András GYENIS andras.gyenis@colorado.edu

Education

Princeton University, Department of Physics (2010 - 2016)
Princeton, New Jersey, USA

- Ph.D. in Physics (experimental condensed matter physics)
- Dissertation: *Scanning Tunneling Microscopy Studies of Correlated and Topological Electronic States*

Budapest University of Technology and Economics (2005 - 2010)
Budapest, Hungary

- B.Sc., M.Sc. in Engineering Physics (experimental condensed matter physics) with highest honors
- Thesis Title: *Resistive Memory Effects in Mesoscopic and Atomic Contacts*

Employment

Assistant Professor (Aug 2021 -)
- Department of Electrical, Computer and Energy Engineering, University of Colorado Boulder
- https://www.colorado.edu/lab/gyenis/

Visiting Assistant Professor (June 2020 - Aug 2021)
- Niels Bohr Institute, University of Copenhagen, Denmark
- Activity: developing hybrid semiconducting superconducting qubits for protected circuits
- https://www.nbi.ku.dk/

Postdoctoral Research Associate (Oct 2016 - June 2020)
- Department of Electrical Engineering, Princeton University
- Advisor: Prof. Andrew Houck
- Activity: realizing intrinsically protected superconducting qubits using circuit quantum electrodynamics
- https://houcklab.princeton.edu/

Graduate Student Researcher (July 2010 - Aug 2016)
- Department of Physics, Princeton University
- Advisor: Prof. Ali Yazdani
- Activity: ultra-low temperature scanning tunneling microscopy on unconventional superconductors, strongly correlated electronic systems and topological materials
- http://wwwphy.princeton.edu/~yazdaniweb

Undergraduate Researcher (July 2007 - June 2010)
- Department of Physics, Budapest University of Technology and Economics
- Advisor: Prof. Gyorgy Mihaly
- Activity: transport and point contact measurements on nanometer-scale resistive junctions
- http://nanoelectronics.physics.bme.hu/

Publications

[1] J. Danon, A. Chatterjee, **A. Gyenis**, F. Kuemmeth. "Protected solid-state qubits". *Appl. Phys. Lett.* **119**, 260502 (2021) (https://doi.org/10.1063/5.0073945)

[2] **A. Gyenis**, A. Di Paolo, J. Koch, A. Blais, A. A. Houck, D. I. Schuster. "Moving beyond the transmon: Noise-protected superconducting quantum circuits". *PRX Quantum Invited Perspective*, 030101 (2021) (https://link.aps.org/doi/10.1103/PRXQuantum.2.030101)

[3] **A. Gyenis***, P. S. Mundada*, A. Di Paolo*, T. M. Hazard, X. You, D. I. Schuster, J. Koch, A. Blais, A. A. Houck. "Experimental realization of a protected superconducting circuit derived from the $0-\pi$ qubit". *PRX Quantum* **2**, 010339 (2021) (https://doi.org/10.1103/PRXQuantum.2.010339)

[4] Z. Huang, P. S. Mundada, **A. Gyenis**, D. I. Schuster, A. A. Houck, J. Koch. "Engineering dynamical sweet spots to protect qubits from $1/f$ noise". *Phys. Rev. Applied* **15**, 034065 (2021) (https://doi.org/10.1103/PhysRevApplied.15.034065)

[5] A. P. Place*, L. V. Rodgers*, P. S. Mundada, B. M. Smitham, M. Fitzpatrick, Z. Leng, A. Premkumar, J. Bryon, A. Vrajitoarea, S. Sussman, G. Cheng, T. Madhavan, H. K. Babla, X. H. Le, Y. Gang, B. Jaeck, **A. Gyenis**, N. Yao, R. J. Cava, N. P. de Leon, A. A. Houck. "New material platform for superconducting transmon qubits with coherence times exceeding 0.3 milliseconds". *Nature Communications* **12**, 1779 (2021) (https://doi.org/10.1038/s41467-021-22030-5)

[6] P. S. Mundada*, **A. Gyenis***, Z. Huang, J. Koch, A. A. Houck. "Floquet-engineered enhancement of coherence times in a driven fluxonium qubit". *Phys. Rev. Applied* **14**, 054033 (2020) (https://doi.org/10.1103/PhysRevApplied.14.054033)

[7] M. Abdelhafez, B. Baker, **A. Gyenis**, P. Mundada, A. A. Houck, D. Schuster, J. Koch. "Universal gates for protected superconducting qubits using optimal control". *Phys. Rev. A* **101**, 022321 (2020) (https://doi.org/10.1103/PhysRevA.101.022321)

[8] T. M. Hazard*, **A. Gyenis***, A. Di Paolo*, A. T. Asfaw, S. A. Lyon, A. Blais and A. A. Houck. "Nanowire-Superinductance Fluxonium Qubit". *Phys. Rev. Lett.* **122**, 010504 (2019) (http://doi.org/10.1103/PhysRevLett.122.010504)

