

# Nanoscale Radiative Heat Transfer

Physics School Les Houches 2013  
May 12th-17th

PROGRAM

## Organizing Committee:

**Philippe Ben-Abdallah**  
Laboratoire Charles Fabry, CNRS, Institut  
d'Optique, Université Paris-Sud, France

**Svend-Age Biehs**  
Institut für Physik, Carl von Ossietzky  
Universität, Oldenburg, Germany

**Karl Joulain**  
Institut P', CNRS-Université de Poitiers,  
France

**Achim Kittel**  
Institut für Physik, Carl von Ossietzky  
Universität, Oldenburg, Germany

ÉCOLE DE PHYSIQUE  
LES HOUCHES



# TIMETABLE

## 13th May – 17th May

	Monday	Tuesday	Wednesday	Thursday	Friday
9 <sup>00</sup> -10 <sup>00</sup>	Henkel	Zhang	Menguç	Antezza	Prunnila
10 <sup>00</sup> -11 <sup>00</sup>	Greffet	Volokitin	Biehs	Rodriguez	Maasilta
11 <sup>00</sup> -11 <sup>30</sup>	Coffee break	Coffee break	Coffee break	Coffee break	Coffee break
11 <sup>30</sup> -12 <sup>00</sup> 12 <sup>00</sup> -12 <sup>30</sup>	De Wilde Contributed talk	Ottens	Ben-Abdallah	Kittel	Chevrier
12 <sup>30</sup>	Lunch	Lunch	Lunch	Lunch	Lunch
15 <sup>00</sup> -16 <sup>00</sup>	Joulain	Fu		Emig	
16 <sup>00</sup> -17 <sup>00</sup>	Fan	Rubi		Rousseau	
17 <sup>00</sup> -18 <sup>00</sup>	Contributed talks	Narayana-swamy		Contributed talks	
18 <sup>30</sup>	Dinner	Dinner	Dinner	Dinner	
20 <sup>00</sup> -21 <sup>30</sup>		Poster session			

### Invited Talks

- Monday**  
**May 13<sup>th</sup>**
- 9<sup>00</sup>-10<sup>00</sup>: Carsten Henkel**, Universität Potsdam, Germany  
*Theoretical foundations: Fluctuational electrodynamic*
- 10<sup>00</sup>-11<sup>00</sup>: Jean-Jacques Greffet**, Institut d'Optique, France  
*Near-field heat transfer and surface waves*
- 11<sup>30</sup>-12<sup>00</sup>: Yannick de Wilde**, Institut Langevin, ESPCI, France  
*Visiting the thermal emission in the near-field of materials with surface waves: experimental part*
- 15<sup>00</sup>-16<sup>00</sup>: Karl Joulain**, Institut P', France  
*Visiting the thermal emission in the near-field of materials with surface waves: theoretical part*
- 16<sup>00</sup>-17<sup>00</sup>: Shanhui Fan**, Stanford University, USA  
*Nanophotonics for the control of thermal electromagnetic fields*

- P10: Kimmo Säskilähti**  
Dept. of Biomedical Engineering and Comp. Science, Aalto University, Finland  
*Thermal balance and quantum heat transport in nanostructures thermalized by Langevin heat baths*
- P11: Mikko Partanen**  
Dept. of Biomedical Engineering and Comp. Science, Aalto University, Finland  
*Noiseless amplification of weak coherent fields without external energy*
- P12: Svend-Age Biehs<sup>1</sup> and Girish S. Agarwal<sup>2</sup>**  
<sup>1</sup>Institut für Physik, Universität Oldenburg, Germany  
<sup>2</sup>Department of Physics, Oklahoma State University, Stillwater, USA  
*Dynamics of heat transfer between nano systems*
- P13: Karl Joulain, et. al.**  
Institut P', CNRS, Université de Poitiers, France  
*Near-field radiative heat transfer between non-local dielectric materials*
- P14: Riccardo Messina<sup>1</sup>, Ali Belarouci<sup>2</sup>, Yvon Cordier<sup>3</sup> and Philippe Ben-Abdallah<sup>1</sup>**  
<sup>1</sup>Laboratoire Charles Fabry, CNRS, France  
<sup>2</sup>Laboratoire Nanotechnologies Nanosystèmes, Université de Sherbrook, Canada  
<sup>3</sup>Centre de Recherche sur l' Hetero-Epitaxie et ses Applications, Sophia Antipolis, France  
*Graphene based near-field thermophotovoltaic energy conversion system*
- P15: Elyès Nefzaoui**  
Institut P', CNRS, Université de Poitiers, France  
*On maximal near-field radiative transfer between two plates*
- P16: Maria Tschikin<sup>1</sup>, Svend-Age Biehs<sup>1</sup>, Riccardo Messina<sup>1</sup>, and Philippe Ben-Abdallah<sup>2</sup>**  
<sup>1</sup>Institut für Physik, Universität Oldenburg, Germany  
<sup>2</sup>Laboratoire Charles Fabry, CNRS, France  
*Super-Planckian Near-Field Thermal Emission with Phonon-Polaritonic Hyperbolic Metamaterials*
- P17: Shiyun Xiong**  
EM2C, École Centrale Paris, France  
*Classic to quantum transition for heat transfer between two clusters*
- P18: Roberta Incardone**  
University of Stuttgart and the Max Planck Institute, Germany  
*Heat transfer between anisotropic objects*

