

LODY2026S



BOOK OF ABSTRACTS

SEVILLA LODY2026S
LOCALIZATION DYNAMICS IN MATTER AND WAVES
SATELLITE WORKSHOP IN SEVILLA
WORKSHOP IN HONOUR OF DR. LARISSA BRIZHIK, BITP, KYIV

Web site: <https://www.grupo.us.es/gfnl/talks/2026/lody2026S/>

Time and premises: Wednesday and Thursday, October 14-15, 2026

Wednesday 14: IMUS: Instituto de Matemáticas de la Universidad de Sevilla

Thursday 15: ETSII: Escuela Técnica Superior de Ingeniería Informática.
Avda Reina Mercedes, 41012-Sevilla

Organizers

Juan FR Archilla, Jesús Cuevas-Maraver, Faustino Palmero
Group of Nonlinear Physics, Universidad de Sevilla

Funding and collaboration

IMUS: Instituto de Matemáticas de la Universidad de Sevilla

ETSII: Escuela Técnica Superior de Ingeniería Informática

Departamento de Física Aplicada I through VII PPITUS-2026 I.1A

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Departamento de Física Aplicada I



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Almudena P Márquez: Universidad de Cádiz, Session 3, Wednesday 15

Elena Recio: Universidad de Cádiz, Session 4, , Wednesday 16

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ETSII Diploma of Distinguished Visitor to Dr. Larissa Brizhik

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PROGRAM

Wednesday, October 14, 2026 IMUS: Instituto de Matemáticas de la Universidad de Sevilla

Session 1: Chair [Niurka R Quintero](#), Group of Math. Modeling of Nonlinear Systems. U. Sevilla

10:00 [Leonor Cruzeiro](#), *The second protein folding problem*

10:30 [Eduardo Menéndez-Proupin](#), *Intrinsic defect in copper nitride.*

10:50 [Julia Cantisán](#), *Fractional dynamics in sine-Gordon models*

11:10 Coffee break

Session 2: Chair [Joël Tsoplefack](#), Group of Nonlinear Physics, Universidad de Sevilla

11:40 [Faustino Palmero](#), *Electrical lattices as experimental platforms for spatially localized Excitations in discrete systems*

12:00 [Juan FR Archilla](#), *Breathers in an electric all-bands-flat lattice.*

12:20 [Hiroki Ono](#), *Non-Fourier thermal transport and NP Symmetry*

12:50 [Michael F Russell](#) (on-line) *Solitons and quodons: What experiments show*

13:10 Lunch: Comedor Instituto de Idiomas

Thursday, October 15, 2026 at ETSII: Escuela Técnica Superior de Ingeniería Informática

Session 3: Chair [Almudena P Márquez](#), Group of Bif. Theory and Dyn. Systems, U. Cádiz

09:00 [Larissa Brizhik](#), *Soliton dynamics in a magnetic field and stabilizing role of dissipation effects*

09:30 [Francisco Villatoro](#), *Nonlinear Dirac equations: solitons and numerical challenges*

10:00 [David Mellado-Alcedo](#), *Stability of parametrically driven, damped nonlinear Dirac solitons*

10:20 Coffee break

Session 4: Chair [Elena Recio](#), Group of Bif. Theory and Dyn. Systems, U. Cádiz

10:50 [Jesús Cuevas-Maraver](#), *Ponderomotive solitons in plasmas,*

11:10 [Fernando Carreño-Navas](#), *Soliton dynamics and stability in PT-Symmetric Gross-Neveu models under modified nonlinear interactions*

11:30 [Jesús Casado-Pascual](#), *Controlling quantum transport by measurement-rate modulation*

11:50 [Maria Laura Olivera-Atencio](#), *Quantum reinforcement learning in the presence of thermal dissipation*

12:10 [Antonio Sojo](#), *Does The Stroboscopic Lindbladian Exist? An Analytical Approach*

12:30 [Pedro Pérez-Fernández](#), *Exploring dynamical phase diagrams with a double quench Controlled by relaxation time*

Session 5: Chair [Juan FR Archilla](#) Grupo de Física No Lineal. Universidad de Sevilla

13:00 [Larissa Brizhik](#), *Questions and answers about women, life and science in a country at war*

13:45-14:00 Closing ceremony:

[Francisco Vega-Narváez](#) director of the group [Científicas, Past Present and Future](#):

Delivery to Dr. Larissa Brizhik, of a signed copy of the [comic book](#) based on their plays

[Alejandro Fernández-Montes](#): ETSII Deputy Director of Research

Presentation of the ETSII Diploma of Distinguished Visitor to Dr. Larissa Brizhik and closing speech:

Foreword

This workshop is a continuation of the session of the same name LODY2026 within CMD32 the 32th General Conference of the Condensed-Matter Division of the European Physical Society-75h Conference of the Austrian Physical Society, Graz, Austria, September 2026. Organized by Juan FR Archilla, Manfred Faber, Masayuki Kimura and Yusuke Doi. It is focused in localization in classical and quantum physics including atomic and particle physics, photonics, condensed matter, matter waves.

