Johannes Pollanen

Curriculum Vitae

Department of Physics and Astronomy, Michigan State University

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Current Positions

2024-present: Cowen Distinguished Chair in Experimental Physics

2022-present: Associate Professor

2017-present: Co-founder and Chief Science Officer (CSO) EeroQ Quantum Hardware Corp.

2021-present: Co-founder and Board Member, Midwest Quantum Collaboratory (MQC)

2019-present: Co-Director, MSU Center for Quantum Computing Science and Engineering

2016-present: Principal Investigator of the Laboratory for Hybrid Quantum Systems (LHQS)

Previous Positions

2016-2022: Jerry Cowen Chair of Physics and Assistant Professor

2012-2015: IQIM Postdoctoral Scholar of Physics at Caltech, Eisenstein Group

2004-2012: Graduate Research Assistant, Northwestern University, W.P. Halperin Ultra Low Temperature (ULT) Physics Group

2001-2003: Research Technician, Laboratory for Experimental Nuclear Astrophysics (LENA) at the Triangle Universities Nuclear Lab (TUNL)

Education

Northwestern University, Evanston, Illinois
Ph.D. in Physics: March 2012
Advisor: William P. Halperin
Thesis Title: Transverse Pulsed NMR of Superfuid ^{3}He in Aerogel: Unconventional Pairing in the Presence of Quenched Disorder

Northwestern University, Evanston, Illinois
Masters in Physics: December 2004
Advisor: William P. Halperin

University of North Carolina at Chapel Hill, Chapel Hill, North Carolina
Bachelors of Science in Physics: December 2002

Highlights/Awards

◇ 2025 Gordon & Betty Moore Foundation Experimental Physics Investigators Initiative Award

◇ EeroQ wins 2025 MSU Startup of the Year Award

◇ 2022 NSF CAREER: Circuit Quantum Optics with Piezoelectric Surface Acoustic Waves

◇ 2021-2022 MSU College of Natural Science Teacher-Scholar Award

◇ 2018: Thomas H. Osgood Excellence in Teaching Award, Michigan State University Department of Physics and Astronomy

◇ 2017: Co-founder and CSO of quantum hardware startup company, EeroQ Quantum Hardware Corp., with Nick Farina, Faye Wattleton, David Ferguson, Stephen A. Lyon and David G. Rees

◇ 73 invited scientific talks, at major national and international conferences, summer schools, university condensed matter physics & quantum information science seminars and colloquia

◇ 71 publications totaling 1419 citations

◇ h-index: 22, i-10 index: 41 (Google Scholar)

Interests & Expertise

◇ Hybrid quantum systems
◇ Experimental quantum information science and engineering (QISE)
◇ Superconducting qubits & circuits (2d and 3d transmon systems and single electron transistors)
◇ Electrons on superfluid helium (eHe)
◇ Surface acoustic waves (SAW) and bulk acoustic waves (BAW) coupled to quantum systems
◇ Low-dimensional electron systems (semiconductor and van der Waals heterostructures)
◇ Quantum fluids (superfluid ^{3}He & ^{4}He)
◇ Nitrogen-vacancy defects (qubits) in diamond
◇ Nuclear magnetic resonance (NMR)
◇ Ultra-low temperature (sub-mK) physics (nuclear demagnetization cooling)
◇ Sol-gel chemistry and silica aerogels

Publications

71. *Impact of Grain Size on Low-Temperature Carrier Phase Coherence Length in Polycrystalline Halide Perovskite Films*, A. Sen, L. Scanlon, A.M. Gaona, J.L. Mendoza-Cortes, **J. Pollanen**, R.R. Lunt, W.J. Gannon, *Advanced Materials Interfaces* **13**, e00567 (2026).

70. *Frequency modulated enhancement of microwave resonator sensing*, P.K. Rath, J.D. Philips, T. Yoon, K.R. Shirer, A. Fereidouni, and **J. Pollanen**, arXiv:2512.06289 (2025).

69. *Selective shuttling of electrons on helium using a CMOS control platform*, K.E. Castoria, H. Byeon, N.R. Beysengulov, E.O. Glen, G. Koolstra, M. Sammon, **J. Pollanen**, D.G. Rees, and S.A. Lyon, arXiv:2511.15922 (2025).

68. *Strong coupling of a microwave photon to an electron on helium*, G. Koolstra, E.O. Glen, N.R. Beysengulov, H. Byeon, K.E. Castoria, M. Sammon, S.A. Lyon, D.G. Rees, and **J. Pollanen**, arXiv:2509.14506 (2025).

67. *Sensing and control of single trapped electrons above 1 Kelvin*, K.E. Castoria, N.R. Beysengulov, G. Koolstra, H. Byeon, E.O. Glen, M. Sammon, S.A. Lyon, **J. Pollanen**, and D.G. Rees, *Physical Review X* **15**, 041002 (2025).

66. *Plasmon mode engineering with electrons on helium*, C.A. Mikolas, N.R. Beysengulov, A.J. Schleusner, D.G. Rees, C. Undershute, and **J. Pollanen**, *Nature Communications*, **16**, 4959 (2025).

65. *Electrons in quantum dots on helium: from charge qubits to synthetic color centers*, M.I. Dykman and **J. Pollanen**, Special Issue: From Order to Disorder: Superfluidity, Stochastic Processes, and the Dynamics of Life-Dedicated to Professor Peter McClintock on the Occasion of His 85th Birthday *Entropy*, **27**, 787 (2025).

