

Aymeric RAMIERE

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Physicist in nanoscale heat transport

Currently Research Assistant Professor at the Southern University of Science and Technology (Shenzhen, China), I have knowledge in nanoscale thermal physics in various configurations such as contact resistances, thermoelectricity and phononic crystals.

Primarily experimentalist, I have experience in low-temperature measurements, nanofabrication and synthesis of inorganic compounds (poly and single-crystals). Also, I conceived my own Monte-Carlo code to simulate phonon transport in nanostructures and do some theory of nanoscale heat transfer.

Concerning teaching, I gave physics lectures at bachelor level at the University of Paris Sud for 3 years and made several interventions/tutorials for young public with the University of Tokyo.

My goal is to get a tenure-track position to pursue my own research in the region of Hong-Kong/Shenzhen, and settle there for a long period.

EDUCATION

Laboratoire d'Informatique pour la Mécanique et les Sciences de l'Ingénieur (LIMSI-CNRS), Orsay, France

- Ph.D. student in physics 2011-2014

Research topics: nanoscale heat conduction, thermal boundary resistances, very low temperatures, Monte-Carlo simulations

University of Paris-Sud, Orsay, France

- M.Sc. in physics and energy engineering 2011 (magna cum laude)
- B.Sc. in fundamental physics 2009

RESEARCH EXPERIENCE

Department of physics, Southern University of Science and Technology, Shenzhen, China

Research Assistant Professor Oct. 2017 - Now

Postdoctoral researcher hosted by Pr. Jiaqing He, May 2017 – Sept. 2017

Project: Nanoscale heat conduction for thermoelectric materials

- Synthesis of novel low-dimensional single crystals for low-temperature thermoelectric applications
- Measurements of electrical and thermal properties from 2K to 400K
- Theory of phonon transport at rough interfaces and in phononic nanostructures
- Supervision of students

Institute of Industrial Science, The University of Tokyo, Tokyo, Japan

JSPS Postdoctoral researcher hosted by Pr. Masahiro Nomura, Apr. 2015 - May 2017

Project: Thermal conductance measurement of Silicon phononic crystals at ultra-low temperature (down to 25mK)

- Design and construct experimental set-up with a dilution refrigerator to measure the thermal conductance of phononic crystals by using SINIS tunnel junctions
- Conception and fabrication of silicon phononic nanostructures
- Conceive a Monte Carlo simulation code for phonon transport in phononic nanostructures
- Supervision of master students

Laboratoire d'Informatique pour la Mécanique et les Sciences de l'Ingénieur (LIMSI-CNRS), Orsay, France

Ph. D. student supervised by Pr. Jay Amrit and Pr. Sebastian Volz, Oct. 2011 - Dec. 2014

Dissertation: Impact of roughness on phonon transport at surfaces and interfaces at very low temperature ($< 2K$)

- Investigation the thermal contact resistance at silicon/superfluid helium interface
- Design of microstructure to measure the thermal contact resistance at a microjunction.
- Creation of a Monte Carlo code to simulate phonon transport in microstructures at very low temperatures.
- Supervision a master student.

Commissariat à l'énergie atomique et aux énergies alternatives (CEA), Saclay, France

Master intern supervised by Pr. Nick Barrett, Apr. - Aug. 2010

- Analysis of magnetoelectric coupling at the Fe₃O₄/BaTiO₃ interface.
- Deposition of Fe₃O₄ on BaTiO₃ by MBE.
- Characterization of the interface using AFM microscopy, VSM, XPS, and electron diffraction.

Institut d'Électronique Fondamentale (IEF), Orsay, France

Undergraduate intern with Pr. Thomas Maroutian, June - July 2009

- Investigation of copper diffusion deposited by MBE on a vicinal silicon surface by using a STM.