Abstract

Solitons are ubiquitous examples of spatial localization, often in movement. They include discrete breathers as envelope solitons. Striking examples in water are tsunamis and bores, but they appear in many other systems as optical waveguides, Josephson junction arrays, Bose-Einstein condensates, matter waves, and biological molecules, to name a few. Solitons appear both in theory, classical and ab-initio nonlinear dynamics, and experiments. They often have long lives, which may hinder heat evacuation in tokamak fusion reactors. Polarons and solitons consist of a charge bounded to a local deformation and/or localized vibrational modes. They are often described using semi-classical models within the tight-binding approximation. Localization can also be in momentum as q-breathers, or in time, as rogue waves. Metamaterials allow for the engineering of especial properties including solitons. With time modulation, time crystals appear, as proposed by Nobel Laureate Frank Wilczek in 2012. Space-time metamaterials bring about new properties of localized excitations that appear within the frequency or momentum bandgaps. Electrons have also been described as topological solitons with Coulomb and Lorenz forces as a consequence, in this way, expanding the soliton concept to particle physics. This mini-colloquium intends to review recent advances and unify theories and approaches.

References:

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Soliton dynamics in a magnetic field and stabilizing role of dissipation effects

Larissa Brizhik

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In this talk I will represent the results of analytical study and numerical modelling of the influence of constant and oscillating magnetic fields on soliton dynamics in low-dimensional molecular systems (macromolecules, (semi)conducting polymers, etc). Such solitons are formed due to the electron-lattice coupling and represent localized states of an extra electron bound with the self-created deformation of the molecular chain. In view of their essentially nonlinear nature they provide long-range charge transport

It will be shown that in the presence of the external magnetic field solitons change their dynamical properties which depend on the orientation of the magnetic field with respect to the axis of the molecular chain. In particular, in the perpendicular magnetic fields their velocity attains oscillations with the frequency which is determined by the intensity and frequency of the magnetic field and by the parameters of the system. Due to such oscillations solitons emit weak linear acoustic waves and electromagnetic radiation. In the oscillating magnetic field solitons move with non-zero acceleration, and their emission increases with time, and they become less stable. Nevertheless, with the velocity increasing it is necessary to take into account dissipation effects which are always present in real circumstances. It is shown that these effects play stabilizing role in soliton dynamics: with time solitons attain some equilibrium velocity, determined by the balance of their radiation and energy dissipation.

These results of the analytical study are supported by the numerical simulations even for very strong magnetic fields, up to hundreds of Tesla. Thus, external magnetic fields affect soliton dynamics but do not affect efficiency of the charge transport.

L. Brizhik, *Chaos Solitons Fract*, **187** (2024) 115459

L. Brizhik, *Low Temp Phys*, **51** (2025) 655

L. Brizhik, B.M.A.G. Piette, *Chaos Solitons Fract*, **208** (2026) 115459

The second protein folding problem

Leonor Cruzeiro

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As it was observed in [1], there are two protein folding problems: the first problem consists in the prediction of the three dimensional structure of a protein from its amino acid sequence and the second problem consists of the knowledge of the physical processes that, in vivo, take that protein from its nascent structure to the native state. While the first protein folding problem was considerably advanced (solved?) by the application of deep learning methods [2], a solution to the second, physical, problem is still outstanding. This talk is concerned with the latter. We will start by reviewing what still seems to be the orthodox view, namely, that folding is an equilibrium process and that the native state corresponds to the conformation(s) that minimize the free energy. The experimental evidence in support of this view will be discussed. Then, numerical and experimental evidence against this view will be discussed. And finally, a different solution to the second protein folding problem will be proposed and its current status will be discussed.

Acknowledgements:

This study received Portuguese national funds from

FCT - Foundation for Science and Technology through contracts UID/04326/2025 (DOI <https://doi.org/10.54499/UID/04326/2025>), UID/PRR/04326/2025 (DOI <https://doi.org/10.54499/UID/PRR/04326/2025>) and LA/P/0101/2020 (DOI:10.54499/LA/P/0101/2020), and from the operational programmes CRESCE Algarve 2020 and COMPETE 2020 through contracts EMBRC.PT ALG-01-0145-FEDER-022121 and BIODATA.PT ALG-01-0145-FEDER-022231.

References:

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Nonlinear Dirac equations: solitons and numerical challenges

Francisco R. Villatoro

Universidad de Málaga, 29071, Málaga, Spain.

Quantum mechanics is linear, and making it fundamentally nonlinear comes at a high price. Generic deterministic nonlinear dynamics, as in Weinberg's proposal [1], can violate relativistic causality [2] and would let quantum computers solve NP-complete and #P problems in polynomial time [3]. As effective models, however, nonlinear Schrödinger and Dirac equations arise naturally in nonlinear optics, Bose–Einstein condensates, water waves, photonic systems, and Dirac materials.

