

# GDR-NAME Easter Newsletter

April, 2022



N A M E

GDR Nanomaterials for Energy Applications



## ***EDITO***

Dear GDR partners,

We start our NL with a moral support message to Ukrainian people and researchers! The GDR-NAME aligns with the efforts of CNRS to provide any form of aid to Ukrainian researchers. The CNRS has joined the scheme set-up as part of the "Pause Programme" ([Programme d'accueil en urgence de scientifiques en exil](#)), launched by the French Ministry of Higher Education, Research and Innovation.

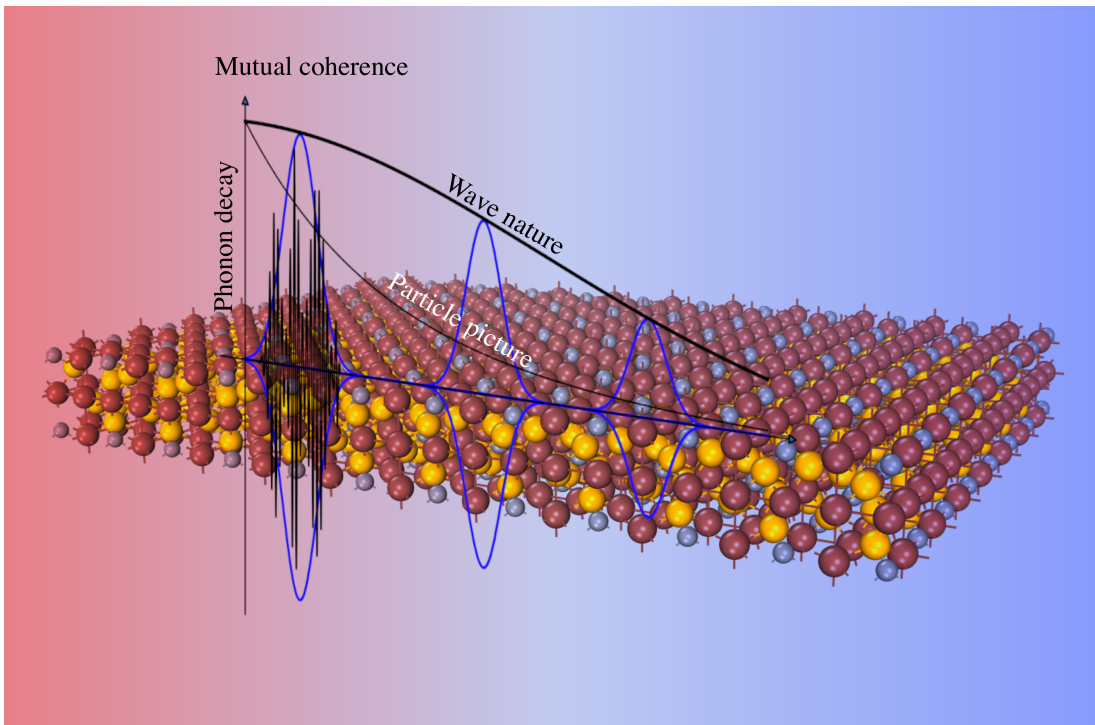
The program aims to welcome and protect researchers from countries where the political situation puts their work and their families in danger. If you work or know Ukrainian researchers, do not hesitate to take a look at "Pulse" projects.

Our GDR year has started with the writing of the 6 chapters of the white-paper and efforts will continue to uniform it till the end of first semester. Combining the white-paper perceptiveness with the "20 fares scientific subjects of the GDR-NAME", a road-map is under preparation. Do not miss several new items in the intranet part of the GDR, see News of the GDR below !