64. *High-impedance resonators for strong coupling to an electron on helium*, G. Koolstra, E.O. Glen, N.R. Beysengulov, H. Byeon, K.E. Castoria, M. Sammon, B. Dizdar, C.S. Wang, D.I. Schuster, S.A. Lyon, **J. Pollanen**, and D.G. Rees, *Phys. Rev. Applied*, **23**, 024001 (2025).

63. *Decoherence of surface phonons in a quantum acoustic system*, C. Undershute, J.M. Kitzman, C.A. Mikolas, and **J. Pollanen**, *Phys. Rev. A*, **111**, 012615 (2025).

62. *Coulomb interaction-driven entanglement of electrons on helium*, N.R. Beysengulov, **J. Pollanen**, Ø.S. Schøyen, S.D. Bilek, J.B. Flaten, O. Leinonen, H.E. Kristiansen, Z.J. Stewart, J.D. Weidman, A.K. Wilson, and M. Hjorth-Jensen, *PRX-Quantum*, **5**, 03024 (2024).

61. *Quantum computing and chemistry*, J. Weidman, M. Sajjan, C.A. Mikolas, Z.J. Stewart, **J. Pollanen**, S. Kais and A.K. Wilson, *Cell Reports Physical Science*, **5**, 102105(2024).

60. *A hermetic on-cryostat helium source for low temperature experiments*, K.E. Castoria, H. Byeon, J. Theis, N.R. Beysengulov, E.O. Glen, G. Koolstra, M. Sammon, S.A. Lyon, **J. Pollanen**, and D.G. Rees, *Review of Scientific Instruments*, **95**, 043902 (2024).

59. *Free-space coupling and characterization of transverse bulk phonon modes in lithium niobate in a quantum acoustic device*, J.M. Kitzman, J.R. Lane, C. Undershute, M. Drimmer, A.J. Schleusner, N.R. Beysengulov, C.A. Mikolas, and **J. Pollanen**, *Applied Physics Letters*, **123**, 224001 (2023).

58. *Phononic bath engineering of a superconducting qubit*, J.M. Kitzman, J.R. Lane, C. Undershute, P.M. Harrington, N.R. Beysengulov, C.A. Mikolas, K.W. Murch and **J. Pollanen**, *Nature Communications*, **14**, 3910 (2023).

57. *Quantum acoustic Fano interference of surface phonons*, J.M. Kitzman, J.R. Lane, C. Undershute, N.R. Beysengulov, C.A. Mikolas, K.W. Murch and **J. Pollanen**, *Phys. Rev. A* **108**, L010601 (2023).

56. *Dirac revivals drive a resonance response in twisted bilayer graphene*, E. Morissette, J.-X. Lin, D. Sun, L. Zhang, S. Liu, D. Rhodes, K. Watanabe, T. Taniguchi, J. Hone, **J. Pollanen**, M.S. Scheurer, M. Lilly, A.M. Mounce and J.I.A. Li, *Nature Physics* **19**, 1156 (2023).

55. *Accelerating Progress Towards Practical Quantum Advantage: The Quantum Technology Demonstration Project Roadmap*, Paul Alsing, Phil Battle, Joshua C. Bienfang, Tammie Borders, Tina Brower-Thomas, Lincoln Carr, Fred Chong, Siamak Dadras, Brian DeMarco, Ivan Deutsch, Eden Figueroa, Danna Freedman, Henry Everitt, Daniel Gauthier, Ezekiel Johnston-Halperin, Jungsang Kim, Mackillo Kira, Prem Kumar, Paul Kwiat, John Lekki, Anjul Loiacono, Marko Loncar, John R. Lowell, Mikhail Lukin, Celia Merzbacher, Aaron Miller, Christopher Monroe, **Johannes Pollanen**, David Pappas, Michael Raymer, Ronald Reano, Brandon Rodenburg, Martin Savage, Thomas Searles and Jun Ye, arXiv:2210.14757 (2022).

54. *Vantablack shielding of superconducting qubit systems*, J.M. Kitzman, J.R. Lane, T. Stefanski, N.R. Beysengulov, D. Tan, K.W. Murch, and **J. Pollanen**, *J. Low Temp. Phys.* **208**, 467 (2022).

53. *Helium surface fluctuations investigated with superconducting coplanar waveguide resonator*, N.R. Beysengulov, C.A. Mikolas, J.M. Kitzman, J.R. Lane, D. Edmunds, D.G. Rees, E.A. Henriksen, S.A. Lyon, and **J. Pollanen**, *J. Low Temp. Phys.* **208**, 482 (2022).

52. *Piezoacoustics for precision control of electrons floating on helium*, H. Byeon, K. Nasyedkin, J.R. Lane, N.R. Beysengulov, L. Zhang, R. Loloee, and **J. Pollanen**, *Nature Communications* **12**, 4150 (2021).

51. *Noise performance and thermalization of a single electron transistor using quantum fluids*, N.R. Beysengulov, J.R. Lane, J.M. Kitzman, K. Nasyedkin, D.G. Rees, and **J. Pollanen**, *J. Low Temp. Phys.* **205**, 143 (2021).

50. *Superconductivity in $PtPb_4$ with possible nontrivial band topology*, C.Q. Xu, B. Li, L. Zhang, **J. Pollanen**, X.L. Yi, X.Z. Xing, Y. Liu, J.H. Wang, Zengwei Zhu, Z.X. Shi, Xiaofeng Xu and X. Ke, *Phys. Rev. B* **104**, 125127 (2021).

