

Puneet A. Murthy

Curriculum vitae

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Date of birth: 26.09.1988
Nationality: Indian

Education

- 07/2018 **PhD in Physics**, *Heidelberg University, Germany*.
Thesis: Emergent phenomena in two-dimensional Fermi systems; Advisor: Prof. Selim Jochim
- 07/2011 **MSc. in Physics**, *University of Mysore, India*.
Thesis: A three-dimensional lattice of ion traps; Advisor: Prof. Sadiq Rangwala

Current Position

- 09/23 - present **Assistant Professor of Photonics**, *Institute for Quantum Electronics, Department of Physics, ETH Zürich, Zurich, Switzerland*.

Previous positions

- 01/23-08/23 **Research consultant**, *NTT Research Inc., Sunnyvale, California, USA*.
- 10/18-12/22 **Postdoctoral fellow and lecturer**, *Institute for Quantum Electronics, ETH Zurich, Switzerland*.
Advisor: Prof. Dr. Atac Imamoglu
- 06/18-09/18 **Postdoctoral researcher**, *Physics Institute, Heidelberg University, Heidelberg, Germany*.
- 07/12-06/18 **Graduate researcher**, *Physics Institute, Heidelberg University, Heidelberg, Germany*.
- 10/11-01/12 **Visiting researcher**, *Max Planck Insitute for Nuclear Physics, Heidelberg*.
Advisors: Prof. Dr. Klaus Blaum and Prof. Dr. Gunter Werth
Project: Measuring ambient magnetic fields in the electron g-factor experiment.

Awards and Fellowships

- 11/2022 **Swiss National Science Foundation (SNSF) Starting Grant 2022**, Fellowship amount: CHF 1.8 million.
- 11/2022 **European Research Council (ERC) Starting Grant 2022**, *declined*.
- 2019 - 2021 **Marie Sklodowska Curie Postdoctoral Fellowship**, *EU Horizon 2020 Programme*, Fellowship amount: EUR 198,000.
- 2013 - 2018 **International Max Planck Research School on Quantum Dynamics**, *Max Planck Institute for Nuclear Physics, Heidelberg*, Role: PhD Student, Fellowship amount: approx. EUR 10,000.

Teaching Experience

- Sep-Dec 2021 **Lecture on Optics of semiconductors**, *ETH Zurich*.
- 2018 - 2021 **TA for advanced laboratory courses**, *ETH Zurich*.

2015 - 2018 **TA for advanced laboratory course on optics**, *Physikalisches Institut, Heidelberg University*.

Research Supervision

During my PhD at Heidelberg University and postdoctoral work at ETH Zurich, I have altogether co-supervised the research work of 1 PhD student (Deepankur Thureja), 5 Master's students, and 6 Bachelor/Semester students.

I have an excellent supervisory track record, which is evidenced by the fact that three of my students have published their work in top research journals as leading authors during their Master and PhD thesis.

Scientific Publications

- 2023 **Quantum control of exciton wavefunctions in 2D semiconductors**, J. Hu, E. Lorchat, X. Chen, K. Watanabe, T. Taniguchi, T. F. Heinz, P. A. Murthy* and T. Chervy*, [arXiv:2308.06361](#). *Corresponding authors
- 2022 **Resonantly enhanced superconductivity mediated by spinor condensates**, G. Bighin, P. A. Murthy*, N. Defenu and T. Enss, [arXiv:2212.07419](#). *Corresponding author
- 2022 **Electrically tunable quantum confinement of neutral excitons**, D. Thureja, A. Imamoglu*, T. Smolenski, I. Amelio, A. Popert, T. Chervy, X. Lu, S. Liu, K. Barmak, K. Watanabe, T. Taniguchi, D. J. Norris, M. Kroner, and P. A. Murthy*, [Nature 606, 298-304 \(2022\)](#). *Corresponding author.
- 2021 **Freeform nanostructuring of hexagonal boron nitride**, N. Lassaline, D. Thureja, T. Chervy, D. Petter, P. A. Murthy, A. W. Knoll, and D. J. Norris, [Nano Letters 21, 19, 8175-8181 \(2021\)](#).
- 2020 **Directly imaging the order parameter of an atomic superfluid**, P. A. Murthy* and S. Jochim, [arXiv:1911.10824 \(2019\)](#). *Corresponding author
- 2019 **Quantum scale anomaly and spatial coherence in a 2D Fermi superfluid** P. A. Murthy*, N. Defenu, L. Bayha, M. Holten, P. M. Preiss, T. Enss and S. Jochim, [Science 365, 268-272 \(2019\)](#). *Corresponding author
- 2018 **Anomalous breaking of scale invariance in a two-dimensional Fermi gas** M. Holten, L. Bayha, A. Klein, P. A. Murthy, P. M. Preiss, and S. Jochim, [Phys. Rev. Lett. 121, 120401 \(2018\)](#).
- 2018 **High-temperature pairing in a strongly interacting two-dimensional Fermi gas**, P. A. Murthy*, M. Neidig, R. Klemt, L. Bayha, I. Boettcher, T. Enss, M. Holten, G. Zürn, P. M. Preiss, and S. Jochim; [Science, 352, 452-455 \(2018\)](#). *Corresponding author
- 2016 **Equation of State of Ultracold Fermions in the 2D BEC-BCS Crossover Region**, I. Boettcher, L. Bayha, D. Kedar, P. A. Murthy, M.G. Ries, A.N. Wenz, G. Zürn, and S. Jochim; [Phys. Rev. Lett. 116, 045303 \(2016\)](#).
PRL Editors' Suggestion and [Viewpoint](#) in Physics magazine (APS).

