# Prashanth S. Venkataram (PSV)

Curriculum Vitae

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## Education

- **Princeton University** — Princeton, NJ
  *M. A. 2016, Ph. D. 2020 (GPA: 4.0/4)* — *2014 September – 2020 June*
  - Electrical Engineering (advisor: Alejandro W. Rodriguez)
  - Thesis: Scattering Theory in Fluctuational Electromagnetics at the Nanoscale: From Numerical Methods to Fundamental Limits
- **Massachusetts Institute of Technology** — Cambridge, MA
  *S. B. 2014 (GPA: 4.9/5)* — *2010 September – 2014 June*
  - Major: Physics (Focused Option, advisor: Jesse D. Thaler), Minor: Economics
  - Thesis: Computational Investigations of Nanophotonic Systems (advisor: Marin Soljačić)

## Publications

- **PSV**, R. Messina, J. C. Cuevas, P. Ben-Abdallah, and A. W. Rodriguez, "Mechanical relations between conductive and radiative heat transfer", arXiv:2005.14342
- **PSV**, S. Molesky, J. C. Cuevas, and A. W. Rodriguez, "Channel-based algebraic limits to conductive heat transfer" arXiv:2006.00932
- **PSV**, J. Hermann, A. Tkatchenko, and A. W. Rodriguez, "Fluctuational Electrodynamics in Atomic and Macroscopic Systems: van der Waals Interactions and Radiative Heat Transfer", arXiv:2005:04083
- **PSV** and A. W. Rodriguez, "Fundamental limits to attractive and repulsive Casimir–Polder forces", Phys. Rev. A **101**, 052115 (2020)
- **PSV**, S. Molesky, W. Jin, and A. W. Rodriguez, "Fundamental Limits to Radiative Heat Transfer: The Limited Role of Nanostructuring in the Near-Field", Phys. Rev. Lett. **124**, 013904 (2020)
- S. Molesky*, **PSV***, W. Jin, and A. W. Rodriguez, "Fundamental limits to radiative heat transfer: Theory", Phys. Rev. B **101**, 035408 (2020) *equal contributions
- S. Molesky, W. Jin, **PSV**, and A. W. Rodriguez, "**T** Operator Bounds on Angle-Integrated Absorption and Thermal Radiation for Arbitrary Objects", Phys. Rev. Lett. **122**, 257401 (2019)
- **PSV**, J. Hermann, T. J. Vongkovit, A. Tkatchenko, and A. W. Rodriguez, "Impact of Nuclear Vibrations on van der Waals and Casimir Interactions at Zero and Finite Temperature", Sci. Adv. **5**, eaaw0456 (2019)
- **PSV**, J. Hermann, A. Tkatchenko, and A. W. Rodriguez, "Phonon-Polariton Mediated Thermal Radiation and Heat Transfer among Molecules and Macroscopic Bodies: Nonlocal Electromagnetic Response at Mesoscopic Scales", Phys. Rev. Lett. **121**, 045901 (2018)
- **PSV**, J. Hermann, A. Tkatchenko, and A. W. Rodriguez, "Unifying Microscopic and Continuum Treatments of van der Waals and Casimir Interactions", Phys. Rev. Lett. **118**, 266802 (2017)
- **PSV**, J. D. Whitton, and A. W. Rodriguez, "Nonadditivity of van der Waals forces on liquid surfaces", Phys. Rev. E **94**, 030801(R) (2016)

- **PSV**, A. W. Rodriguez, J. C. Cuevas, R. Messina,, S.-A. Biehs, and P. Ben-Abdallah, "Near-field radiative heat transfer in many-body systems" *[in preparation]*

## Presentations

- **PSV**, S. Molesky, W. Jin, and A. W. Rodriguez, "Approaching the fundamental limits of heat transfer at the nanoscale: the surprisingly limited role ofinverse design", META 2019 (Invited Talk)
- **PSV**, "Mesoscale fluctuational electrodynamics: modeling and bounds, from molecules to continuous media", Université du Luxembourg 2019 July (Invited Talk)
- **PSV**, J. Hermann, T. J. Vongkovit, A. Tkatchenko, and A. W. Rodriguez, "Impact of nuclear vibrations on van der Waals interactions and radiative heat transfer in graphene", 2019 APS March Meeting (Contributed Talk)
- **PSV**, J. Hermann, A. Tkatchenko, and A. W. Rodriguez, "Van der Waals Interactions and Radiative Thermal Energy Exchange among Molecules and Macroscopic Bodies", 2018 APS March Meeting (Contributed Talk)
- **PSV**, J. Hermann, A. Tkatchenko, and A. W. Rodriguez, "Unifying Microscopic and Continuum Treatments of van der Waals and Casimir Interactions", 2017 APS March Meeting (Contributed Talk)