49. *Coherent hopping transport and giant negative magnetoresistance in epitaxial $CsSnBr_3$*, L. Zhang, I. King, K. Nasyedkin, P. Chen, B. Skinner, R.R. Lunt, and **J. Pollanen**, *ACS Applied Electronic Materials* **3**, 2948 (2021).

48. *Extraordinary phase coherence length in epitaxial halide perovskites*, K. Nasyedkin, I. King, L. Zhang, P. Chen, L. Wang, R.J. Staples, R.R. Lunt, and **J. Pollanen**, *iScience* **24**, 102912 (2021).

47. *Integrating superfluids with superconducting qubit systems*, J.R. Lane, D. Tan, N.R. Beysengulov, K. Nasyedkin, E. Brook, L. Zhang, T. Stefanski, H. Byeon, K.W. Murch and **J. Pollanen**, *Phys. Rev. A* **101**, 012336 (2020).

46. *Fabrication of Graphene-inserted Tunneling Device (GiTD) for emerging spin devices*, H.R. Cherian, N.O. Birge, **J. Pollanen**, and E.C. Ahn *ECS Transactions* **98**, 3 (2020).

45. *Anomalous attenuation of piezoacoustic surface waves by liquid helium thin films*, H. Byeon, K. Nasyedkin, J.R. Lane, L. Zhang, N.R. Beysengulov, R. Loloee and **J. Pollanen**, *J. Low Temp. Phys.* **195**, 336 (2019).

44. *Flip-chip gate-tunable acoustoelectric effect in graphene*, J.R. Lane, L. Zhang, M.A. Khasawneh, B.N. Zhou, E.A. Henriksen and **J. Pollanen**, *Journal of Applied Physics* **124**, 194302 (2018).

43. *Unconventional field effect transistor composed of electrons floating on helium*, K. Nasyedkin, H. Byeon, L. Zhang, N.R. Beysengulov, J. Milem, S. Hemmerle, R. Loloee and **J. Pollanen**, *Journal of Physics: Condensed Matter* **30**, 465501 (2018).

42. *Charge metastability and hysteresis in the quantum Hall regime*, **J. Pollanen**, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **94**, 245440 (2016).

41. *Crystallization of ^{4}He in aerogel via mass flow through surrounding solid ^{4}He*, H. Matsuda, A. Ochi, R. Isozaki, S. Minami, R. Nomura, **J. Pollanen**, W.P. Halperin, and Y. Okuda, *Phys. Rev. B* **94**, 024509 (2016).

40. *Heterostructure symmetry and the orientation of the quantum Hall nematic phases*, **J. Pollanen**, K.B. Cooper, S. Brandsen, J.P. Eisenstein, L.N. Pfeiffer, and K.W. West, *Phys. Rev. B* **92**, 115410 (2015).

39. *Anisotropic phases of superfluid ^{3}He in compressed aerogel*, J.I.A. Li, A.M. Zimmerman, **J. Pollanen**, C.A. Collett, and W.P. Halperin, *Phys. Rev. Lett.* **114**, 105302 (2015).

38. *Stability of superfluid ^{3}He-B in compressed aerogel*, J.I.A. Li, A.M. Zimmerman, **J. Pollanen**, C.A. Collett, W.J. Gannon, and W.P. Halperin, *Phys. Rev. Lett.* **112**, 115303 (2014).

37. *Dissipation signatures of the normal and superfluid phases in torsion pendulum experiments with ^{3}He in aerogel*, N. Zhelev, R.G. Bennett, E.N. Smith, **J. Pollanen**, W.P. Halperin, and J.M. Parpia, *Phys. Rev. B* **89**, 094513 (Editors' Suggestion) (2014).

36. *The superfluid glass phase of ^{3}He-A*, J.I.A. Li, **J. Pollanen**, A.M. Zimmerman, C.A. Collett, W.J. Gannon, and W.P. Halperin, *Nature Physics* **9**, 775 (2013).

35. *Nonlinear field dependence and f-wave interactions in superfluid ^{3}He*, C.A. Collett, **J. Pollanen**, J.I.A. Li, W.J. Gannon, and W.P. Halperin, *Phys. Rev. B* **87**, 024502 (2013).

34. *Orientation of the angular momentum in superfluid ^{3}He-A in a stretched aerogel*, J.I.A. Li, A.M. Zimmerman, **J. Pollanen**, C.A. Collett, W.J. Gannon, and W.P. Halperin, *J. Low Temp. Phys.* **175**, 31 (2013).

33. *Anisotropy of silica aerogels induced by small strain*, A.M. Zimmerman, M.G. Specht, D. Ginzburg, **J. Pollanen**, J.I.A. Li, C.A. Collett, W.J. Gannon, and W.P. Halperin, *J. Low Temp. Phys.* **171**, 745 (2013).

32. *Zeeman splitting and nonlinear field-dependence in superfluid ^{3}He*, C.A. Collett, **J. Pollanen**, J.I.A. Li, W.J. Gannon, and W.P. Halperin, *J. Low Temp. Phys.* **171**, 214 (2013).

31. *New chiral phases of superfluid ^{3}He stabilized by anisotropic silica aerogel*, **J. Pollanen**, J.I.A. Li, C.A. Collett, W.J. Gannon, W.P. Halperin, and J.A. Sauls, *Nature Physics* **8**, 317 (2012).

30. *Nonlinear field-dependence of the imaginary squashing mode of superfluid ^{3}He at moderate magnetic fields*, C.A Collett, **J. Pollanen**, J.I.A. Li, W.J. Gannon, J.P. Davis, and W.P Halperin, *J. Phys. Conf. Ser.* **400**, 012006 (2012).