- 2015 **Observation of the Berezinskii–Kosterlitz–Thouless phase transition in an ultracold Fermi gas**, P. A. Murthy*, I. Boettcher*, L. Bayha, M. Holzmann, D. Kedar, M. Neidig, M.G. Ries, A.N. Wenz, G. Zürn, and S. Jochim; **Phys. Rev. Lett. 115 010401 (2015)**. *Corresponding author
Selected for PRL Editors’ Suggestion.
- 2015 **Observation of pair-condensation in the quasi-2D BEC-BCS crossover**, M.G. Ries, A.N. Wenz, G. Zürn, L. Bayha, I. Boettcher, D. Kedar, P. A. Murthy, M. Neidig, T. Lompe, and S. Jochim; **Phys. Rev. Lett. 114, 230401 (2015)**.
Selected for PRL Editors’ Suggestion and a [Viewpoint](#) in Physics magazine (APS).
- 2014 **Matterwave Fourier optics with a strongly interacting two-dimensional Fermi gas**, P. A. Murthy*, D. Kedar, T. Lompe, M. Neidig, M.G. Ries, A.N. Wenz, G. Zürn, and S. Jochim; **Phys. Rev. A 90, 043611 (2014)**. *Corresponding author

Patents

- 2021 **Confinement of Neutral Excitons in Semiconductor Layer Structure**, EU patent application Number: EP21156970.2 (*Status: PCT Stage*), P. A. Murthy, D. Thureja, A. Imamoglu, M. Kroner, A. Popert.

Research Interests

- Strongly interacting photons
- Photonic quantum technologies
- Nanophotonics
- Quantum simulation and information processing

International Network and Collaborations

- Dr. Thibault Chervy (NTT Research, USA): Nonlinear photonic systems
- Prof. Dr. David Norris (ETH Zurich): Freeform patterning of dielectric 2D materials
- Prof. Dr. Tilman Enss (Heidelberg University) and Dr. Nicolo Defenu: Strongly correlated many-body systems in two dimensions.

Selected Conferences

- Sep 2021 *Bose–Einstein Condensation conference*, Sant Feliu de Guixols, Spain
Aug 2021 *Optics of excitons in confined systems (OECS)*, Dortmund, Germany
Sep 2021 *Bose–Einstein Condensation conference*, Sant Feliu de Guixols, Spain
Dec 2019 *QSIT conference*, Arosa, Switzerland
Nov 2017 *Frontiers in Two-Dimensional Quantum Systems*, Trieste, Italy
Jun 2017 *DAMOP Conference*, Sacramento
Aug 2016 *Gordon Research Conference and Seminar on Quantum Science*, Boston, USA
Sep 2015 *Frontiers in Bose-Einstein Condensation*, Sant Feliu, Spain
Apr 2014 *Young Atom Opticians Conference*, Barcelona

————— **Reviewing work**

Reviewer for international journals including Nature Physics, Phys. Rev. Applied, New Journal of Physics.

————— **Memberships and Administrative activities**

- 2012-2018: Member of Heidelberg Graduate School of Fundamental Physics
- 2018-2019: Student representative of over 300 physics doctoral students in Heidelberg University.
- 2017-2018: Member of SFB Collaborative network at Heidelberg University and part of its Young Researchers Convention.