Nonlinear Dirac equations are also studied as classical field theories and mean-field models. The Soler model [4], known in one dimension as the massive Gross–Neveu model [5], supports localized solitary waves and is a natural testbed for relativistic nonlinear dynamics. Its numerical study, however, is surprisingly subtle [6]. Finite differences, Fourier or Chebyshev collocation, periodic boxes, and dissipative time integrators can generate spurious eigenvalues, fermion doublers, and artificial instability bubbles, or overdamp genuine unstable modes.

I will present as yet unpublished results showing how single-cone staggered discretizations [7], structure-preserving integrators, and transparent or Jost-type open boundaries help separate physical instabilities from numerical artifacts. In the massive Soler model they distinguish genuine internal modes from Nyquist and finite-box artifacts. In a massless two-dimensional Weyl model they reveal a genuine radial instability with growth rate 0.2723, recover the neutral translational mode in the $q=1$ sector, and detect no non-radial instability in the spectral regions examined.

The practical lesson is that an instability should be trusted only when it survives mesh refinement, domain enlargement, and changes of spatial discretization and boundary treatment.

References:

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- [4] M. Soler, *Phys. Rev. D* 1, 2766–2769 (1970).
- [5] D. J. Gross and A. Neveu, *Phys. Rev. D* 10, 3235–3253 (1974).
- [6] T. I. Lakoba, *Phys. Lett. A* 382, 300–308 (2018).
- [7] R. Hammer, W. Pötz, and A. Arnold, *J. Comput. Phys.* 256, 728–747 (2014).

Breathers in an electric all-bands-flat lattice

Juan FR Archilla, Masayuki Kimura and Sergej Flach

Universidad de Sevilla, Setsunan University and Institute for Basic Science

Abstract

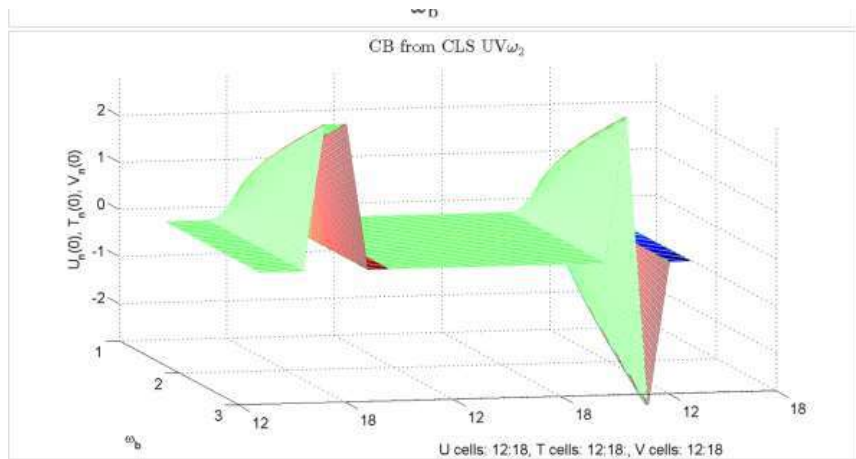
A lattice of electrical circuits with some specific coupling and three oscillators per unit cell, called the diamond lattice, has the property that the three phonon bands are optical and completely flat.

The addition of a nonlinear on-site hard potential brings about the existence of breathers, that is localized periodic oscillations. The

largest vibration can be located in any of the oscillators inside the unit cell, and their frequencies can be in three of the four different phonon forbidden bands. The forbidden band below the lowest flat band has no breathers due to

the hardness of the on-site potential. There are, therefore, nine different types of breathers, with different properties of stability and energy. Some of them are shown in the figure. We consider the increase of energy in the different oscillators in a thermalized system, and let the system evolve until thermalization is achieved, measuring the thermalization time. We use a function, called the localization function, which has the property that its value at thermal equilibrium is $N/2$, where N is the number of oscillators in the system.

The different routes to thermalization for the different breathers are described.



Acknowledgements

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YD acknowledges support from JSPS Kakenhi (C) No. 24K14978.

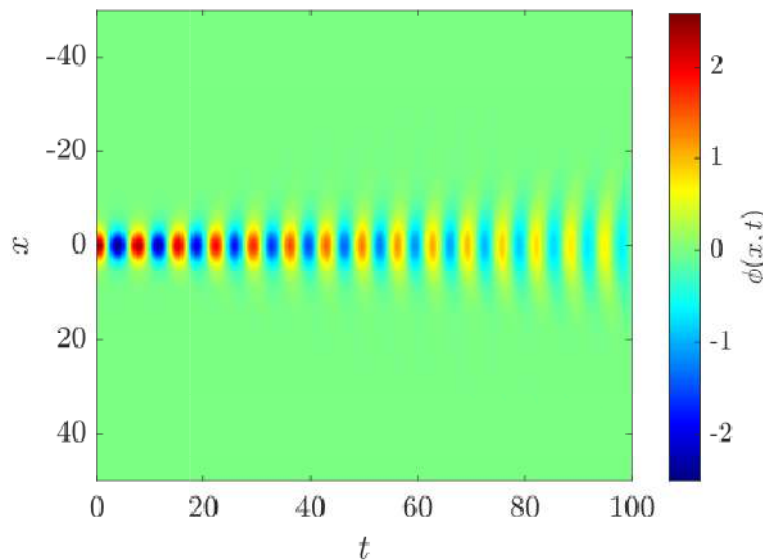
SF acknowledges funding by IBS Project No. IBS-R024-D1.