29. *Pressure dependence of the longitudinal resonance frequency of ^{3}He superfluid phases in aerogel*, J.I.A. Li, **J. Pollanen**, C.A. Collett, W.J. Gannon, and W.P. Halperin, *J. Phys. Conf. Ser.* **400**, 012039 (2012).

28. *Modification of the ^{3}He phase diagram by anisotropic disorder*, R.G. Bennett, N. Zhelev, E.N. Smith, **J. Pollanen**, W.P. Halperin, and J.M. Parpia, *Phys. Rev. Lett* **107**, 235504 (2011).

27. *Identification of superfluid phases of ^{3}He in uniformly isotropic 98.2% aerogel*, **J. Pollanen**, J.I.A. Li, C.A. Collett, W.J. Gannon, and W.P. Halperin, *Phys. Rev. Lett* **107**, 195301 (2011).

26. *Nanoparticle-loaded aerogels and layered aerogels cast from sol-gel mixtures*, J. Kim, H. Nakanishi, **J. Pollanen**, S. Smoukov, W.P. Halperin, and B.A. Grzybowski, *Small* **7**, 2542 (2011).

25. *Mass coupling and Q^{-1} of impurity-limited normal ^{3}He in a torsion pendulum*, R.G. Bennett, N. Zhelev, A.D. Fefferman, K.Y. Fang, **J. Pollanen**, P. Sharma, W.P. Halperin, and J.M. Parpia, *J. Low Temp. Phys.* **162**, 174 (2011).

24. *Superfluid phase stability of ^{3}He in axially anisotropic aerogel*, **J. Pollanen**, J.P. Davis, B. Reddy, K.R. Shirer, H. Choi, and W.P. Halperin, *J. Phys. Conf. Ser.* **150**, 032084 (2009).

23. *Low temperature thermal resistance for a new design of silver sinter heat exchanger*, **J. Pollanen**, H. Choi, J.P. Davis, B.T. Rolfs, and W.P. Halperin, *J. Phys. Conf. Ser.* **150**, 012037 (2009).

22. *Impurity effects of aerogel in superfluid ^{3}He*, W.P. Halperin, H. Choi, J.P. Davis, and **J. Pollanen**, *J. Phys. Soc. Jpn.* **77**, 111002 (2008).

21. *Globally anisotropic high porosity silica aerogels*, **J. Pollanen**, K. Shirer, S. Blinstein, J.P. Davis, H. Choi, T.M. Lippman, L.B. Lurio, and W.P. Halperin, *J. Non-Crystalline Solids* **354**, 4668 (2008).

20. *High frequency sound in superfluid ^{3}He-B*, J.P. Davis, H. Choi, **J. Pollanen**, and W.P. Halperin, *J. Low Temp. Phys.* **153**, 1 (2008).

19. *Anomalous attenuation of transverse sound in ^{3}He*, J.P. Davis, **J. Pollanen**, H. Choi, J.A. Sauls, W.P. Halperin, and A.B. Vorontsov, *Phys. Rev. Lett.* **101**, 085301 (2008).

18. *Discovery of a new excited pair state in superfluid ^{3}He*, J.P. Davis, **J. Pollanen**, H. Choi, J.A. Sauls, and W.P. Halperin, *Nature Physics* **4**, 571 (2008).

17. *Stability of the axial phase of superfluid ^{3}He in aerogel with globally anisotropic scattering*, J.P. Davis, **J. Pollanen**, B. Reddy, K.R. Shirer, H. Choi, and W.P. Halperin, *Phys. Rev. B* **77**, 140502(R) (2008).

16. *Magnetoresistance of UPt_3*, T.M. Lippman, H. Choi, J.P. Davis, **J. Pollanen**, W.J. Gannon, and W.P. Halperin, *New J. of Physics* **10**, 043006 (2008).

15. *Magneto-acoustic spectroscopy in superfluid ^{3}He-B*, J.P. Davis, H. Choi, **J. Pollanen**, and W.P. Halperin, *Phys. Rev. Lett.* **100**, 015301 (2008).

14. *Strong coupling corrections to the Ginzburg-Landau theory of superfluid ^{3}He*, H. Choi, J.P. Davis, **J. Pollanen**, T.M. Haard, and W.P. Halperin, *Phys. Rev. B* **75**, 174503 (2007).

13. *Magnetoresistance of UPt_3*, T.M. Lippman, J.P. Davis, H. Choi, **J. Pollanen**, and W.P. Halperin, *J. Low Temp. Phys.* **148**, 863 (2007).

12. *Anisotropic aerogels for studying superfluid ^{3}He*, **J. Pollanen**, S. Blinstein, H. Choi, J.P. Davis, T.M. Lippman, L.B. Lurio, and W.P. Halperin, *J. Low Temp. Phys.* **148**, 579 (2007).

11. *Analysis of strong-coupling parameters for superfluid ^{3}He*, H. Choi, J.P. Davis, **J. Pollanen**, T.M. Haard, and W.P. Halperin, *J. Low Temp. Phys.* **148**, 507 (2007).

10. *Imaginary squashing mode spectroscopy of ^{3}He-B*, J.P. Davis H. Choi, **J. Pollanen**, and W.P. Halperin, *J. Low Temp. Phys.* **148**, 501 (2007).

9. *Collective modes and f-wave pairing interactions in superfluid ^{3}He*, J.P. Davis, H. Choi, **J. Pollanen**, and W.P. Halperin, *Phys. Rev. Lett.* **97**, 115301 (2006).

