

*Curriculum Vitae*  
Andrew P. Higginbotham

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## **Education**

Harvard University, Ph.D. — 2010-2015  
Traveling scholar at Niels Bohr Institute, DK  
Advisor: Charles M. Marcus

Cambridge University, M.Phil. — 2009-2010  
Advisor: Jacqueline M. Cole

Harvey Mudd College, B.Sc. — 2005-2009  
Advisor: Thomas D. Donnelly

## **Positions**

University of Chicago, James Franck Institute, Assistant Professor — 2023-present

IST Austria, Assistant Professor — 2019-2023

Microsoft Station Q Copenhagen, Researcher — 2017-2019  
Research topic: Topological superconductivity and quantum information

JILA: NIST and CU Boulder, Postdoctoral Researcher — 2015-2017  
Research topics: Quantum microwave-mechanical-optical transducer  
Advisors: Konrad W. Lehnert & Cindy A. Regal

## **Awards and Honors**

National Research Council Postdoctoral Fellowship, 2016  
D.O.E. Office of Science Graduate Fellowship, 2010  
D.O.D. National Defense Science & Engineering Graduate Fellowship (declined), 2010  
A.P.S. Apker Award Finalist, 2009  
Churchill Foundation Scholarship (Cambridge, UK), 2009

D.O.D. National Defense Science & Engineering Graduate Fellowship (declined), 2009  
Fannie and John Hertz Foundation Scholarship Finalist, 2009  
Mindlin Prize for Innovation in Science (college), 2009  
Thomas B. Brown Memorial Award (college), 2009  
Bell Prize for Excellence in Physics (college), 2009

## Publications

- S. Mukhopadhyay, J. Senior, J. Saez-Mollejo, D. Puglia, M. Zemlicka, J. Fink, A.P. Higginbotham. Superconductivity from a melted insulator, doi:10.1038/s41567-023-02161-w. *Nature Physics* **19**, 1630 (2023).
- D. Phan, P. Falthansl-Scheinecker, U. Mishra, W.M. Strickland, D. Langone, J. Shabani, A.P. Higginbotham. Gate-tunable superconductor-semiconductor parametric amplifier, *Phys. Rev. App.* **19** 064032 (2023).
- J. Díez-Mérida, A. Díez-Carlón, S.Y. Yang, Y.-M. Xie, X.-J. Gao, J. Senior, K. Watanabe, T. Taniguchi, X. Lu, A.P. Higginbotham, K.T. Law, D.K. Efetov. Symmetry-broken Josephson junctions and superconducting diodes in magic-angle twisted bilayer graphene. *Nat. Comms.* **14** 2396 (2023).
- D. Phan, J. Senior, A. Ghazaryan, M. Hatefipour, W.M. Strickland, J. Shabani, M. Serbyn, A.P. Higginbotham, Detecting Induced Pairing at the Al-InAs Interface with a Quantum Microwave Circuit. *Phys. Rev. Lett.* **128**, 107701 (2022).
- D. Puglia, E.A. Martinez, G.C. Ménard, A. Pöschl, S. Gronin, G.C. Gardner, R. Kallaher, M.J. Manfra, C.M. Marcus, A.P. Higginbotham, L. Casparis. Closing of the induced gap in a hybrid superconductor-semiconductor nanowire, *Phys Rev. B* **103**, 235201 (2021).
- J. Danon, A.B. Hellenes, E.B. Hansen, L. Casparis, A.P. Higginbotham, K. Flensberg. Nonlocal conductance spectroscopy of Andreev bound states: Symmetry relations and BCS charges, *Phys. Rev. Lett.* **124**, 036801 (2020).
- G.C. Ménard, G.L.R. Anselmetti, E.A. Martinez, D. Puglia, F.K. Malinowski, J.S. Lee, S. Choi, M. Pendharkar, C.J. Palmstrøm, K. Flensberg, C.M. Marcus, L. Casparis, A.P. Higginbotham. Conductance-matrix symmetries of a three-terminal hybrid device, *Phys. Rev. Lett.* **124**, 036802 (2020).
- G.L.R. Anselmetti, E.A. Martinez, G.C. Ménard, D. Puglia, F.K. Malinowski, J.S. Lee, S. Choi, M. Pendharkar, C.J. Palmstrøm, C.M. Marcus, L. Casparis, A.P. Higginbotham. Harnessing electro-optic correlations in an efficient mechanical converter, *Phys. Rev. B* **100**, 205412 (2019).

