

**Humboldt University of Berlin****Postdoc, Institute of Physics & IRIS Adlershof** [2022 - present]✿ *Research Fellowship, Alexander von Humboldt Foundation*✿ *German Language Fellowship, Alexander von Humboldt Foundation*

- Conducting original research in the field of thermoelectric transport and superconductivity.
- Published 4 original research papers.
- Gave 1 invited and 4 contributed talks. 1 upcoming invited talk.
- Co-supervising 1 incoming PhD student (many-body effects) and 2 Bachelor students (superconductivity and magnetotransport).
- Peer reviewing for scientific journals.
- Acted as international jury and PhD thesis committee member for 1 doctoral candidate.

**Catalan Institute of Nanoscience and Nanotechnology****Postdoc, Theory and Simulation** [2021 - 2022]

- Developed free software ([elphbolt](#)) for thermoelectricity simulations.
- Published 2 original research papers in high impact journals.
- Gave 2 presentations at high impact scientific conferences.
- Did peer reviewing for scientific journals.

**Harvard University****Postdoc, School of Engineering & Applied Sciences** [2019 - 2021]

- Wrote software for thermoelectricity and superconductivity simulations.
- Published 3 original research papers.
- Gave 1 presentation at a high impact scientific conference.
- Did peer reviewing for scientific journals.

**Boston College****PhD student, Department of Physics** [2014 - 2019]✿ *Conference travel grants, Boston College*

- Developed an original theoretical and computational framework for thermoelectric transport simulations, solving a century-old problem.
- Wrote scientific software for simulating thermoelectric transport.
- Published 6 original research papers.
- Wrote 1 PhD thesis.
- Gave 4 presentations at high impact scientific conferences.
- Taught undergraduate level physics.

**University of Ottawa****Master's student, Department of Physics** [2011 - 2013]✿ *Differential Admission Scholarship, University of Ottawa*

- Implemented a many-body quantum chemistry method for studying laser-matter interactions.
- Published 2 original research papers.
- Wrote 1 MSc thesis.
- Taught undergraduate level physics.
- Gave 1 presentation at a scientific symposium.

**Brac University****Teaching assistant, Department of Physics** [2010 - 2011]

- Taught undergraduate level physics and mathematics.

**Bachelor's student, Department of Physics** [2006 - 2010]✿ *Highest Distinction & Vice Chancellor's Medal, Brac University*✿ *6-month scholarship to Romania, Erasmus Mundus*

- Got training in physics (major) and computer science (minor).
- Wrote scientific software for simulating quantum field theories on non-commutative geometries.
- Wrote 1 BSc thesis.
- Gave 2 presentations at international scientific conferences.

**Contact**✉ [nakib.haider.protik@gmail.com](mailto:nakib.haider.protik@gmail.com)in [LinkedIn](#)🌐 [Personal website](#)🐙 [Github](#)📄 [Google Scholar](#)**Education**

2019 PhD Physics, Boston College

2013 MSc Physics, U of Ottawa

2010 BSc Physics, Brac U

**Skills**

★ Physics	●●●
★ Research	●●●
★ Project management	●●●
★ Scientific communication	●●●
★ Peer reviewing	●●●
★ Funding acquisition	●●○
★ Teaching	●●●
★ Mentoring	●●○
★ Software development	●●●
★ Scientific computation	●●●
★ High-performance computing	●●●
★ Docker	●○●
★ Data analysis	●●●
★ Data visualization	●●●
★ Machine learning	●○●
★ Modern Fortran [coarrays and OO]	●●●
★ Python [numpy, matplotlib, scipy]	●●○
★ C	●●○
★ Mathematica	●●○
★ Shell	●●○
★ Linux	●●●
★ Matlab	●●○
★ Java	●○●
★ Lisp	●○●
★ $\text{\LaTeX}$	●●●
★ MPI	●●●
★ Coarrays	●●●
★ OpenACC	●●○
★ OpenMP	●○●
★ Git	●●○
★ Bangla	●●●
★ English	●●●
★ German, Esperanto, Spanish	●○●


**Attachments**

I	Research
II	Teaching
III	Service

# I Research

My research is on the physics of interactions and transport phenomena in condensed matter. Specifically, using *ab initio* theoretical and computational tools, I study how the scattering processes in matter – electron-phonon, phonon-phonon, phonon-defects, electron-defects, etc. – affect the transport properties. I am also generally interested in superconductivity, topological defects, and topological phases among various other topics.