## Poster Session

- P1: Stanislav Maslovski**  
Universidade de Coimbra, Portugal  
*Equivalent circuit model of radiative heat transfer*
- P2: Azadeh Didari**  
Özyengin University, Turkey  
*Analysis of near-field emission within nano-gaps using finite difference time domain method*
- P3: Yoichiro Tsurimaki<sup>1,2</sup>, P-Olivier Chapuis<sup>1</sup>, Rodolphe Vaillon<sup>1</sup>, Tatsuya Kobari<sup>2</sup>, Junnosuke Okajima<sup>2</sup>, Atsuki Komiya<sup>2</sup>, and Shigenao Maruyama<sup>2</sup>**  
<sup>1</sup>Université de Lyon, CNRS, INSA-Lyon, UCBL, CETHIL, UMR5008, F-69621 Villeurbanne, France  
<sup>2</sup>Institute of Fluid Science, Tohoku University, 980-8577, 2-1-1, Sendai, Japan  
*Reducing thermal radiation heat transfer with interferences*
- P4: Slawa Lang**  
Hamburg University of Technology, Institute of Optical and Electronic Material, Germany  
*Layered Au-Si hyperbolic metamaterial for near infrared*
- P5: Hugo Frederich**  
GEMAC, Université de Versailles St Quentin, France  
*Controlling fluorescence emission with nano-photonics and plasmonics: an issue analogous with nanoscale radiative heat transfer*
- P6: Jose Ordonez, et. al.**  
EM2C, École Centrale Paris, France  
*Anomalous Thermal Conductivity of Amorphous Nano-sized Thin Films and Tubes due to Surface Phonon-polaritons*
- P7: Y. Guo, C. L. Cortes, W. Newman, S. Molesky, P. Shekhar, S. Jahani, and Zubin Jacob**  
Computer Engineering University of Alberta, Canada  
*Engineering vacuum and thermal fluctuations with hyperbolic metamaterials*
- P8: Laurent Tranchant**  
EM2C, Ecole Centrale Paris, France  
*Far Field Detection of Thermal Surface Phonon-Polariton propagation at the Surface of a Micro-sized Glass Tube*
- P9: Tomas Kralik**  
Institute of Scientific Instruments of the ASCR, Czech Republic  
*Strong Near-Field Enhancement of Radiative Heat Transfer between Metallic Surfaces*

## Contributed Talks

- Monday May 13<sup>th</sup>** **12<sup>00</sup>-12<sup>30</sup>: Stanislav Maslovski**, Universidade de Coimbra, Portugal  
*Equivalent circuit model of radiative heat transfer*
- 17<sup>00</sup>-17<sup>20</sup>: Vassilios Yannopapas**, Department of Materials Science, University of Patras, Greece  
*Coherent control of temperature in laser-heated nanostructures*
- 17<sup>20</sup>-17<sup>40</sup>: Zubin Jacob**, Department of Electrical and Computer Engineering University of Alberta, Canada  
*High temperature plasmonics and metamaterials*
- 17<sup>40</sup>-18<sup>00</sup>: Pramod Reddy**, University of Michigan, USA  
*Instrumentation for studying near-field effects in nanoscale gaps between planar surfaces*