Fractional dynamics in sine-Gordon models

Tassos Bountis, **Julia Cantisán**, Jesús Cuevas-Maraver, J.E.Macías-Díaz, Panayotis G.Kevrekidis
University of Seville

Abstract

The study of physical, chemical and biological applications of fractional calculus has been a theme of growing interest over the past few years. With that spirit and motivation in mind, in the present work, we build on recent studies of spatially fractional models of the ϕ^4 type by examining the famous sine-Gordon equation with fractional derivatives in time. We show what happens to localized structures when we replace the usual time derivative by the Caputo derivative. We also explore if this type of model can be used to capture real media effects such as memory and losses.



Acknowledgements

Some of the authors acknowledge support from grant CEX2024-001517-M, funded by MICIU/AEI/10.13039/501100011033 and ERDF/EU.

Soliton dynamics and stability in PT-symmetric Gross-Neveu models under modified nonlinear interactions

Fernando Carreño-Navas

Group of Mathematical Modeling of Nonlinear Systems. Universidad de Sevilla,
IMUS

Abstract

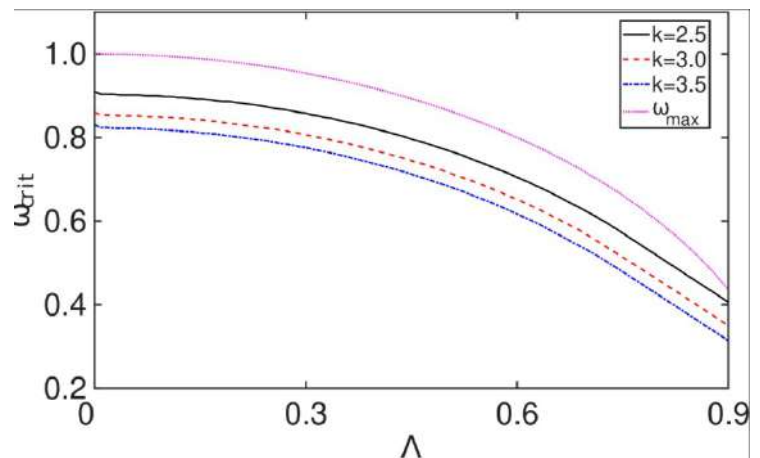
We investigate the interplay between gain-loss dynamics and nonlinearity in the $\mathcal{PT}$ -symmetric nonlinear Dirac equation with a scalar-scalar power-law interaction of the form

$$i\partial_t \psi + \partial_x^2 \psi - \psi^2 + \kappa |\psi|^k \psi = \kappa^5 \psi,$$

with $\kappa > 0$. Exact solitary wave solutions reveal that the $\mathcal{PT}$ -transition point is determined solely by the existence condition and is independent of the nonlinearity exponent k . Despite the presence of gain and loss, the energy remains conserved. Although charge and canonical momentum are not conserved, a $\mathcal{PT}$ -symmetric modification of the canonical momentum yields a new conserved quantity which gives rise to unusual kinematic properties.

Finally, linear stability analysis and numerical simulations show that gain-loss effects and higher-order nonlinearities reduce the stability region of solitary waves: solutions remain stable for $\kappa \leq 2$

and become unstable in part of the parameter space for $\kappa > 2$, when the frequency of oscillation ω exceeds a critical frequency ω_{crit} .



Acknowledgements

We thank Siannah Peñaranda, Renato Alvarez-Nodarse, and Niurka R. Quintero for valuable discussions on this work. F.C.N. was supported by Grant FPU24/00951 funded by the Ministerio de Ciencia, Innovación y Universidades (Spain).

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- N.V. Alexeeva, I.V. Barashenkov, A. Saxena. Ann. Phys. 403, 198 (2019)

Controlling quantum transport by measurement-rate modulation

Jesús Casado-Pascual, Luis Octavio Castaños-Cervantes

Física Teórica, Universidad de Sevilla, Multidisciplinary Unit for Energy Science,
Universidad de Sevilla, Tecnológico de Monterrey, Universidad Nacional Autónoma
de México, Mexico City, Mexico

Abstract

Temporal modulation of the measurement rate provides a powerful mechanism for controlling open-system dynamics through measurement backaction. We demonstrate this mechanism in a minimal exactly solvable model of a continuously monitored quantum particle on a switching lattice. We derive exact analytical expressions for the long-time current under both periodic and stochastic switching, revealing a common slow-switching limit and identifying a measurement-induced crossover between Zeno- and anti-Zeno-dominated transport regimes that controls the direction of the current.