## Published code

2021	 A solver for the coupled and decoupled electron and phonon Boltzmann transport equations.
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## Theses

2019	<b>PhD Thesis, Physics, Boston College.</b> Topic: Theoretical/computational condensed matter physics with an emphasis on semiclassical transport. Title: <i>Phonon and carrier transport in semiconductors from first principles.</i> Committee: David Broido (chair), Kenneth Burch, Krzysztof Kempa, Fazel Tafti, and Natalio Mingo.
2013	<b>MSc Thesis, Physics, University of Ottawa.</b> Topic: Attosecond phenomena in laser-matter interaction using computational many-body quantum methods. Title: <i>The multiconfiguration time dependent Hartree-Fock method for cylindrical systems.</i> Advisor: Thomas Brabec.
2010	<b>BSc Thesis, Physics, BRAC University.</b> Topic: Numerical studies of quantum field theories on non-commutative geometries. Title: <i>Chern-Simons action on the noncommutative plane.</i> Advisor: Arshad Momen.

## Publications (\* = equal contribution)

2024	Nakib H. Protik and Claudia Draxl. <a href="#">Beyond the Tamura model of the phonon-isotope scattering.</a> <i>arXiv preprint.</i>
2023	Mahmoud Elhajhasan, Wilken Seemann, Katharina Dudde, Daniel Vaske, Gordon Callsen, Ian Rousseau, Thomas F. K. Weatherley, Jean-François Carlin, Raphaël Butté, and Nicolas Grandjean, <b>Nakib H. Protik</b> , and Giuseppe Romano. <a href="#">Joined optical and thermal characterization of a III-nitride semiconductor membrane by micro-photoluminescence spectroscopy and Raman thermometry.</a> <i>Physical Review B.</i>
2023	Krzysztof Kempa, <b>Nakib H. Protik</b> , Tyler Dodge, Claudia Draxl, and Michael J. Naughton. <a href="#">Enhancing superconductivity with resonant anti-shielding and topological plasmon-polarons.</a> <i>Physical Review B.</i>
2023	Yu Xie, Jonathan Vandermause, Senja Ramakers, <b>Nakib H. Protik</b> , Anders Johansson, and Boris Kozinsky. <a href="#">Uncertainty-aware molecular dynamics from Bayesian active learning for phase transformations and thermal transport in SiC.</a> <i>npj Computational Materials.</i>
2023	Chunhua Li, <b>Nakib H. Protik</b> , Navaneetha K. Ravichandran, and David Broido. <a href="#">High-frequency phonons drive large phonon-drag thermopower in semiconductors at high carrier density.</a> <i>Physical Review B.</i>
2022	Chunhua Li, <b>Nakib H. Protik</b> , Pablo Ordejón, and David Broido. <a href="#">Colossal phonon drag enhanced thermopower in lightly doped diamond.</a> <i>Materials Today Physics.</i>
2022	<b>Nakib H. Protik</b> , Chunhua Li, Miguel Pruneda, David Broido, and Pablo Ordejón. <a href="#">The elphbolt ab initio solver for the coupled electron-phonon Boltzmann transport equations.</a> <i>npj Computational Materials.</i>