8. *Surface specific heat of ^{3}He and Andreev bound states*, H. Choi, J.P. Davis, **J. Pollanen**, and W.P. Halperin, *Phys. Rev. Lett.* **96**, 125301 (2006).

7. *Specific heat of disordered ^{3}He*, H. Choi, J.P. Davis, **J. Pollanen**, N. Mulders, and W.P. Halperin, *AIP Conf. Proc.* **850**, 241 (2006).

6. *Acoustic spectroscopy of superfluid ^{3}He in aerogel*, J.P. Davis, H. Choi, **J. Pollanen**, and W.P. Halperin, *AIP Conf. Proc.* **850**, 239 (2006).

5. *Compressed silica aerogels for the study of superfluid ^{3}He in aerogel*, **J. Pollanen**, H. Choi, J.P. Davis, S. Blinstein, T.M. Lippman, L.B. Lurio, N. Mulders, and W.P. Halperin, *AIP Conf. Proc.* **850**, 237 (2006).

4. *Thermonuclear reaction rate of $^{17}O(p,\gamma)^{18}F$*, C. Fox, C. Iliadis, A.E. Champagne, R.P. Fitzgerald, R. Longland, J. Newton, **J. Pollanen**, and R.C. Runkle, *Phys. Rev. C* **71**, 055801 (2005).

3. *Direct measurement of the $^{14}N(p,\gamma)^{15}O$ S factor*, R.C. Runkle, A.E. Champagne, C. Angulo, C. Fox, C. Iliadis, R. Longland, and **J. Pollanen**, *Phys. Rev. Lett.* **94**, 82503 (2005).

2. *Explosive hydrogen burning of ^{17}O in classical novae*, C. Fox, C. Iliadis, A.E. Champagne, A. Coc, J. José, R. Longland, J. Newton, **J. Pollanen**, and R.C. Runkle, *Phys. Rev. Lett.* **93**, 081102 (2004).

1. *Search for a resonance in the $^{14}N(p,\gamma)^{15}O$ reaction at $E_p = 127$ keV*, R.C. Runkle, A.E. Champagne, C. Fox, C. Iliadis, **J. Pollanen**, A. Stephan, and C. Westerfeldt, *Phys. Rev. C* **66**, 022801 (2002).

Patents/IP

8. *Spectral Enhanced Surface Acoustic Wave Sensing Using Phononic And Photonic Interference*, P.K. Rath and **J. Pollanen**, (United States Patent Application Number 19/281,893, 8/2025)

7. *Monolithic Laser-Written Color Center Vector Magnetometer*, P. Kalinadhabhotla, P. Quayle, J.N. Becker, S.S. Nicley, **J. Pollanen**, and A. Kirkpatrick, (MSU Invention Disclosure 6/2025)

6. *Quantum computing core*, D.G. Rees, K.E. Castoria, H. Byeon, J.R. Theis, N.R. Beysengulov, E. Glen, G. Koolstra, S.A. Lyon, **J. Pollanen**, and M. Sammon (United States Patent Application Number US19217448 5/23/2025)

5. *Modular quantum interconnect apparatus for microwave and telecommunications wavelengths*, J.N. Becker, S.S. Nicley and **J. Pollanen**, (United States Patent Number 12308889 granted on 5/20/2025)

4. *A closed-volume on-cryostat helium source for trapped electron technologies*, K.E. Castoria, H. Byeon, J.R. Theis, N.R. Beysengulov, E. Glen, G. Koolstra, S.A. Lyon, **J. Pollanen**, D.G. Rees and M. Sammon (United States Provisional Patent 5/2025)

3. *Acoustic apparatus for contactless excitation of transverse piezo-acoustic phonons*, J.M. Kitzman, P.K. Rath and **J. Pollanen**, (United States Patent Application Number US2437579 7/11/2024)

2. *Multi-electron qubits with dipole-dipole interaction quantum gates*, S.A. Lyon, **J. Pollanen**, and D.G. Rees, (United States Provisional Patent 7/2024)

1. *Qubit hardware for electrons on helium*, **J. Pollanen**, N.R. Beysengulov, and D.G. Rees, (United States Patent Number 10,892,398 granted on 1/21/2021)

Invited Talks

73. **Panel Speaker: Princeton Quantum Initiative (PQI) Quantum Industry Roundtable**, Princeton University, Princeton, NJ, February 9th, 2026.

72. **Hybrid quantum phononics with superconducting qubits**, University of Washington, Seattle, WA, January 5th, 2026.

71. **Panel Speaker: Quantum Computing Platforms**, 2025 Chicago Quantum Summit, Chicago, IL, November 3-4, 2025.

70. **Hybrid quantum phononics with superconducting qubits**, Louisiana State University (Colloquium), Baton Rouge, LA, September 4th, 2025.

69. **Hybrid quantum phononics with superconducting qubits**, University of Kentucky, Lexington, KY, April 21st, 2025.

68. **Hybrid quantum phononics with superconducting qubits**, Purdue University, Quantum Information Science Seminar, West Lafayette, IN, October 22nd, 2024.

67. **Hybrid quantum phononics with superconducting qubits**, Iowa State University (Colloquium), Ames, IA, September 9th, 2024.

66. **Hybrid quantum phononics with superconducting qubits**, MQC Entanglement 2024 Conference, East Lansing, MI, August 5-6th, 2024.

65. **Hybrid quantum phononics with superconducting qubits**, University of Oregon (Colloquium), Eugene, OR, June 6th, 2024.

64. **Hybrid quantum phononics with superconducting qubits**, University of Illinois at Chicago, Chicago, IL, February 27th, 2024.