SKILLS and TECHNIQUES

Experimental methods	Characterization techniques	Computing skills
<ul style="list-style-type: none"> • Cryogenics (dilution and ³He refrigerators) • Clean room nanofabrication • Vacuum techniques • Thin films deposition (MBE and e-beam) 	<ul style="list-style-type: none"> • Low-temperature thermometry • Microscopy (AFM, SEM, STM) • Surface roughness analysis • Magnetic characterization 	<ul style="list-style-type: none"> • C++ and python • Monte-Carlo simulations • Web (html5, css3, javascript)

HONORS AND AWARDS

- Research featured by CNRS for major publications by French scholars:
 - “Wave nature of phonons in disordered phononic structures” published in *Science Advances* (2017)
 - “Heat guiding and focusing in phononic nanostructures” published in *Nature Communications* (2017)
 - “Thermal resistance at a solid/superfluid helium interface” published in *Nature Materials* (2016)
- Japan Society for the Promotion of Science (JSPS) postdoctoral fellowship (2015-2017)
- Grant for conference by Association Française du Froid (2013)
- Paris-Sud University Ph.D. scholarship (2011-2014)
- Pres UniverSud master scholarship (2011)

TEACHING EXPERIENCE

Presentations in English for Japanese schools (JSPS science dialogue program)

December 16, 2015: Tokyo Metropolitan High School of Science and Technology

September 17, 2016: Junior High School at Komaba, University of Tsukuba (special request by the organizer)

Institut universitaire technologique d'Orsay (University of Paris Sud Institute of Technology), Orsay, France

Assistant lecturer, 2011-2014

Practical works and tutorials in thermal physics, thermodynamics, cryogenics

PUBLICATIONS

1. Amrit J., **Ramiere A.** & Volz S. Role of fluttering dislocations in the thermal interface resistance between a silicon crystal and plastic solid ⁴He. *Phys. Rev. B* **97**, 014308 (2018)
2. Maire J., Anufriev R., Yanagisawa R., **Ramiere A.**, Volz S. & Nomura M. Heat conduction using the wave nature of phonons. *Sci. Adv.* **3**, e1700027 (2017)
3. Verdier M., Anufriev R., **Ramiere A.**, Termentzidis K. & Lacroix D. Thermal conductivity of phononic membranes with aligned and staggered lattices of holes at room and low temperatures. *Phys. Rev. B* **95**, 205438 (2017)
4. Anufriev R.*, **Ramiere A.***, Maire J. & Nomura M. Heat guiding and focusing using ballistic phonon transport in nanostructured materials. *Nat. Commun.* **8**, 15505 (2017)
5. Yanagisawa R., Maire J., **Ramiere A.**, Anufriev R. & Nomura M. Impact of the limiting dimension on thermal conductivity of silicon one dimensional phononic crystals. *Appl. Phys. Lett.* **110**, 133108 (2017)
6. **Ramiere A.**, Volz S. & Amrit J. Heat flux induced blueshift of dominant phonon wavelengths and its impact on thermal conductivity. *AIP Advances* **7**, 015017 (2017)
7. **Ramiere A.**, Volz S. & Amrit J. Thermal resistance at a solid/superfluid helium interface. *Nat. Mater.* **15**, 512-516 (2016)

8. **Ramiere A.**, Volz S. & Amrit J. Geometrical tuning of thermal phonon spectrum in nanoribbons. *J. Phys. D: Appl. Phys.* **49**, 115306 (2016)
9. **Ramiere A.**, Amrit J. & Volz S. Thermal resistance at constrictions in 2D mesoscopic ribbons at low temperatures. *J. Phys. Conf. Ser.* **568**, 052023 (2014).
10. **Ramiere A.**, Amrit J. & Volz S. Role of boundary roughness on heat transport in mesoscopic silicon ribbons at low temperatures. *Nano Energy Lett.* **6**, 13–14 (2013).
11. Amrit J. & **Ramiere A.** Kapitza resistance between superfluid helium and solid: Role of the boundary. *Low Temp. Phys.* **39**, 9 (2013).
12. **Ramiere A.**, Amrit J. & Volz S. Pressure dependence of the thermal contact resistance at the Si/He interface. *J. Phys. Conf. Ser.* **395**, 12110 (2012).

* Contributed equally to this work

REFEREES

- Dr. Jay Amrit, Associate Professor at the University of Paris-Sud: amrit@limsi.fr
- Dr. Sebastian Volz, Professor at French National Research Center: sebastian.volz@centralesupelec.fr
- Dr. Masahiro Nomura, Associate Professor at the University of Tokyo: nomura@iis.u-tokyo.ac.jp
- Dr. He Jiaqing, Professor at Southern University of Science and Technology: hjq@sustc.edu.cn