grant

Category: Seminars

Enhanced Surface Tension of Liquid-vapour Interfaces at Mesoscopic Scales
Signatures of Quantum Condensation in a Plasmonic Nanoparticle Array
Capillary Emptying and Wetting Transitions: Why the Tragedy of Spilling a Glass of Beer is Actually a Rare Interfacial Phase Transition

Modelling of Active Plasmonic and Metamaterial Systems in the Time-Domain

Density instabilities in 2D dipolar Fermi gases

Advances in three-dimensional imaging, quantitative mapping and device fabrication by force microscopy

A force generating living polymer: experiments and theory to understand how it works

The influence of defects in the electrical transport properties of metalorganic nanoribbons and in the mechanical properties of suspended graphene flakes

Thermoelectric properties of Chromium Nitride

Continuous Mott transition between a Fermi-liquid and a gapless spin-liquid

Periodically nanostructured graphene

Theory and experiments with quantum fluids of light

The Nobel prize in Physics 2012

Spin-orbit interaction in carbon nanotubes and its utility for proving entanglement of electrons

Structural flexibility mapping by bimodal atomic force microscopy in liquids

A new tool for particle hydrodynamics at different scales

Transport spectroscopy of NS nanowire junctions with Majorana fermions

Ultrafast switching of semiconductor microcavities

Improvement of STM Resolution with H-sensitized Tips

Digital Quantum Simulation with Rydberg Atoms and Ions

Magnetic ground states in transition-metal oxides driven by superexchange interactions

Integrable Richardson-Gaudin models in mesoscopic physics

Non-Abelian gauge fields in twisted bilayer graphene

Dynamical Simulations of Virus Wrapping and Budding

DFT analysis of combined 3D NC-AFM and STM imaging of the Cu(100)-O oxide surface

Understanding nc-AFM contrast on TiO₂ and water adsorption on CeO₂

Semiconductor nanostructures grown on GaAs nanoholes for quantum optical information technologies

Superradiance Mediated by Graphene Surface Plasmons

Fano interference and infrared phonon activity in bilayer graphene

Quantum Effects in Plasmonic Nanostructures

Electronic transport in defective low dimensional carbon materials: nanotubes and graphene

On the optical properties of graphenes

Quantum Information for Molecular Physics

First-Principles Simulations on PbTiO₃/SrTiO₃ Superlattices

Towards a microscopic description of the pseudogap phase in cuprate and organic superconductors

Pi-phases and triplet pair correlations in s-wave superfluids as signatures of the FFLO-type states

Magnetoplasmonics: The interplay between magneto-optics and plasmonics

Lens-like particles and their entropy-driven clustering

Josephson current in finite-length nanowire SNS junctions with Majorana fermions

Quantum Optics as Tools to Probe the Spacetime Structure

The impact of electron interactions on one-dimensional helical conductors and Majorana end states

Landau-Zener tunneling of qubits: dynamics, decoherence, and measurement

A new tool for particle hydrodynamics at different scales

DiagMC for the Anderson-Holstein model: Separation of timescales

Quantum transport of cold atoms

Collection and Concentration of Light by Touching Spheres: A Transformation Optics Approach

The Tau-3 lattice, graphene's big brother: transport and spectral properties

2D nematics in a circular cavity

Entanglement and Quantum Criticality

Molding the flow of Terahertz radiation using plasmonic metamaterials

Spin transport in graphene

Ring-shaped nanomagnets: from quantum effects to spin-cluster qubits

Torsion and anchoring of protein filaments

Density Functional Theory - OpenMX

The glass transition and the universal properties of glasses

PForces and currents in carbon nanostructures

Phase-controlled transport in periodically-driven optical lattices

Phase-controlled transport in periodically-driven optical lattices

Shaping a quantum field with dissipation

Towards quantum plasmonics: plasmon mediated qubit-qubit entanglement

Dynamic response of a Kondo dot in a photonic cavity

Quantum transport of cold atoms

Which is the origin of the resistivity anisotropy in iron superconductors?