63. **Hybrid quantum phononics with superconducting qubits**, Washington University in St. Louis (Colloquium), St. Louis, MO, February 7th, 2024.

62. **Hybrid quantum phononics with superconducting qubits**, Northwestern University, Evanston, IL, January 18th, 2024.

61. **Phononic bath engineering of a superconducting qubit**, University of Michigan Quantum Research Institute Seminar, Ann Arbor, MI, November 16th, 2023.

60. **I. Hybrid quantum information systems with electrons on helium & II. Phononic bath engineering of a superconducting qubit**, 10th Petra School of Physics 2023 (PSP10), Amman, Jordan, October 9-13, 2023.

59. **High-frequency collective dynamics of electrons on helium**, International Conference on Quantum Fluids and Solids 2023 (QFS2023), Manchester, England, August 9-15, 2023.

58. **Creating and controlling hybrid quantum systems ... one electron and phonon at a time**, QuanTalks: IISc Quantum Technology Initiative (IQTI) Seminar, IISc Bangalore, India (via zoom), April 12, 2023.

57. **Phononic bath engineering of a superconducting qubit**, Brown University, Providence, RI, February 9, 2023.

56. **Creating and controlling synthetic quantum systems ... one electron at a time**, Northern Illinois University (Colloquium) DeKalb, IL, February 3, 2023.

55. **Creating and controlling synthetic quantum systems ... one electron at a time**, Bard College (Colloquium) Annandale-on-Hudson, NY, December 9, 2022.

54. **Phononic bath engineering of a superconducting qubit**, AQT/LBNL Colloquium (via zoom) Berkeley, CA, November 17, 2022.

53. **Hybrid systems and quantum computing with electrons floating on the surface of superfluid helium**, International Conference on Ultra Low Temperature Physics Otaru, Japan, August 25-28, 2022.

52. **Creating and controlling hybrid quantum systems ... one electron at a time**, Washington University in St. Louis, March 28th, 2022.

51. **Hybrid systems based on electrons floating on superfluid helium**, APS March Meeting Invited Talk Chicago, IL, March 14-18, 2022.

50. **Quantum acoustics with hybrid SAW + qubit systems**, Midwest Quantum Collaboratory (MQC) workshop on Quantum Ready Scalability (via zoom), February 24th, 2022.

49. **Creating and controlling hybrid quantum systems ... one electron at a time**, Michigan State University, December 9th, 2021.

48. **Quantum piezoacoustics: From low-dimensional electrons to qubits**, Workshop on Quantum Technologies and Hybrid Quantum Systems University of Jyväskylä, Finland, October 25-29, 2021.

47. **Hybrid systems based on qubits, superfluids, and electrons on helium**, International Conference on Quantum Fluids and Solids QFS2021 IISc Bangalore, India (via zoom), August 10-19, 2021.

46. **Building Quantum Technologies ... One Electron at a Time**, MSU NatSci 2021 Classes Without Quizzes (via zoom), April 24th, 2021.

45. **Hybrid systems based on superconducting circuits, superfluids and electrons on helium**, The Ohio State University (via zoom), January 25th, 2021.

44. **Hybrid systems based on superconducting circuits and electrons on helium**, University of Notre Dame (via zoom), December 9th, 2020.

43. **Hybrid systems based on superconducting circuits and electrons on helium**, Quantum Simulation for Nuclear Physics (QS4NP) Seminar Series (via zoom), December 3rd, 2020.

42. **Hybrid QIS systems based on superconducting qubits, superfluids and electrons on helium**, "Quantum Spin Coherence" Workshop (via zoom), University of Florida MagLab AMRIS and High B/T Facilities, Gainesville, FL, September 14-15th, 2020.

41. **Quantum Fluids meet Quantum Information Science**, Quantum Fluids in Isolation Seminar Series, Boston College (via zoom), July 30th, 2020.

40. **Towards quantum single electronics on liquid helium**, RD2DS 2020: Recent Development in 2D Systems, Okinawa, Japan, April 6-11, 2020 (canceled due to COVID-19 pandemic).

39. **Electrons on helium find their quantum groove**, EIH2020 Electrons On/In Helium, Bangalore, India, January 23-25, 2020.

38. **Superconducting qubits** $|101\rangle$, IBM-Q Qiskit bootcamp at MSU, East Lansing, MI, October 18, 2019.

37. **Quantum piezoacoustics: From low-dimensional electrons to qubits**, University of Kentucky, Lexington, KY, September 17, 2019.

36. **Quantum piezoacoustics: From low-dimensional electrons to qubits**, QT2DS2019 - Quantum transport in 2D Systems II, Luchon, France, May 25-31, 2019.

35. **Quantum piezoacoustics: From low-dimensional electrons to qubits**, University of Wisconsin-Madison, Madison, WI, April 11th-12th, 2019.

34. **Hybrid quantum systems based on electrons on helium and superconducting qubits**, University of Michigan Quantum Science Workshop, University of Michigan, Ann Arbor, MI, May 9th, 2019.

33. **Hybrid quantum systems based on electrons on helium and superconducting qubits**, 2019 Experimental Techniques in Quantum Sensing and Information Science, Facility for Rare Isotope Beams (FRIB) Michigan State University, East Lansing, MI, March 22nd, 2019.

32. **Creating and controlling quantum systems ... one electron at a time**, 2019 Conference for Undergraduate Women in Physics (CuWiP) Michigan State University, Physics Slam Speaker, East Lansing, MI, January 19th, 2019.