- A.P. Higginbotham,\* P.S. Burns,\* M.D. Urmey,\* R.W. Peterson, N.S. Kampel, B.M. Brubaker, G.C. Smith, K.W. Lehnert, C.A. Regal. Electro-optic correlations improve an efficient, microwave-mechanical-optical converter, *Nature Physics* **14**, 1038-1042 (2018).
- E.I. Rosenthal, N.K. Ehrlich, M.S. Rudner, A.P. Higginbotham, K.W. Lehnert. Topological phase transition measured in a dissipative metamaterial, *Phys. Rev. B* **97**, 220301(R) (2018).
- E.I. Rosenthal, B.J. Chapman, A.P. Higginbotham, J. Kerckhoff, K.W. Lehnert. Breaking Lorentz reciprocity with frequency conversion and delay, *Phys. Rev. Lett.* **119**, 147703 (2017).
- T. Menke, P.S. Burns, A.P. Higginbotham, N.S. Kampel, R.W. Peterson, K. Cicak, R.W. Simmonds, C.A. Regal, K.W. Lehnert, Reconfigurable re-entrant cavity for wireless coupling to an electro-optomechanical device, *Review of Scientific Instruments* **88**, 094701 (2017).
- S.M. Albrecht, E.B. Hansen, A.P. Higginbotham, F. Kuemmeth, T.S. Jespersen, J. Nygård, P. Krogstrup, J. Danon, K. Flensberg, C.M. Marcus, Transport signatures of quasiparticle poisoning in a Majorana island, *Phys. Rev. Lett.* **118**, 137701 (2017).
- J.M. Cole, T.-C. Lin, C.M. Ashcroft, J. Perez-Moreno, Y. Tan, P. Venkatesan, A.P. Higginbotham, P. Pattison, A.J. Edwards, R.O. Piltz, K. Clays, A. Ilangoan, Relating the Structure of Geminal Amido Esters to Their Molecular Hyperpolarizability, *J. Phys. Chem. C* **120**, 29439–29448 (2016).
- D. Aasen, M. Hell, R.V. Mishmash, A.P. Higginbotham, J. Danon, M. Leijnse, T.S. Jespersen, J.A. Folk, C.M. Marcus, K. Flensberg, and J. Alicea, Milestones toward Majorana-based quantum computing, *Phys. Rev. X* **6**, 031016 (2016).
- R.V. Mishmash, D. Aasen, A.P. Higginbotham, and J. Alicea, Approaching a topological phase transition in Majorana nanowires, *Phys. Rev. B* **93**, 245404 (2016).
- S.M. Albrecht,\* A.P. Higginbotham,\* M. Madsen, F. Kuemmeth, T. S. Jespersen, J. Nygård, P. Krogstrup, C.M. Marcus, Exponential protection of zero modes in Majorana islands, *Nature* **531**, 206–209 (2016).
- A.P. Higginbotham,\* S.M. Albrecht,\* G. Kiršanskas, W. Chang, F. Kuemmeth, P. Krogstrup, T.S. Jespersen, J. Nygård, K. Flensberg, C.M. Marcus, Parity lifetime of bound states in a proximitized semiconductor nanowire, *Nature Physics* **11**, 1017–1021 (2015).

- A.P. Higginbotham, T.W. Larsen, J. Yao, H. Yan, C.M. Lieber, C.M. Marcus, Hole Spin Coherence in a Ge/Si Heterostructure Nanowire, *Nano Lett.* **14**, 3582 (2014).
- A.P. Higginbotham, F. Kuemmeth, T.W. Larsen, M. Fitzpatrick, J. Yao, H. Yan, C.M. Lieber, C.M. Marcus, Antilocalization of Coulomb Blockade in a Ge/Si Nanowire, *Phys. Rev. Lett.* **112**, 216806 (2014).
- A.P. Higginbotham, F. Kuemmeth, M. P. Hanson, A. C. Gossard, C.M. Marcus, Coherent Operations and Screening in Multielectron Spin Qubits, *Phys. Rev. Lett.* **112**, 026801 (2014).
- T-C. Lin, J. M. Cole, A.P. Higginbotham, A.J. Edwards, R.O. Piltz, J. Pérez-Moreno, J-Y. Seo, S-C. Lee, K. Clays, O-P. Kwon, Molecular Origins of the High-Performance Nonlinear Optical Susceptibility in a Phenolic Polyene Chromophore, *J. Phys. Chem. C.* **117**, 9416 (2013).
- A.P. Higginbotham, J.M. Cole, M.A. Blood-Forsythe, D.D. Hickstein, Identifying and evaluating organic nonlinear optical materials via molecular moments, *J. Appl. Phys.* **111**, 033512 (2012).
- A.P. Higginbotham, A. Guillen, N. Jones, T.D. Donnelly, A.J. Bernoff, Evidence of the harmonic Faraday instability in ultrasonic atomization experiments with a deep, inviscid fluid, *J. Acoust. Soc. Am.* **130**, 2694 (2011).
- I.K. Wright, A.P. Higginbotham, S.M. Baker, T.D. Donnelly, Generation of nanoparticles of controlled size using ultrasonic piezoelectric oscillators in solution, *ACS Appl. Mater. Interfaces* **2**, 2360 (2010).
- A.P. Higginbotham, O. Semonin, S. Bruce, C. Chan, M. Maindi, T.D. Donnelly, M. Maurer, W. Bang, I. Churina, J. Osterholz, I. Kim, A.C. Bernstein, T. Ditmire, Generation of Mie size microdroplet aerosols with applications in laser-driven fusion experiments, *Rev. Sci. Inst.* **80**, 063503 (2009).