Acknowledgements

This work is part of the project PID2022-136228NB-C22, funded by MICIU/AEI/10.13039/501100011033 and by ERDF/EU. This work was also co-financed by the European Union, Ministerio de Hacienda y Función Pública, FEDER, and Junta de Andalucía through project SOL2024-31833.

Ponderomotive solitons in plasmas

Jesús Cuevas-Maraver

Group of Nonlinear Physics. Universidad de Sevilla

Abstract

When a high-power laser is injected into a plasma, the non-homogeneous electric field exerts a ponderomotive force that pushes electrons which concomitantly pull cations creating cavities in the plasma. Due to the nonlinear nature of the interactions and the dispersive effects of the medium, the laser is self-focused creating an optical soliton; at the same time, the cavity in the plasma is also localized and the corresponding soliton is denoted as a caviton.

As demonstrated by Tappert et al. in the 1970s, the dynamics of the optical soliton can be described by a nonlinear Schrödinger (NLS) equation with a saturable-like nonlinearity (the so-called ‘ponderomotive nonlinearity’). In the 1980s, many studies focused on the relativistic effects and a relativistic NLS equation was developed such that, in the limit of local cavitation, leads to the well-known NLS equation with photorefractive nonlinearity.

These ponderomotive solitons have many potential applications. For instance, they can be used in proton beam therapy, radioisotopes synthesis, non-destructive tomography, micro-propulsion of artificial satellites, inertial confinement nuclear fusion or in plasma optical fibers which are able to guide petawatt lasers.

In this talk, I will revisit some dynamical properties of such nonlinear waves, paying special attention to the collision between solitons in both non-relativistic and relativistic scenarios.

Acknowledgements

I acknowledge support from grant CEX2024-001517-M, funded by MICIU/AEI/10.13039/501100011033 and ERDF/EU.

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Stability of parametrically driven, damped nonlinear Dirac solitons

David Mellado Alcedo

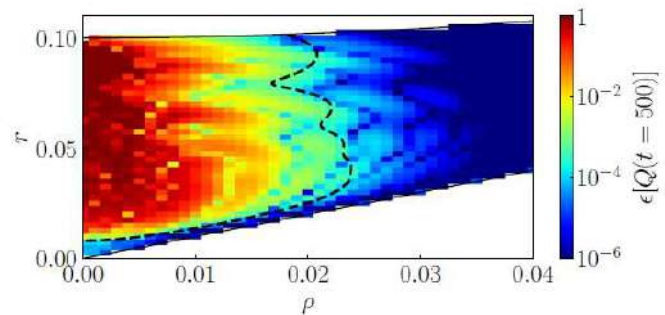
Group of Mathematical Modeling of Nonlinear Systems. Universidad de Sevilla
Departamento de Matemáticas. Universidad de Cádiz

Abstract

The stabilization of damped nonlinear Dirac (NLD) solitons is addressed by considering a time-periodic parametric force that supplies the required balance between energy losses and gains. Following previous studies on parametrically driven nonlinear Dirac equations, we obtain two exact stationary soliton solutions and derive their existence conditions. Numerical simulations are performed by using an algorithm based on the method of characteristics.

Their stability is studied by linearizing the NLD equation around these solutions and by solving the corresponding eigenvalue problem.

The predictions of the stability analysis are fully confirmed by direct numerical simulations of the parametrically driven, damped NLD equation. Our results show that dissipation may stabilize one of the stationary solitons, similarly to what occurs in parametrically driven nonlinear Schrödinger systems.



Acknowledgements

We thank Jesús Casado-Pascual and Nora V. Alexeeva for valuable discussions on this work. D.M.A. and N.R.Q. were supported by FQM-415 (Plan Propio, Universidad de Sevilla, Spain) D.M.A. acknowledges financial support from the Departamento de Matemática Aplicada I (Universidad de Sevilla) and thanks the Instituto Carlos I de Física Teórica y Computacional for access to the PROTEUS computational resources.

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Intrinsic defect in copper nitride

Eduardo Menéndez-Proupin

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I, Universidad de Sevilla

Abstract

Copper nitride (Cu_3N) is a narrow-bandgap semiconductor that exhibits a wide range of functional properties in both bulk and thin-film forms. Its potential applications include solar energy conversion, optical data storage, semiconductors for microelectronics, and various advanced electronic devices. Cu_3N thin films exhibit particularly interesting behavior, as they demonstrate bipolar doping, capable of showing n-type or p-type conductivity depending on the growth temperature and the Cu/N flux ratio during deposition. This versatility enables the direct fabrication of p–n junctions within the material itself, a key feature for its integration into electronic and photovoltaic devices.

In this talk, I present a recent study [1] of Cu and N vacancies and interstitials in Cu_3N using density functional theory calculations. I explain the method to calculate defect formation energies and transition levels, and describe the nature of each defect. Special attention is paid to finite-size corrections, implemented via the finite-size scaling method. Finally, I discuss how these defects determine the type of conductivity.