2021	Zhe Cheng, Weifang Lu, Jingjing Shi, Daiki Tanaka, <b>Nakib H. Protik</b> , Shangkun Wang, Motoaki Iwaya, Tetsuya Takeuchi, Satoshi Kamiyama, Isamu Akasaki, Hiroshi Amano, and Samuel Graham. <a href="#">Quasi-Ballistic Thermal Conduction in 6H-SiC</a> . <i>Materials Today Physics</i> .
2021	Mauro Fava*, <b>Nakib Haider Protik</b> *, Chunhua Li, Navaneetha Krishnan Ravichandran, Jesús Carrete, Ambroise van Roekeghem, Georg K. H. Madsen, Natalio Mingo, and David Broido. <a href="#">How dopants limit the ultrahigh thermal conductivity of boron arsenide: a first principles study</a> . <i>npj Computational Materials</i> .
2020	<b>Nakib Haider Protik</b> and Boris Kozinsky. <a href="#">Electron-phonon drag enhancement of transport properties from a fully coupled <i>ab initio</i> Boltzmann formalism</a> . <i>Physical Review B</i> , 102, 245202.
2020	<b>Nakib Haider Protik</b> and David Broido. <a href="#">Coupled transport of phonons and carriers in semiconductors: A case study of n-doped GaAs</a> . <i>Physical Review B</i> , 101, 075202 [Editors' Suggestion].
2019	Xueyuan Wu*, Jiantao Kong*, <b>Nakib Haider Protik</b> *, David Broido, and Krzysztof Kempa. <a href="#">Tailoring the electron-phonon interaction with metallic plasmonic structures</a> . In <i>Materials Today Physics</i> 8, 86-91.
2017	<b>Nakib Haider Protik</b> , Ankita Katre, Lucas Lindsay, Jesús Carrete, Natalio Mingo, and David Broido. <a href="#">Phonon thermal transport in 2H, 4H and 6H silicon carbide from first principles</a> . In <i>Materials Today Physics</i> 1C, 31-38.
2016	<b>Nakib Haider Protik</b> , Jesús Carrete, Nebil A. Katcho, Natalio Mingo, and David Broido. <a href="#">Ab initio study of the effect of vacancies on the thermal conductivity of boron arsenide</a> . In <i>Physical Review B</i> 94, 045207.
2014	G. Orlando, C. R. McDonald, <b>N. H. Protik</b> , G. Vampa, and T. Brabec. <a href="#">Tunneling time, what does it mean?</a> In <i>Journal of Physics B</i> 47, 204002.
2014	G. Orlando, C. R. McDonald, <b>N. H. Protik</b> , and T. Brabec. <a href="#">Identification of the Keldysh time as a lower limit for the tunneling time</a> . In <i>Physical Review A</i> 89, 014102.

## Invited/Long Talks

Upcoming	<b>Nakib Haider Protik</b> . Probing the transport of the interacting electron-phonon system self-consistently and <i>ab initio</i> . At <a href="#">DPG Meeting</a> , Berlin, March, 2024.
2022	<b>Nakib Haider Protik</b> . Coupled transport of the interacting electron-phonon gas – state of the art and the future. At Solid State Seminar, Institute of Solid State Physics and Institute of Theoretical Physics, University of Bremen, Bremen, November 1, 2022.
2021	<b>Nakib Haider Protik</b> , Chunhua Li, Miguel Pruneda, David Broido, and Pablo Ordejón. <a href="#">elphbolt - A free software for coupled electron-phonon Boltzmann transport</a> . Video <a href="#">here</a> . At International Workshop on Advanced Materials-to-Device Solutions for Synaptic Electronics, Session 4, Barcelona, November 12, 2021.

## Other Talks

2023	<b>Nakib Haider Protik</b> . Dragful electron-phonon transport – elphbolt a year and a half on. At <a href="#">HoW xciting! 2023</a> , Berlin, August 9, 2023.
2023	<b>Nakib Haider Protik</b> and Claudia Draxl. When does the Tamura model of phonon-isotope scattering break down?. At <a href="#">DPG Meeting</a> , Dresden, March 27, 2023. At <a href="#">APS March Meeting</a> , Virtual, March 21, 2023.