## Invited talks

Thermally-enhanced superconductivity and evidence of photonic friction in Josephson Junction Arrays. National Physical Laboratory Teddington workshop Charge-phase duality in novel superconducting circuits workshop (2023).

“Circuit quantum electrodynamics meets superconductor-insulator phase transition” Dresden MPI-PKS Quantum Materials in the Quantum Information Era (2023).

“0,1,...,N: Exploring superconductor-semiconductor hybrids by adding Josephson junctions”, SPIE Spintronics XVI (2023).

“0,1,...,N: Exploring superconductor-semiconductor hybrids by adding Josephson junctions”, Aalto Quantum Physics seminar (2023).

“Routes and challenges for engineering exotic superconductivity in hybrid structures”, Surrey UK workshop Topological states in solid-state devices as a resource for quantum computing (2023).

“0,1,...,N: Exploring superconductor-semiconductor hybrids by adding Josephson junctions”, Bratislava workshop Opportunities for collaborations in the fields of superconductivity and 2D materials (2023).

“0,1,...,N: Exploring superconductor-semiconductor hybrids by adding Josephson junctions”, IST Austria Hybrid quantum technologies workshop (2023).

“Probing and simulating condensed matter with superconducting circuits”, TU Vienna Symposium on Correlated Quantum Materials & Solid State Quantum Systems (2023).

“Probing and Simulating Condensed Matter with Superconducting Circuits”, UCSB Physics Department Colloquium (2023).

“Probing and Simulating Condensed Matter with Superconducting Circuits”, UChicago James Franck Institute Seminar (2023).

“Probing and Simulating Condensed Matter with Superconducting Circuits”, NYU CQIP Seminar (2022).

“0,1,...,N: Exploring superconductor-semiconductor hybrids by adding Josephson junctions.” Nano & Quantum Colloquium, University of Basel (2022).

“0,1,...,N: Exploring superconductor-semiconductor hybrids by adding Josephson junctions.” Engineering Quantum Systems Seminar, MIT (2022).

“0,1,...,N: Exploring superconductor-semiconductor hybrids by adding Josephson junctions.” Experimental Solid State Physics Seminar, TU Munich (2022).

“0,1,...,N: Exploring superconductor-semiconductor hybrids by adding Josephson junctions.” Quantum Devices seminar, University of Copenhagen (2022).

“Probing quantum materials with circuit quantum electrodynamics.” Frontiers of Quantum Materials and Devices, Valencia (2022).

“Probing engineered quantum materials with microwave circuits.” SFB 1227 Colloquium, Regensburg (2022).

- “Probing engineered quantum materials with microwave circuits.” TU Vienna Atom Institute Seminar (2022).
- “Detecting induced  $p\pm ip$  pairing with a quantum microwave circuit.” TOPCOR, Dresden (2022).
- “Probing quantum materials with circuit quantum electrodynamics.” NYU CQP Seminar (2021).
- “Probing  $p\pm ip$  pairing in a superconductor-semiconductor hybrid” Materials Research Society (2021).
- “Probing quantum materials with circuit quantum electrodynamics.” CEA Grenoble Seminar (2021).
- “Searching for Majorana pairs in superconductor-semiconductor nanowires.” TU Vienna Institute for Solid State Physics Seminar (2019)
- “Electro-optic correlations improve an efficient mechanical converter.” University of Vienna Quantum Optics Seminar (2019)
- “Approaching quantum operation of a microwave-mechanical-optical transducer.” Physics of Quantum Electronics, Snowbird UT (2017).
- “Exponential localization of zero modes in Majorana islands.” CNAM Condensed Matter Colloquium, University of Maryland (2016).
- “Microwave-mechanical-optical transducer in a dilution refrigerator.” Quantum Interfaces with Nano-opto-electro-mechanical devices: Applications and Fundamental Physics, Erice IT (2016).
- “Exponential protection of zero modes in Majorana islands.” Caltech Condensed Matter Seminar (2015).
- “Long spin coherence in a strong spin-orbit qubit.” APS March Meeting Invited Talk (2014).