References

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Quantum reinforcement learning in the presence of thermal dissipation

María Laura Olivera Atencio, Lucas Lamata; Manuel Morillo, Jesús Casado Pascual

Universidad de Sevilla

Abstract

A study of the effect of thermal dissipation on quantum reinforcement learning is performed. For this purpose, a nondissipative quantum reinforcement learning protocol is adapted to the presence of thermal dissipation. Analytical calculations as well as numerical simulation are carried out, obtaining evidence that dissipation does not significantly degrade the performance of the quantum reinforcement learning protocol for sufficiently low temperatures, in some cases being even beneficial.

Quantum reinforcement learning under realistic experimental conditions of thermal dissipation opens an avenue for the realization of quantum agent to be able to interact with a changing environment, as well as adapt to it, with many plausible applications inside quantum technologies and machine learning [1, 2]

References

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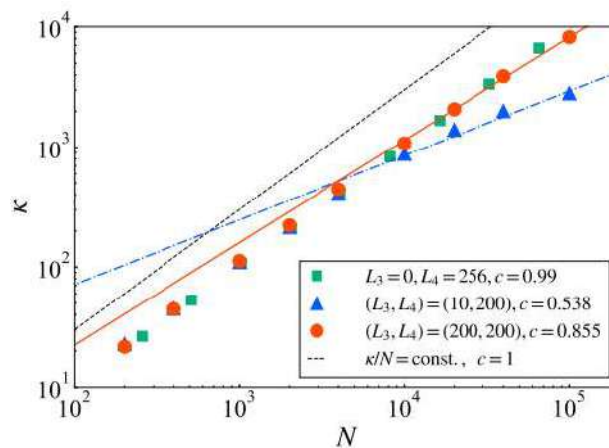
Non-Fourier thermal transport and NP symmetry

Hiroki Ono, Yusuke Doi, Akihiro Nakatani
The University of Osaka

Abstract

Thermal transport in solids is described by Fourier's law. In the regime of Fourier's law, thermal conductivity becomes a constant physical value only depending on materials. On the other hand, there exists a regime called Non-Fourier thermal transport. In Non-Fourier thermal transport, thermal conductivity has the dependence of system size. Especially, when thermal conductivity is proportional to the system size, the form of thermal transport is called "Ballistic thermal transport". In Ballistic thermal transport, there is no thermal resistance, and heat carriers such as phonons can propagate smoothly in solids. In this talk, we introduce the specific one-dimensional nonlinear lattice called umklapp free lattice (UFL). The UFL has the long range nonlinear potential which suppresses the umklapp processes, where the umklapp processes are the resources of thermal resistance.

First, we show the result of non-equilibrium steady state numerical simulations to verify that the ballistic thermal transport can be realized in the UFL model, as shown in Fig. 1. Next, we review the mathematical mechanism why the umklapp processes vanish in the UFL. The UFL has the specific symmetry, called NP symmetry, and its symmetry suppresses the umklapp processes.



References

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Electrical lattices as experimental platforms for spatially localized Excitations in discrete systems

Faustino Palmero Acebedo

Group of Nonlinear Physics. Universidad de Sevilla

Abstract:

Electrical lattices provide a versatile experimental framework for the study of spatial localization in discrete systems. Their main advantage lies in the possibility of designing the lattice geometry and interactions in a controlled way while directly measuring the dynamical variables at each individual node. This makes them particularly suitable for quantitative comparisons between theoretical models, numerical simulations, and experiments. In this talk, I will review several mechanisms leading to spatial localization in electrical networks. I will first discuss Anderson localization in disordered electrical lattices, where randomness alone produces exponentially localized linear modes. I will then consider topological localization through an electrical realization of the Su–Schrieffer–Heeger model. The role of nonlinearity will subsequently be illustrated through discrete breathers, or intrinsic localized modes, in nonlinear electrical transmission lines. Finally, I will discuss diamond lattices and flat-band physics as a further route to localization through destructive interference, highlighting the possibility of combining geometry, disorder, topology, and nonlinearity within the same experimental platform.

Exploring Dynamical Phase Diagrams with a Double Quench Controlled by Relaxation Time

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The characterization of dynamical phase transitions (DPTs) in quantum many-body systems has attracted growing attention in recent years, particularly regarding their connection to excited-state quantum phase transitions (ESQPTs). In this talk, I will present a double-quench protocol in which the relaxation time between two fixed quenches acts as the only control parameter, enabling a systematic exploration of the full dynamical phase diagram of a system hosting two distinct symmetry-breaking phases and a disordered one.

As a case study, I will consider the anharmonic Lipkin-Meshkov-Glick (aLMG) model, which exhibits two ESQPTs and is therefore the ideal testbed for this purpose. I will show how each symmetry-breaking phase can be characterized by its own pair of noncommuting constants of motion, allowing us to distinguish their nature. Building on this, I will introduce a generalized microcanonical ensemble (GME) that incorporates all relevant constants of motion and reproduces the long-time averages of physically relevant observables with excellent accuracy.