## Invited Talks

- Tuesday May 14<sup>th</sup>** **9<sup>00</sup>-10<sup>00</sup>: Zhuomin Zhang**, GeorgiaTech, USA  
*Applications of magnetic polaritons in micro/nano-structures for tailoring radiative properties*
- 10<sup>00</sup>-11<sup>00</sup>: Alexander Volokitin**, Samara State Technical University, Russia  
*The Casimir forces, friction and radiative heat transfer in graphene systems: effect of electric current*
- 11<sup>30</sup>-12<sup>30</sup>: Richard Ottens**, Department of Physics, University of Florida, USA  
*Near-Field Radiative Heat Transfer between Macroscopic Planar Surfaces*
- 15<sup>00</sup>-16<sup>00</sup>: Ceji Fu**, Peking University, China  
*Spectral and directional control of the thermal emission with periodic Microstructures*
- 16<sup>00</sup>-17<sup>00</sup>: Miguel Rubi**, Facultat de Fisica, Universitat de Barcelona, Spain  
*Nanothermodynamics and near-field heat Transfer*
- 17<sup>00</sup>-18<sup>00</sup>: Arvind Narayanaswamy**, University of Columbia, USA  
*Proximity effects in fluctuational energy and momentum transfer*

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### Invited Talks

- Wednesday** **9<sup>00</sup>-10<sup>00</sup>: Pinar Menguç**, Özyengin University, Turkey  
**May 15<sup>th</sup>** *Near-field heat-transfer for energy harvesting*
- 10<sup>00</sup>-11<sup>00</sup>: Svend-Age Biehs**, Institut für Physik, Universität Oldenburg, Germany  
*Near-field heat transfer between anisotropic materials*
- 11<sup>30</sup>-12<sup>30</sup>: Philippe Ben-Abdallah**, Laboratoire Charles Fabry, CNRS, France  
*Near-field heat transfer and thermal emission control with complex plasmonic systems*

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### Invited Talks

- Thursday** **9<sup>00</sup>-10<sup>00</sup>: Mauro Antezza**, Montpellier 2, France  
**May 16<sup>th</sup>** *Near-field heat transfer between arbitrary bodies: from quantum thermalization to entanglement*
- 10<sup>00</sup>-11<sup>00</sup>: Alejandro W. Rodriguez**, Harvard University, USA  
*Surface-integral equation formulation of radiative heat transfer between arbitrary bodies*
- 11<sup>30</sup>-12<sup>30</sup>: Achim Kittel**, Institut für Physik, Universität Oldenburg, Germany  
*Heat transfer detected on the nanometer scale by means of the near field thermal scanning microscopy*
- 15<sup>00</sup>-16<sup>00</sup>: Thorsten Emig**, LPTMS, CNRS, France  
*Scattering approach for heat transfer*
- 16<sup>00</sup>-17<sup>00</sup>: Emmanuel Rousseau**, Laboratoire Charles Coulomb, CNRS, France  
*Radiative heat transfer measurement at the nanoscale*

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### Contributed Talks

- Thursday** **17<sup>00</sup>-17<sup>15</sup>: Igor Nefedov**, Aalto University, Finland  
**May 16<sup>th</sup>** *Role of the spatial dispersion in thermal radiative heat transfer in wire hyperbolic media*
- 17<sup>15</sup>-17<sup>30</sup>: Mathias Krüger**, University of Stuttgart and the Max Planck Institute, Germany  
*Interplay of surface roughness/modulation and curvature at proximity*
- 17<sup>30</sup>-17<sup>45</sup>: Thomas Antoni**, EM2C, Ecole Central Paris, France  
*Surface Phonon Polaritons supported Heat conduction*
- 17<sup>45</sup>-18<sup>00</sup>: Ramon Alcobilla**, UPC Technical University of Catalunya, Barcelona, Spain  
*Silicon Photonic crystal based thermal selective emitters*

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### Invited Talks

- Friday** **9<sup>00</sup>-10<sup>00</sup>: Mika Prunnila**, VTT Technical Research Centre, Finland  
**May 17<sup>th</sup>** *Acoustic Phonon Tunneling and Heat Transport due to Evanescent Electric Fields*
- 10<sup>00</sup>-11<sup>00</sup>: Ilari Maasilta**, University of Jyväskylä, Finland  
*Near-field thermal effects at mesoscopic scale*
- 11<sup>30</sup>-12<sup>30</sup>: Joel Chevrier**, Institut Néel, Grenoble, France  
*Active control of near-field heat transfer with phase change materials*