Non Linear processes in structured solid state lasers

Huge enhancement of the magnetoresistance in nanoparticle arrays

Resonant Optical Forces on Metallic and Dielectric Nanoparticles

Optical Response of Metallic Nanogaps: From Nanoelectronics to Nanoplasmonics

Coupling between topological insulators: Band topology and quantum spin Hall effect in bilayer graphene

Spin Coherent Phenomena in Quantum Dots Driven by AC Magnetic Fields

Quantum Entanglement in Many Body Systems

Spoof Plasmons: Dominos, Endoscopes and Invisibility Cloaks

Single Molecule Junctions

Lasers made from self-assembled photonic structures
Microcavity-Mediated coupling of two distant semiconductor quantum dots
Plasmon Quantum Tsunami on C60 observed with highly charged ion energy gain spectroscopy
Organic and inorganic semiconductor interfaces across physics, chemistry and time
The curious magnetic state in undoped iron pnictides
Nuclear magnetism, electron order, spin-filtering, and spin-selective Peierls transitions in interacting one-dimensional conductors
Quantum pumping in graphene
Superconducting molecular quantum dots
Spectroscopy of the Andreev Bound States in a Carbon Nanotube
Persistent currents and quantised vortices in a matter-light superfluid
Noise Correlations and Coherent Coupling in Solid State Qubits
QM/MM Methods: Towards an Efficient and Accurate Description of Biological Photoreceptors and their Reactivity: Rhodopsin-Like Systems as an Example
Quantum control of spin qubits in Silicon
Charge and spin transfer statistics of quantum impurity models
Modifications of geometric and electronic properties of surface systems caused by structural defects
Light-matter coupling in photonic crystal structures: from sea-mouse to exciton-polaritons
The effect of the supporting oxide on the activity of vanadia catalysts
Probing the spin of a single atom with tunneling electrons
Many-body physics in arrays of ultracold atoms
Interplay of Coulomb correlations and geometrical frustration in two-dimensional compounds
Intermolecular interaction in DFT : Application to Carbon Nanotubes and Fullerenes
Control and instability of a periodically-driven Bose-Einstein condensate
Three-Dimensional Force Imaging and Quantification with Atomic Resolution
Transport studies of self-assembled InAs quantum dots contacted with superconducting leads
Unusual elastic and inelastic behaviors of carbon nanotubes due to molecular encapsulations: Dynamic force microscopy and spectroscopy studies
Numerical evaluation of four-center molecular integrals for localized orbitals
Dissipative Systems and Non-Equilibrium Bose-Einstein Condensation: from microcavity polaritons to atom lasers
Sculpting Membranes. Mechanisms of Curvature Generation by Proteins
Excitons in Carbon based quasi-1D systems: an ab-initio study of nanotubes and graphene ribbons
Electrical conduction through molecules: Influence of endgroups and sidegroups
Magnetotransport in non-magnetic inhomogeneous media

Cluster-based density functional approach to transport through molecular and atomic contacts

Tunable superfluids in ultracold atomic gases

Molecular simulations in the Era of GPUs

Exciton and Polariton Manipulation Within Semiconductor Microstructures

Toward molecule-machines at the nanoscale

Weak localization-like processes in gapped systems in connection with the realization of a source of entangled pairs of electrons

Theoretical aspects and modelization of low dimensional Molecular Conductors

Adiabatic pumping through quantum dots

Hard Superconductivity in Soft Quantum Films

Adaptive Resolution Molecular Dynamics Scheme

Category: IFIMAC Seminars

Metallic Nanostructures and Quantum Emitters

Photon Statistics Measured with Scanning Tunneling Microscopy Luminescence on Single Molecules

Analog Quantum Chemistry Simulation with Ultra-cold Atoms

Looking for Magnetism in Graphene

Universal Natural Shapes

An Operational Approach to Quantum Stochastic Thermodynamics

Non-perturbative Cavity QED

Periodic Energy Transport and Entropy in Quantum Electronics

Recent Developments and Applications of Inverse Design in Nanophotonics

The Quantum Design of Photosynthesis for Bio-Inspired Solar-Energy Conversion

Enhancing Quantum Coherence of Organic Molecules with Nanophotonic Structures

Active Colloid at a Fluid Interface

Resolution of Superluminal Signalling in Non-perturbative Cavity Quantum Electrodynamics

Theoretical Challenges in Levitated Nanomechanics: the case of magnon-phonon interaction