Finally, I will discuss the consequences of this protocol for both types of DPTs: DPT-I, linked to the long-time averages of spin observables, and DPT-II, associated with nonanalyticities in return probabilities. In particular, I will analyze the role played by the constants of motion in each case, the anomalous (or non-anomalous) character of the observed DPT-II, and the effect of wave-packet diffusion at long relaxation times. The results reveal that the relaxation time not only determines the final phase reached after the second quench, but also modulates the fine structure of the dynamical transitions, opening a practical route to explore dynamical phase diagrams in collective quantum systems.

Acknowledgements

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Hyperconductivity in insulators, semiconductors and metals

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Turbon International, formerly Rutherford Appleton Laboratory, UK
Group of Nonlinear Physics. Universidad de Sevilla

The remarkable ability of quodons to propagate macro distances through different materials, retain their structure and remain independent from phonons, is hard to explain by classical physics. The close proximity of atoms with energies of order several eV in a quodon, giving de Broglie wavelengths of electrons of similar size to the envelope of a quodon, suggests their stability might arise from quantum effects. The difficulty of observing individual charge-neutral quodons has hindered practical applications. The development of the triple-filter-technique for separating quodon currents from those by conduction has eased this problem. It opens the way to construct powerful sources of quodons by using controllable ion beams. Studies of the effect of quodons on plants enables first order estimates to be made of their effect on biological materials such as tumours.

Does The Stroboscopic Lindbladian Exist? An Analytical Approach

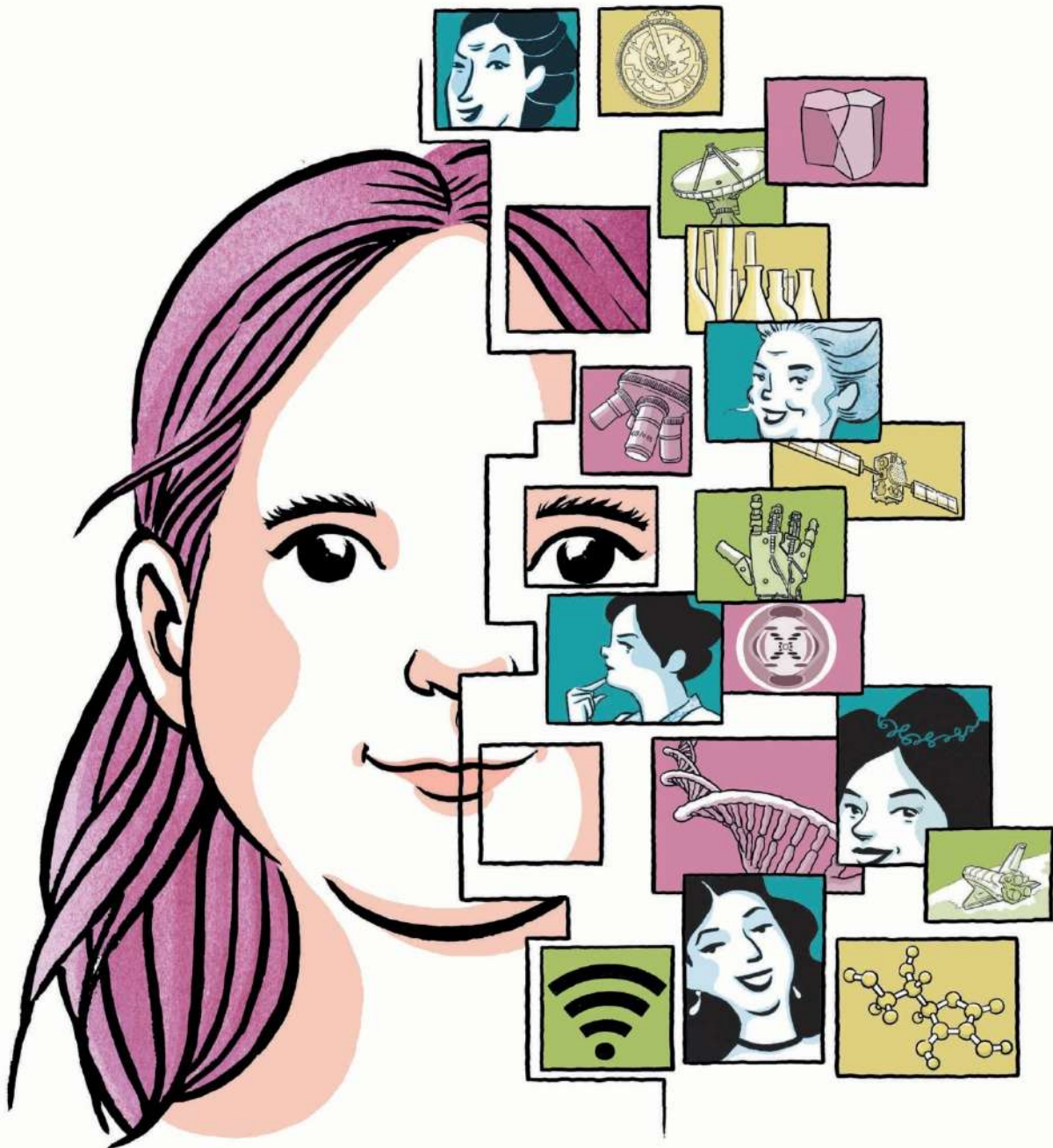
Antonio Sojo, Jesús Casado-Pascual
University of Seville