## Research Experience

- **Rodriguez Group** Princeton University Department of Electrical Engineering
  - Graduate research, thesis work: theoretical & computational analysis of nanoscale fluctuational electrodynamic phenomena (van der Waals/Casimir interactions, heat transfer)
  - Applications: material characterization & discovery, engineering thermophotovoltaic cells & nanoscale cooling systems
  - Skills: theoretical & numerical analysis, code development, international collaborations
- **Soljačić Group** Massachusetts Institute of Technology Department of Physics
  - Undergraduate research, thesis work: computational investigations of nanophotonic systems
  - Applications: photovoltaic devices, optofluidic platforms, nanoparticle design
  - Supervisors: Peter Bermel, Bo Zhen, Alejandro W. Rodriguez, Owen Miller
- **Sensor Science Division** National Institute of Standards and Technology, Gaithersburg
  - High school & college summer research: reflective surfaces, LEDs
  - Skills: experiments, device testing, data analysis, literature review
  - Supervisors: David Allen (2009 June–August), Yoshihiro Ohno (2011 May–August)

## Scholarships, Awards, and Honors

- **Bede Liu Best Dissertation Award** Winner
  *Princeton University Dep't of Electrical Engineering Award* *2020 May*
- **SEAS Award for Excellence** Winner
  *Princeton University School of Engineering and Applied Science Award* *2018 October*
- **Yan Huo *94 Graduate Fellowship** Fellow
  *Princeton University Dep't of Electrical Engineering Fellowship* *2017 September – 2018 June*

- **Early PhD Career Award** — Winner
  *Princeton University Dep't of Electrical Engineering Award* — *2016 May*
- **National Science Foundation GRFP** — Fellow
  *National Graduate Fellowship* — *2014 – 2019*
- **Sigma Pi Sigma** — Member
  *National Physics Honors Society* — *Inducted 2014 June*
- **Phi Beta Kappa** — Member
  *National Academic Honors Society* — *Inducted 2014 June*
- **Selfless Service to Undergraduate Teaching by an Undergraduate Award** — MIT Physics Department Award Winner
  *For contributions to 8.033 – Relativity lecture notes* — *2013 September*
- **AFCEA NOVA Scholarship** — Winner
  *Regional Scholarship* — *2013 & 2014 May*
- **Xerox Technical Minority Scholarship** — Winner
  *National Scholarship* — *2012 & 2013 & 2014 January*
- **Smiths Industries Scholarship** — Winner
  *Companywide Scholarship* — *2011 January*

## Skills

- OSs and programming languages: Linux (intermediate), LaTeX(proficient), C++ (basic), Scheme (basic), JAVA (basic)
- Scientific software: MATLAB, Julia, MEEP, SCUFF-EM
- Numerical analysis (Princeton University MAT 321: Numerical Methods)

## Leadership Activities

- 2019 Princeton University SmartDrivingCar Summit panelist & discussant
- Princeton University Department of Electrical Engineering: mentored undergraduate research students Jeremy D. Whitton (2015), Teerit J. Vongkovit (2018), and Jason Necaise (2019)
- Princeton University School of Engineering and Applied Science: recruited students for PhD program at 2018 Society of Hispanic Professional Engineers (SHPE) Convention
- Princeton University Department of Electrical Engineering: panelist for prospective graduate student and new student fellowship panels (2016, 2017)
- MIT Society of Physics Students (SPS): Publicity Chair (2011 June–2013 May), Secretary (2013 June–2014 May), organized Lightning Lectures, weekly colloquium lunches, publicized SPS events
- 2013 MIT Diversity Summit panelist (Disability as an Aspect of Diversity)
- MIT Department of Physics: represented department at various campus-wide undergraduate major and research expositions

## Educational Activities

- TA for Princeton class ELE 511 – Quantum Mechanics with Applications (2017 & 2018 fall): organized and led precepts, held office hours, and graded assignments & exams
- TA for Princeton class EGR 154 – Linear Systems (2018 spring): organized and led help sessions & office hours, and graded assignments

- Graded problem sets for MIT classes 8.012 – Physics I (2011 fall) and 8.022 – Physics II (2012 spring)
- Typeset MIT course notes for physics classes 8.033 – Relativity, 8.04 – Quantum Physics I, and 8.09 – Classical Mechanics III for use on MIT OpenCourseWare
- Online tutoring: InstaEDU/Chegg Tutors (high school through graduate school STEM subjects + economics, 2014 January–2017 December), Tutorspree (high school JAVA, 2012 August–2013 April)
- STEM educational videos: MIT UROP Spotlight (2013 January), MIT-K12 Initiative (2013–2014 January, 3 videos)