Coupling Molecules and Atomic-scale Plasmonic Fields

Robustness of Yu-Shiba-Rusinov Resonances in Presence of a Complex Superconducting Order Parameter

Large Deviations and Quantum Non-equilibrium

Optical Characterization at the Nanoscale

Bubbles, Drops and Vesicles: The Charm of Microfluidics

Superconductors and Quantum Information Preservation in Black Holes

Geometry-invariant Phenomena in Near-zero-index Media

Polariton Lattices: A Novel Platform for Analogue Simulation

Charge and Energy Noise in ac-driven Conductors and their Detection from

Frequency-resolved Potential and Temperature Fluctuations
Velocity Gradient Power Functional Theory for Brownian Dynamics
Computational Study of the Collective Motion of Micro-swimmers
Polymer-theory Insights into Biomolecular Systems
Fabrication of Gold Nano-Crystal Arrays for Molecular Electronics: High Frequency
Molecular Rectifiers and π - π Inter Molecular Interaction Energy
Complex Magnetic Structures at Surfaces and Their Imaging with STM from First Principles
Molecular and Biomolecular Electron Transfer Processes: From the Single Molecule to the Cellular Length Scales
Bottom-up Nanoelectronics: Contacting Single Molecules and Nanoparticles
Liquid-vapour Interfaces of Patchy Colloids
Josephson Photonics: Quantum Optics Meets Quantum Electronics
Fractional Spin And Josephson Effect In Time-reversal-invariant Topological Superconductors
Unexpected Phenomena In The Quantum Transport Through Carbon Nanotubes
Quantum Optics in Low Dimensions: From Fundamentals to Applications
Chiral Quantum Optics
Transport Through Topological Confined States of Matter
Modelling Organic Condensates From Weak To Strong Coupling
Multi-scale Molecular Dynamics Simulations of Photoactive Molecules Strongly Interacting With Confined Light
Weyl Semimetals in 3D Optical Lattices, and Synthetic Gauge Fields in Strongly Interacting 1D Bose Gases
A Single-photon Fock State Filter in the Solid State
Submolecular AFM Imaging and Spectroscopy on Single Molecules Using KolibriSensorTM and Cantilevers
Spin-orbit Coupling in Photonic Systems: from Optical Spin Hall Effect to Z Topological Insulator Analog
Polaritons in Lattices: A Nonlinear Photonic Emulator of Graphene
Probing Concepts in Single-Molecule Wires: Diodes, Electromechanics, FETs, Spinterface, Photo-switches and... Single-molecule Chemistry?
Spin Pumping And Quantum Anomalous Hall Effect In 2D-based Materials
Non-Covalent van der Waals Interactions at the Nanoscale: A Solved Problem?
Photonics of Excitonic Nanomaterials: Understanding and Controlling the Flow of Energy
Spin Polarization and Molecular Chirality In STM Junctions
Spin States in Molecules from a Quantum Information Perspective
Metal Nonlinearity - Some New Aspects
First Principles Understanding of Liquid Water and its Anomalies
Exfoliation, Hybridization and Chemical Functionalization of 2D Materials

International Year of Light: Two New Kinds of Light
Spin Texture of Sub-Gap Andreev Levels in Semiconductor Quantum Dots
Proximity-coupled to Superconductors
Building Nano-Lenses Based on DNA Origami Structures
Calculating the Conductance of Single Molecule Junctions from First Principles
Spectroscopy and Topological Phases for Organic Excitons
Crystallographic Transitions Coupled to Spin Crossover in Molecular Complexes
The Small Frontier: Imaging Atomic and Molecular Functionality
Quantum Merging: A Physical Mechanism for non-Abelian Matter
Non-equilibrium Transport Theory Compared with Experiments on Single
Molecular Junctions
Packing Them In: Using Self-Assembled Protein Cages to Direct the Synthesis and
Packaging of Polymers, Minerals, and Proteins
Superconductor Nanowire Superconductor Junctions as Useful Platforms to Study
Topological Superconductivity and Majorana Bound States
Strained Graphene Revisited
Anisotropic Magnetoresistance and the Nature of the Electronic Reconstruction in
Oxide Heterostructures
Cooper Pair Splitting as a Source of Entangled Electrons
Thermalization and Cooling of Plasmon-exciton-polaritons: Towards Quantum
Condensation
Ising Phase in AA Stacked Bilayer Graphene
Transport in Atomically Resolved Graphene Nanoribbons