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## **IMAGE OF THE MONTH**

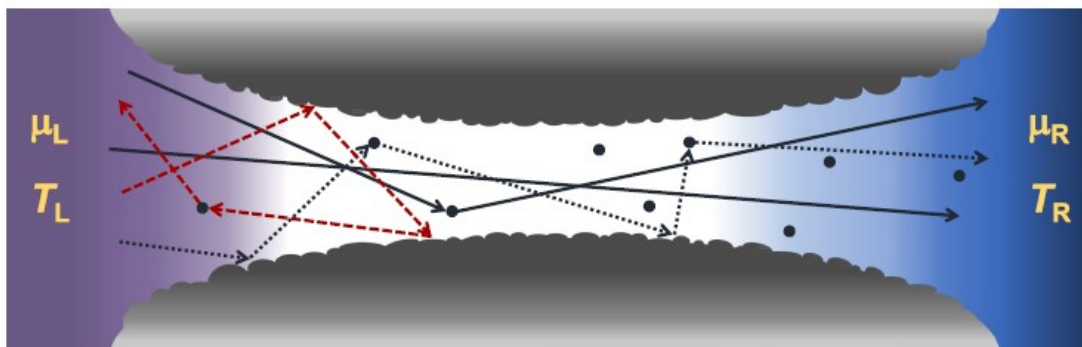


## Phonon coherence revealed the wave nature of heat transport

The phonon gas model fails to describe coherence and its impact on thermal transport. In this Letter, we propose a general heat conduction formalism supported by theoretical arguments and direct atomic simulations, which takes into account both the conventional phonon gas model and the wave nature of thermal phonons. Our theory and simulations reveal two distinct types of coherence, ie, intrinsic and mutual, appearing in two different temperature ranges. This contribution establishes a fundamental frame for understanding and quantifying the coherence of thermal phonons, which should have a general impact on the estimation of the thermal properties of solids. see Zhang et al PHYSICAL REVIEW LETTERS **128**, 015901 (2022)

[LINK](#)

## Scientific highlights



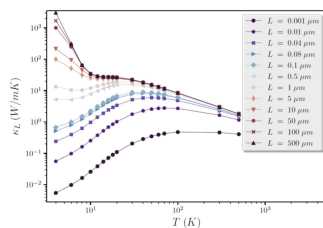
What is quantum in heat transport ?

## Quantum heat transport in condensed matter systems

In this Colloquium recent advances in the field of quantum heat transport are reviewed. This topic has been investigated theoretically for several decades, but only during the past 20 years have experiments on various mesoscopic systems become feasible. A summary of the theoretical basis for describing heat transport in one-dimensional channels is first provided. The main experimental investigations of quantized heat conductance due to phonons, photons, electrons, and anyons in such channels are then presented. These experiments are important for understanding the fundamental processes that underlie the concept of a heat conductance quantum for a single channel. An illustration of how one can control the quantum heat transport by means of electric and magnetic fields, and how such tunable heat currents can be useful in devices, is first given. This lays the basis for realizing various thermal device components such as quantum heat valves, rectifiers, heat engines, refrigerators, and calorimeters. Also of interest are fluctuations of quantum heat currents, both for fundamental reasons and for optimizing the most sensitive thermal detectors; at the end of the Colloquium the status of research on this topic is given.

J.P. Pekola and B. Karimi, REVIEWS OF MODERN PHYSICS, VOLUME 93, OCTOBER–DECEMBER 2021

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## Thermal transport in GeTe !

### Effect of characteristic size on the collective phonon transport in crystalline GeTe

The authors study the effect of characteristic size variation on the phonon thermal transport in crystalline GeTe for a wide range of temperatures using the first-principles density-functional method coupled with the kinetic collective model approach. The characteristic size dependence of phonon thermal transport reveals an intriguing collective phonon transport regime, located in between the ballistic and the diffusive transport regimes. Discover competitive effects between grain size and temperature by reading the paper !

Gosh et al Phys. Rev. Materials 5, 073605 (2021)

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## GDR-NAME NEWS

### *Breaking news of the GDR*

**Check the GDR web site, we have added recently :**

1-a clickable map of France with the [video presentations](#) and pdf of most of the laboratories members of the GDR (for those laboratories that do not appear in the map or have not sent yet their video, please contact us at [gdr-name@services.cnrs.fr](mailto:gdr-name@services.cnrs.fr))

2-the [presentations of the ateliers](#)

3-the results of the new survey "[who does what, who needs what](#)"! .

Concerning the survey, do not hesitate to fill it up, if there are missing information in your opinion of your expertises or needs about your laboratory or group "<https://framaforms.org/gdr-name-maj-2022-info-equip-1645198141>

*Lots of conferences to come, see also announcements at the bottom of the NL*

The other good news of the year is the return of the in-person conferences. There is a plethora of very interesting conferences and meetings this year and we have tried to gather the most relevant ones to our community. If we are missing some of them, please let us know to make the announcement.