31. **Quantum piezoacoustics: From low-dimensional electrons to qubits**, Michigan State University, East Lansing, MI, November 26th, 2018.

30. **Hybrid quantum information systems with electrons on helium**, Fall 2018 INTRIQ Meeting, Bromont, QC, Canada November 13-14, 2018.

29. **Creating and controlling hybrid quantum systems ... one electron at a time**, University of Alberta, Edmonton, Alberta, Canada November 9th, 2018. (Colloquium)

28. **Quantum piezoacoustics: From low-dimensional electrons to qubits**, EIPBN: 62^{nd} International Conference on Electron, Ion, and Photon Beam Technology and Nanofabrication, Puerto Rico, May 29 - June 1, 2018.

27. **Piezoacoustics studies of low-dimensional electron systems**, The International Workshop on Electrons and Ions in Quantum Fluids and Solids, Mishima, Japan, March 11-14, 2018.

26. **Creating and controlling quantum systems ... one electron at a time**, Wayne State University, Detroit, MI, October 13th, 2017.

25. **Creating and controlling quantum systems ... one electron at a time**, Cowen Investiture Ceremony Public Lecture, Michigan State University, East Lansing, MI, September 14th, 2017.

24. **"Listening" to hysteretic conductivity in the quantum Hall regime**, QT2DS2017 - Quantum transport in 2D Systems II, Luchon, France, May 20-27, 2017.

23. **Quantum phases of low-dimensional electrons: On the road to hybrid quantum systems**, Purdue University, West Lafayette, IN, March 2nd, 2017.

22. **Quantum phases of low-dimensional electrons: On the road to hybrid quantum systems**, Cornell University, Ithaca, NY, January 31st, 2017.

21. **Low-dimensional electrons: On the road to hybrid quantum systems**, Northwestern University, Evanston, IL, December 1st, 2016.

20. **Low-dimensional electrons: On the road to hybrid quantum systems**, Michigan State University, East Lansing, MI, November 28th, 2016.

19. **Low-dimensional electrons: On the road to hybrid quantum systems**, McGill University, Montreal, Canada, November 10th, 2016.

18. **Superfluids and low-dimensional electrons: On the road to hybrid quantum systems**, College of Wooster, Wooster, OH, September 20, 2016. (Colloquium)

17. **Superfluids and low-dimensional electrons: On the road to hybrid quantum systems**, Korea Research Institute of Standards and Science (KRISS), Daejeon South Korea, August 11, 2016.

16. **Low-dimensional electrons: On the road to hybrid quantum systems**, Korean Advanced Institute of Science and Technology (KAIST), Daejeon South Korea, July 28, 2016.

15. **Superfluids and low-dimensional electrons: On the road to hybrid quantum systems**, Texas A&M University, College Station, TX, March 11, 2016.

14. **Superfluids and low-dimensional electrons: On the road to hybrid quantum systems**, Notre Dame University, South Bend, IN, March 3, 2016.

13. **Heterostructure Symmetry and the Orientation of the Quantum Hall Nematic Phases**, EPQHS 2016, Workshop on Emergent Phenomena in Quantum Hall Systems, at the TIFR: TATA Institute for Fundamental Research, Mumbai, India January 7-9, 2016.

12. **Engineering Quantum Matter: From Superfluids to Low Dimensional Electrons**, Washington University in St. Louis, MO, November 23, 2015.

11. **Engineering Quantum Matter: From Superfluids to Low-dimensional Electrons**, Young Research Leaders Workshop, SPICE Workshop Series, at the Spin Phenomena Interdisciplinary Center (SPICE) at Johannes Gutenberg University Mainz, Germany August 3-14, 2015.

10. **Engineering Quantum Matter: From Superfluids to Low Dimensional Electrons**, IQIM Seminar, California Institute of Technology, Pasadena, CA, May 22 2015.

9. **Engineering Quantum Matter: From Superfluids to Low Dimensional Electrons**, Stanford University, Palo Alto, CA, February 2015.

8. **Engineering Quantum Matter: From Superfluids to Low Dimensional Electrons**, University of Vermont, Burlington, VT, February 18, 2015.

7. **^{3}He in Aerogel: Engineering Superfluid States with Disorder**, QFS2013 International Symposium on Quantum Fluids and Solids, Matsue, Japan, 2013.

6. **Superfluid ^{3}He in Aerogel: Unconventional Pairing with Impurity Scattering**, University of Chicago, Chicago, IL, 2011.

5. **Superfluid ^{3}He in Aerogel: Unconventional Pairing with Impurity Scattering**, Yale University, New Haven, CT, 2011.

4. **Superfluid ^{3}He in Aerogel: Unconventional Pairing with Impurity Scattering**, University of California Santa Barbara, Santa Barbara, CA, 2011.

3. **Superfluid ^{3}He in Aerogel: Unconventional Pairing with Impurity Scattering**, California Institute of Technology, Pasadena, CA, 2011.

2. **Anisotropic Aerogels for Studying Superfluid ^{3}He**, ULT2008 Conference; Frontiers of Low Temperature Physics, Egham, England, 2008.

1. **^{3}He in Aerogel: New Superfluid Phases?**, Northwestern University Society of Physics Students (SPS), Northwestern University, Evanston, IL, 2007.