Category: INC Colloquium

Visualization of Spatial Modulation and Persistent Response States of Strongly-
driven Membrane Resonators
Heavy, heavier, the softest – Heavy Electrons to Explore Correlated Quantum
Matter
When Light Goes Small
Lightwave Driven Quantum Dynamics: from molecular movies to Bloch waves
Imaging the Surface States of a Strongly Correlated Topological Insulator, SmB₆
Maxwell's Demon and Quantum Computers
Meeting at Oxide Interfaces: Superconductivity Between Insulators
Droplets of Quantum Physics or Why Helium is The Superelement
Materials, Energy and Life: Entertaining Aspects of High Magnetic Field Research
Majorana Braiding in Superconductors: How to Operate on a Zen Particle
Exploring Flatland with Cold Atomic Gases
Superconductors : the Magic and the Mystery
Material Design and Strongly Correlated Electron Systems
Electronic Liquid Crystals
How Mesoscopic Superconductivity is Changing Astronomical Observation

Particle Physics On a Chip: the Search for Majorana Fermions

A Chance to Grow: Design, Discovery, Growth and Characterization of Novel Compounds

Category: Trainings & Courses

Linux Administration Course

Parallel Programming with OpenMP and MPI

Linux on Scientific and Production Environment: Linux Security

Linux on Scientific and Production Environment: Advanced Level

Linux on Scientific and Production Environment

Parallel Programming with MPI and OpenMP

Training Course in Open Source Queue Management System – Slurm

Category: Uncategorized

FAQs

5.18 Locomotion in Complex Environments - Tutor: Juan Aragonés

5.17 Refracción Negativa, Óptica de Transformación e Invisibilidad - Tutores: Francisco J. García, Antonio Fernández Domínguez

5.16 Dynamics of Plasmonic Nanoparticles Under Optical Forces in an Hydrodynamic Environment / Dinámica de Nanopartículas Plasmónicas y luz en un Medio Hidrodinámico - Tutor: Rafael Delgado Buscalioni

5.15 Hibridación de Modos Ópticos en Sistemas Moleculares - Tutor: Pablo García González

5.14 Modelización de un Microscopio de Fuerzas Atómico (AFM): Imágenes de alta resolución de moléculas y materiales 2D - Tutor: Pablo Pou

5.13 Comportamiento de Campos Electromagnéticos en Cristales Fotónicos - Tutores: Francisco J. García, Esteban Moreno

5.12 Demonios de Maxwell que Hacen Trabajo sin Gastar Energía (ni violar el 2º principio de la termodinámica) - Tutor: Rafael Sánchez

5.11 ¿Cómo se Define la Temperatura en Sistemas Fuera del Equilibrio? - Tutor: Rafael Sánchez

5.10 Electron Transport Through Molecular Junctions - Tutores: Linda Angela Zotti, Juan Carlos Cuevas

5.9 Spontaneous Patterns in Coherently Driven Spinor Polariton Structures - Tutor: Francesca Maria Marchetti

5.8 Materia Activa: La Física de las Bandadas de Pájaros y los Motores Moleculares - Tutor: Pedro Tarazona

5.7 H₂O - Tutor: José Ortega

5.6 Simulaciones de Microscopía Túnel en Superficies Semiconductoras - Tutores: César González, José Ortega

5.5 Interacción de Moléculas con el Campo Electromagnético en Microcavidades - Tutores: Johannes Feist, Esteban Moreno

5.4 Entrelazamiento de Pares de Fotones Mediante Potenciales Oscilantes - Tutor:

Carlos Tejedor

5.3 Hard-spherocylinder Fluids as Two-phase Media and a Direct Test of the Decoupling Approximation - Tutor: Giorgio Cinacchi

5.2 Fluctuaciones en Interacción Luz-materia: Cisnes Negros y Estados Paralelos - Tutor: Elena del Valle

5.1 Passive Radiative Cooling - Tutor: Juan Carlos Cuevas