2022	<b>Nakib Haider Protik</b> and Claudia Draxl. <a href="#">Electron-phonon drag in <math>\text{MgB}_2</math></a> . At DPG Meeting, Regensburg, September 7, 2022.
2022	<b>Nakib Haider Protik</b> , Chunhua Li, Miguel Prudena, David Broido, and Pablo Ordejón. <a href="#">elphbolt: An ab initio solver for the coupled and decoupled electron and phonon Boltzmann transport equations</a> . At APS March Meeting, March 15, 2022.
2021	<b>Nakib Haider Protik</b> and Boris Kozinsky. <a href="#">Electron-phonon drag enhancement of transport properties from fully coupled <i>ab initio</i> Boltzmann formalism</a> . At APS March Meeting, Online, March 17, 2021.
2019	<b>Nakib Haider Protik</b> , Mauro Fava, Natalio Mingo, Jesús Carrete, George Madsen, Navaneetha Ravichandran and David Broido. <a href="#">Effect of substitutional defects on the thermal conductivity of boron arsenide</a> . At APS March Meeting, Boston, March 4, 2019.
2018	<b>Nakib Haider Protik</b> and David Broido. <a href="#">Effect of plasmon-LO phonon coupling on the mobility of GaN</a> . At APS March Meeting, Los Angeles, March 7, 2018.
2017	<b>Nakib Haider Protik</b> , Ankita Katre, Lucas Lindsay, Jesús Carrete, Bonny Dongre, George K. H. Madsen, Natalio Mingo, David Broido. <a href="#">Phonon thermal transport in 2H, 4H and 6H silicon carbide from first principles</a> . At APS March Meeting, New Orleans, March 13, 2017.
2016	<b>Nakib Haider Protik</b> , Jesús Carrete, Natalio Mingo, Nebil A. Katcho and David Broido. <a href="#">Ab initio study of the effect of vacancies on the thermal conductivity</a> . At APS March Meeting, Baltimore, March 15, 2016.
2014	<b>Nakib Haider Protik</b> . <b>Quantum Manybody Physics (Or what I've been up to since I left BRACU)</b> . At BRAC University, Dhaka, June 19, 2014.
2013	<b>Nakib Haider Protik</b> . <b>Manybody Quantum Dynamics</b> . At Ottawa-Carleton Institute of Physics Graduate Symposia, Ottawa, April 30, 2013.
2010	<b>Nakib Haider Protik</b> and Arshad Momen. <b>Simulating the Topologically Massive Maxwell Theory on the Moyal Plane</b> . At International Conference on Recent Advance in Physics - 2010, Dhaka, March 29, 2010. Technical Session 4B: Statistical and Theoretical Physics - 1.
2009	Arshad Momen and <b>Nakib Haider Protik</b> . <b>Simulating the Abelian Chern-Simons Theory on the Moyal Plane</b> . At Physics Conference, TIM - 09, Timisoara, November 27, 2009. Section: Theoretical and Computational Physics.

## II Teaching

- **Teaching Assistant @ Boston College**

Quantum Physics I: generating homework solutions and grading.

Intro to Physics Recitation I, II: recitations and grading.

1st year physics labs: experiments demonstration and lab report grading.

- **Teaching Assistant @ University of Ottawa**

Fundamentals of Applied Physics III: grading.

Advanced Optics & Introduction to Photonics: grading.

Principles of Physics I: recitations and grading.

Electricity and Magnetism: recitations and grading.

Fundamentals of Physics for Engineers: recitations and grading.

1st year physics lab: experiments demonstration and lab report grading.

- **Teaching Assistant @ BRAC University**

Applied Physics Lab I: lab management, experiments demonstration, exam preparation and grading.

Principles of Physics I, II labs: lab management, experiments demonstration, exam preparation and grading.

Mathematics II lab: lectures, exam preparation and grading.

- **Lab Assistant @ BRAC University**

Physics Lab I, III: experiments demonstration and lab report grading.

### III Service

#### PhD thesis committee member

- International expert and jury member in Dr. Martí Raya Moreno's PhD dissertation committee at Universitat Autònoma de Barcelona.

Thesis title: *Heat transport in binary semiconductor polytypes and devices based on 2D materials: an ab initio study.*

#### Journal reviewer

- *Physical Review Letters, Physical Review B, Physical Review Materials, Materials Today Physics, Acta Physica Polonica A, Journal of Physics and Chemistry of Solids*

#### Other

- Student representative in Graduate Affairs Committee (2018-2019), Boston College.
- Graduate Teaching Committee liaison person (2017-18), Boston College.