First of all the plenary meeting of the GDR at 3-5 October at Lyon this time! Special thanks to the local COPIL for the organization: M. Lallart-LGEF, V. Giordano-ILM, M. Amara-INL and S. Gomes-CETHIL. Other scientific events related directly with the GDR are: the thematic school "MONACOSTE" 8-13 May at Frejus (Modeling Nanomaterials for Energy Transport and Storage) organized by S. Merabia-ILM, G. Fugallo-LTEN, M. Cobian-LTDS, the 2nd meeting of the Nanothermal Measurements 14 April at Paris organized by S. Gomes-CETHIL, O. Bourgeois-NEEL, S. Dilhaire-LOMA, the thematic day "Beyond Fourier" the 9th September at Paris organized by F. Banfi and P. Maioli-ILM. It follows a list of the upcoming events.

#### ***GDR-NAME Events***



N A M e

GDR Nanomaterials for Energy Applications

ELABORATION  
MEASUREMENTS & METROLOGY  
SIMULATIONS & THEORY  
APPLICATIONS

### **SAVE THE DATE !!! Next Plenary meeting GDR NAME 3-5 October in Lyon**

There will be lots of outstanding scientific presentations and round table on nanomaterials for energy !! More information to come.

## **Modeling Nanomaterials for Energy, Transport and Storage**

**08th-13th May 2022,  
Villa Clythia, Fréjus,  
French Riviera,  
France**



## **MONACOSTE SUMMER SCHOOL**

Thematic School MONACOSTE, 8-13 Mai at Frejus,

SCOPE : Designing new materials to store or convert waste energy is becoming an urgent challenge for the 21st century. Numerical techniques are important to tackle this



challenge. Indeed, these last years have seen the flourishing development of new methods to model matter at nanometric scales. The objective of the summer school "Modeling of nanostructured materials for energy conversion and transport" is to train scientists in theoretical and numerical techniques and tools for the modeling of energy transport and conversion in nano-structured materials

#### Contacts/Organizers

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## Potential researcher position at CNRS lab MPQ in Paris

The "Matériaux and Phénomènes Quantiques" laboratory is among a short list of laboratories for a CNRS permanent position ("chargé de recherche") starting in 2023 (in section 3). In this context, the TELEM team is looking for an excellent experimentalist in the field of quantum transport in 2D materials and heterostructures with an extensive experience in nanofabrication, electrical and magneto-electrical measurements of nanoscale devices. The successful applicant will join a dynamic experimental research group working on charge, spin and heat transport at the nanoscale. The MPQ laboratory is offering a large variety of experimental facilities including a fully equipped micro- and nanofabrication cleanroom and various magneto-transport and characterizations setups.

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Philippe Lafarge (philippe.lafarge@u-paris.fr)

Cristiano Ciuti, head of the MPQ laboratory (cristiano.ciuti@u-paris.fr)

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## Research scientist - Functional oxide surfaces and interfaces for low power electronics

Job offer at CEA Saclay on functional oxide surface !  
The Condensed Matter Division (Service de Physique de l'Etat Condensé – SPEC  
UMR3680 CEA, CNRS) of the French Atomic Energy and Alternative Energy Authority's IRAMIS institute

including UPS, XPS, Hard X-ray photoemission, PEEM, LEEM. Laboratory experiments are complemented by extensive use of synchrotron radiation, in particular the Soleil synchrotron in France and the Elettra synchrotron in Italy.

Contact : Nicholas BARRETT DRF/IRAMIS/SPEC  
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<https://www.lensislabs.com/>

***White Paper: wrapping up !***



## **Six workshops on related subjects to the Nanomaterials for Energy**

We are close to finish the White Paper, we need to assemble all the contributions and build the final version. To come early in 2022 !

**We deeply thank all the participants !!**

## **ANNOUNCEMENTS**

***Events, Conferences, workshop etc...!!!***



## **Nanoscale and Microscale Heat Transfer, Palermo, ITALY Deadline for abstract submission 10th of January 2022**

The next Eurotherm conference "Nanoscale and Microscale Heat Transfer VII" will be held in Palermo in Sicily from 30th of May to the 3rd of June.

**Aims and Scope:** It will be the seventh in the series of successful conferences, the last three of which took place in Lyon (2014), Santorini (2016) and Levi (2018). Its main scope is to present the state-of-the-art and the modern trends of nanoscale and microscale heat/energy transfer.

The program features 4 tutorial sessions and 4 plenary sessions led by selected speakers (see below), complemented by contributed oral and poster presentations, covering the full range of topics.