Service: External

- Member of the Local Program Committee (LPC) for the 2026 International Symposium on Quantum Fluids and Solids (QFS2026)), South Bend, IN USA (Notre Dame University) (1/2026-present)
- Member of the International Advisory Committee for the 2025 International Conference on Ultra Low Temperature Physics (ULT2025), Lancaster England (12/2024-8/2025)
- Member of the International Program Committee for the International Conference on Electronic Properties of 2D Systems (EP2DS-26) & Modulated Semiconductor Structures (MSS-22), St. Louis MO (10/2024-7/2025)
- Member of the International Advisory Committee for the 30th International Conference on Low Temperature Physics (LT30), Bilbao Spain (5/2024-8/2025)
- Elected member of the US National High Magnetic Field Laboratory (DC-High B/T) Users Advisory Committee (6/2021-present)
- Co-Founder and Board Member of the Midwest Quantum Collaboratory (2021-present)
- Member of the International Advisory Committee for the 2024 International Symposium on Quantum Fluids and Solids QFS2024, Jacksonville FL USA (11/2023-8/2024)
- Member of the International Advisory Committee for the 2023 International Symposium on Quantum Fluids and Solids QFS2023, Manchester England (8/2022-8/2023)
- Invited member of the NSF TIP - Technology, Innovation and Partnership Directorate scoping workshop for QIST (June 27-28, 2022)
- Subject Matter Expert for the NSF-funded QuSTEAM Initiative (2019-2023)
- Member of the International Advisory Committee for the 29th International Conference on Low Temperature Physics, Sapporo Japan (1/2019-8/2022)
- Member of the International Program Advisory Committee for the 2021 International Symposium on Quantum Fluids and Solids QFS2021, Bangalore India (5/2020-8/2021)
- Member of Local Advisory Committee for 2019 FRIB Workshop on Experimental Techniques in Quantum Sensing and Information Science (12/2018-3/2019)
- Co-organizer of MSU workshop on Quantum Information Science: Are we at the crossroads? (September 30th-October 3rd 2018)
- Member of the American Physical Society (APS)
- Member of the Division of Quantum Information of the APS
- Member of the Division of Condensed Matter Physics of the APS
- Referee for *Physical Review Letters*, *Physical Review B*, *Nature Physics*, *Nature Communications*, *Nano Letters*, *Applied Physics Letters*, *Review of Scientific Instruments*, *Journal of Applied Physics*, *Journal of Low Temperature Physics*, *Journal of Physics: Condensed Matter (IOP)*, *Journal of Physics: Communications (IOP)*, *Advanced Science (Wiley)*, *AVS Quantum Science (AIP)*

Media/Outreach

- ◇ EeroQ Breakthrough Solves the "Wire Problem" in Quantum Computing, (press release, picked up by multiple news outlets) (Jan. 15, 2026).
- ◇ Floating electrons on a sea of helium, (popular science article in ArsTechnica) (Oct. 8, 2025).
- ◇ MSU physicists awarded Moore Foundation grants to advance quantum science, fundamental physics, (popular science article in MSUToday) (Oct. 8, 2025).
- ◇ 2025 MSU Startup of The Year-EeroQ Quantum Hardware: Advancing Quantum Computing to New Frontiers , (popular science announcement by MSU Innovation Center) (Apr. 15, 2025).
- ◇ MSU researcher-led company working to bring quantum computers into reality, (popular science article by MSU NatSci) (Jan. 22, 2025).
- ◇ Quantum Motor City Summer School, (quantum physics high school outreach camp) (July 9-11, 2025).
- ◇ Quantum Zone at the 2025 MSU SciFest, (quantum physics high school outreach camp) (April 5-6, 2025).
- ◇ Quantum Motor City Summer School, (quantum physics high school outreach camp) (June 12-14, 2024).
- ◇ "Good vibrations: MSU physicists help bolster quantum computing", (popular science article in MSUToday) (July 12th, 2023).
- ◇ Quantum Computing at MSU, (quantum physics public outreach) (April 9th, 2022).
- ◇ APS Graduate Student Lunch with the Experts, DQI, APS March Meeting, Chicago, IL, (March 15, 2022).
- ◇ "A launchpad for flying qubits", (popular science article in MSUToday) (July 27th, 2021).
- ◇ MSU NatSci 2021 Classes Without Quizzes Event: Building Quantum Technologies ... One Electron at a Time, (quantum computing public outreach) (April 24th, 2021).
- ◇ MSU NatSci Virtual Alumni Event: MSU's Quantum Leap, (quantum computing public outreach) (May 14th, 2020).
- ◇ MSU Classes without Quizzes, (quantum computing public outreach) (April 25th, 2020) (canceled due to COVID-19 pandemic).
- ◇ Invisible Quantum World, (quantum physics public outreach) (April 4th, 2020) (canceled due to COVID-19 pandemic).
- ◇ ThinkQuantum, NSF supported (DMR-1708331) broader impacts blog on quantum science.
- ◇ Time for Quantum MSU SciFest Expo Zone Booth, (quantum physics public outreach) (April 6th, 2019).
- ◇ Spartans on Stranger Things: Johannes Pollanen, (quantum physics outreach video) (October 25, 2017).
- ◇ APS Graduate Student Lunch with the Experts, DCMP, APS March Meeting, Baltimore, MD, (March 15, 2016).
- ◇ IQIM Presents: Greater Than Its Parts (outreach video), (January 21, 2016).
- ◇ IQIM News: Eisenstein group demonstrates method to control orientation of exotic quantum states, (November 15, 2015).
- ◇ Outreach interview for the Institute for Quantum Information (IQIM) and Matter at Caltech, (July 2015).
- ◇ Promotional/Outreach Video: Institute for Quantum Information and Matter (IQIM) at Caltech, (September 18, 2014).
- ◇ Northwestern University NANO-DAY: Low temperature physics demonstrations for high school students, (March 22, 2006).