Abstract

Floquet theory enables the decomposition of periodically driven dynamics into the micromotion within each period and the stroboscopic propagator over one driving cycle. In Lindbladian open quantum systems, the effective stroboscopic generator may fail to retain a Lindbladian structure, despite the full evolution being Markovian. This stroboscopic embedding problem has mainly been investigated numerically, making the analysis particularly sensitive to precision-related artifacts near Markovian--non-Markovian phase boundaries. Here, we introduce a parametrized model that eliminates such ambiguities and provides exact analytical expressions for the conditions under which a stroboscopic Markovian phase exists in parameter space. These results could be relevant to extend Floquet Engineering techniques to open quantum systems.

Acknowledgements

This work is supported by the VII PIF-Plan Propio from the University of Seville.



C I E N T Í F I C A S

PASADO PRESENTE FUTURO

E L C Ó M I C



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LODY2026S: Localization Dynamics in Matter and Waves in Sevilla In honour of Dra Larissa Brizhik

CONFERENCIA ESPECIAL INVITADA

**Q&A about women, life and
science in a country at war**

Dra. Larissa Brizhik, BITP, Kyiv

Prigogine Medal 2011

Thursday, October 15

ETSII. Sala multiusos 13-13:45h

grupo.us.es/gfnl/talks/2026/lody2026S/





Closing Remarks

Talk by Prof. Larissa Brizhik · Sevilla LODY2026S Satellite Workshop
Escuela Técnica Superior de Ingeniería Informática, Universidad de Sevilla · 15 October 2026

Добрый день, Larissa. Good afternoon, everyone.

On behalf of the Director of the School, Professor María del Carmen Romero, who unfortunately could not be here today, and on behalf of the whole Escuela Técnica Superior de Ingeniería Informática, I would like to close this session with a few words.

First, thank you, Professor Brizhik, for being with us. It is an honour to welcome a scientist of your standing. You lead the Department of Condensed Matter at the Bogolyubov Institute and you were the first woman to receive the Ilya Prigogine Gold Medal. Thank you also for the talk we have just heard. You did not speak about solitons or magnetic fields this time. You spoke about people: scientists and ordinary citizens carrying on with their lives and their work in Kyiv and across Ukraine.

What you have shared with us today is a lesson that no equation can teach. Science is not only done in quiet laboratories. It is also done by people who keep thinking, teaching and publishing while missiles and drones fall on their cities, as happened a few days ago at the Academy of Sciences itself. Keeping science alive in those conditions is an act of courage, and also an act of hope.

We want you to know that you are not alone. This School and this University stand with you, with your colleagues, and with everyone in Ukraine going through these extremely hard times. Our doors are open, today and in the future.

As a small token of that recognition, it is my pleasure to present you with this certificate naming you a Distinguished Visitor of the School of Computer Engineering. Please accept it on your own behalf and also on behalf of all the women and men of Ukrainian science you represent so well.

I would also like to thank the organisers, Juan Archilla, Jesús Cuevas and Faustino Palmero, for bringing this workshop and our guest to the School.

Дякую, Larissa. Thank you very much. Thank you all.

Alejandro Fernández-Montes

Deputy Director for Research, Transfer and Entrepreneurship
Escuela Técnica Superior de Ingeniería Informática
Universidad de Sevilla



UNIVERSITY OF SEVILLE
SCHOOL OF COMPUTER ENGINEERING
CERTIFICATE OF RECOGNITION
DISTINGUISHED VISITOR

awarded to

Dr. Larissa Brizhik

On the occasion of her visit to this School as guest of honour of the LODY2026S workshop, in recognition of her outstanding scientific career as Head of the Department of Condensed Matter at the Bogolyubov Institute for Theoretical Physics of the National Academy of Sciences of Ukraine, and as a token of support and admiration for all the scientists who, like her, keep science alive in Ukraine under the most difficult circumstances.

Seville, 15 October 2026



Dr. María del Carmen Romero Ternero
ESCUOLA TÉCNICA DE INGENIERÍA DE ETSHI
INGENIERÍA INFORMÁTICA



LODY2026S: Localization Dynamics in Matter and Waves in Sevilla In honour of Dra Larissa Brizhik



Miércoles 14 de Octubre

IMUS: Seminar II

10:00-13:30

Protein folding, Defects in
copper nitride. Sine-Gordon
solitons. All-bands flat.
Thermal transport.
Hyperconductivity

Jueves 15 de Octubre

ETSII Sala Multiusos

9:00 a 14:00

Soliton dynamics, Dirac equations.
Plasma solitons. PT-symmetry.
Quantum transport. Stroboscopic
Lindbladlan.

Science in Ukraine under war

grupo.us.es/gfnl/talks/2026/lody2026S/