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## **NANOSUM International Summer School on Nanosciences and Nanotechnologies Carry-Le-Rouet 13-24 june 2022**

### **2 WEEKS ON NANOSCIENCES & NANOTECHNOLOGIES**

NANOSUM will offer face-to-face courses at the state-of-the art (WEEK 1) and keynote seminars (WEEK 2) from actors of the development of Nanosciences and Nanotechnologies, Topics: Spintronics, Quantum optics, Quantum computation, Quantum transport, Nanophotovoltaics, two-dimensional materials, Magnetic, nanoparticles for catalysis, Scalable fabrication approaches, Photodetection, High resolution imaging, Synchrotron: unlocking the secrets of matter

Registration and information at: <https://nanosum.org/>

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## WPW 2022 and JNRSE 2022 Wireless Power Week and Journées Nationales sur la Récupération et le Stockage de l'Énergie

The 2022 IEEE Wireless Power Week Conference (WPW) will be held at Bordeaux on July 4-9 2022. WPW is the largest wireless power event in the world, financially co-sponsored by IEEE Microwave Theory and Techniques Society (MTT-S) and Power Electronics Society (PELS). WPW is technically co-sponsored by MTT-S, PELS and Antenna Propagation Society (APS). The Wireless Power Transfer School, supported by the IEEE Wireless Power Transfer Project initiative will be held during the event. The conference will be jointly held with the Energy harvesting Summit (JNRSE).

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## Journées de la Matière Condensée Lyon 22-26 août 2022

Location: Ecole Normale Supérieure de Lyon: Amphithéâtre Mérieux et Amphithéâtres ENS Sciences

Since 1988, the "Journées de la Matière Condensée" (JMC) are organized every even year by the Condensed Matter Physics Division of the French Physical Society (SFP). The topics discussed cover all the fields related to condensed matter, from concepts to applications. The success of these days makes it the largest national congress of Condensed Matter Physics in France (600-700 participants). The 18th edition is held in Lyon from August 22 to 26, 2022.



**Two Mini-colloquia at JMC (Journées de la Matière Condensée) 22-26 August at Lyon, "MC11. Lattice vibrations: lifetime, transport and (quantum) thermodynamics" and "MC14. Micro Nanoscale Heat Transport Management" will be of interest for the GDR NAME !!**

[LINK](#)



## **Photon, Phonon, and Electron Transitions in Coupled Nanoscale Systems, WE-Heraeus-Seminar, 19-23 September at Bad Honnef GERMANY**

Location: Physikzentrum Bad Honnef

Organizer: Prof. Dr. Achim Kittel, PD Dr. Svend-Age Biehs, Institut für Physik, Universität Oldenburg

The coupling between nanosized subsystems is of great importance from the viewpoint of basic research and, not less important, in developing conceptually new devices. Even in low energy devices which are usually operated close to thermal equilibrium a coupling between two subsystems is caused by small differences in temperature leading to relatively large temperature gradients due to the small dimensions. For local temperature management, it might be desirable to avoid these gradients for draining waste heat or on the contrary to have as large as possible gradients during cooling of a local detector. These gradients cause a heat flow mediated by electrons and phonons which can be strongly influenced by interfaces reducing the coupling of the subsystems.

This seminar aims to bring together well-established experts, young academics, and graduate students (physicists, engineers, and chemists) working on experiments and theory of the photonic, phononic, and electronic transport properties in nanoscale systems. The program of the seminar will be organized in a series of lectures given by internationally recognized scientists in theoretical or experimental research. These lectures will give a pedagogical introduction into specific topics of the field and an overview of present development, new insights and novel result in theory as well as techniques and methods of measurements.

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**Pâques arrive, préparez les oeufs !**



## Un livre : Les oeufs fatidiques

Ou Les oeufs du destin, dernière nouvelle de Mikhaïl Boulgakov, illustration de là où peut mener la recherche sans la conscience qui se doit d'aller avec !



## Une recette: les oeufs en meurette

Recette bourguignonne avec bien sûr du vin rouge, des lardons, des champignons, des croutons si l'on veut, du thym, du laurier et de l'ail, éventuellement de la coriandre (fait débat dans la communauté !!), et enfin des oeufs pochés, à vos casseroles !



## Un peintre : Magritte et les oeufs

On peut s'interroger sur la présence des oeufs dans le travail du peintre surréaliste belge René Magritte, une bonne dizaine de toiles sont concernées. Celle ci-dessus apporte un peu d'espoir en ces temps difficiles...

<https://www.oeufpassion.com/tag/rene-magritte>

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