[9] A. T. Asfawa, E. I. Kleinbaum, T. M. Hazard, **A. Gyenis**, A. A. Houck and S. A. Lyon. "SKIFFS: Superconducting Kinetic Inductance Field-Frequency Sensors for sensitive magnetometry in moderate background magnetic fields". *Appl. Phys. Lett.* **113**, 172601 (2018) (https://doi.org/10.1063/1.5049615)

[10] M. T. Randeria*, B. E. Feldman*, F. Wu*, H. Ding, **A. Gyenis**, H. Ji, R. J. Cava, A. H. MacDonald and A. Yazdani. "Ferroelectric quantum Hall phase revealed by visualizing Landau level wavefunction interference". *Nat. Phys.* **14**, 796 (2018) (http://doi.org/10.1038/s41567-018-0148-2)

[11] **A. Gyenis***, B. E. Feldman*, M. T. Randeria*, G. A. Peterson, E. D. Bauer, P. Aynajian and A. Yazdani. "Visualizing heavy fermion confinement and Pauli-limited superconductivity in layered $CeCoIn_5$". *Nat. Commun.* **9**, 549 (2018) (http://doi.org/10.1038/s41467-018-02841-9)

[12] **A. Gyenis**, H. Inoue, S. Jeon, B. B. Zhou, B. E. Feldman, Z. Wang, J. Li, S. Jiang, Q. D. Gibson, S. K. Kushwaha, J. W. Krizan, N. Ni, R. J. Cava, and B. A. Bernevig, A. Yazdani. "Imaging electronic states on topological semimetals using scanning tunneling microscopy". *New J. Phys.* **18**, 105003 (2016) (http://doi.org/10.1088/1367-2630/18/10/105003)

[13] **A. Gyenis***, E. H. da Silva Neto*, R. Sutarto, E. Schierle, F. He, E. Weschke, M. Kavai, R. E. Baumbach, J. D. Thompson, E. D. Bauer, Z. Fisk, A. Damascelli, A. Yazdani, P. Aynajian. "Quasiparticle interference of heavy fermions in resonant x-ray scattering". *Science Advances* **2**, 10 (2016) (http://doi.org/10.1126/sciadv.1601086)

[14] B. E. Feldman*, M. T. Randeria*, **A. Gyenis***, F. Wu, H. Ji, R. J. Cava, A. H. MacDonald, A. Yazdani. "Observation of a nematic quantum Hall liquid on the surface of bismuth". *Science* **354**, 6310 (2016) (http://doi.org/10.1126/science.aag1715)

[15] H. Inoue*, **A. Gyenis***, Z. Wang, J. Li, S. Woo Oh, S. Jiang, N. Ni, B. A. Bernevig, A. Yazdani. "Quasi-particle interference of the Fermi arcs and surface-bulk connectivity of a Weyl semimetal". *Science* **351**, 1184 (2016) (http://doi.org/10.1126/science.aad8766)

[16] P. K. Das, D. Di Sante, I. Vobornik, J. Fujii, T. Okuda, E. Bruyer, **A. Gyenis**, B. E. Feldman, J. Tao, R. Ciancio, G. Rossi, M. N. Ali, S. Picozzi, A. Yazdani, G. Panaccione, R. J. Cava. "Layer-dependent quantum cooperation of electron and hole states in the anomalous semimetal WTe_2". *Nat. Commun.* **7**, 10847 (2016) (http://doi.org/10.1038/ncomms10847)

[17] S. Kushwaha, I. Pletikosic, T. Liang, **A. Gyenis**, S. Lapidus, Y. Tian, H. Zhao, K. Burch, H. Ji, A. Fedorov, A. Yazdani, P. Ong, T. Valla, R. Cava. "Sn-doped $Bi_{1.1}Sb_{0.9}Te_2S$, a bulk topological insulator with ideal properties". *Nat. Commun.* **7**, 11456 (2016) (http://doi.org/10.1038/ncomms11456)

[18] H. Luo, W. Xie, J. Tao, H. Inoue, **A. Gyenis**, J. Krizan, A. Yazdani, Y. Zhu, R. Cava. "Polytypism, polymorphism, and superconductivity in $TaSe_{2-x}Te_x$". *Proc. Natl. Acad. Sci. U. S. A.*, **112**, E1174 (2015) (http://dx.doi.org/10.1073/pnas.1502460112)

[19] S. Kushwaha, J. Krizan, B. Feldman, **A. Gyenis**, M. Randeria, J. Xiong, S-Y. Xu, N. Alidoust, I. Belopolski, T. Liang, Z. Hasan, P. Ong, A. Yazdani, R. Cava. "Bulk crystal growth and electronic characterization of the 3D Dirac semimetal Na_3Bi". *APL Mater.* **3**, 041504 (2015) (http://dx.doi.org/10.1063/1.4908158)

[20] S. Jeon*, B. Zhou*, **A. Gyenis**, B. Feldman, I. Kimchi, A. Potter, Q. Gibson, R. Cava, A. Vishwanath, A. Yazdani. "Landau Quantization and Quasiparticle Interference in the Three-Dimensional Dirac Semimetal Cd_3As_2". *Nat. Mater.* **13**, 851 (2014) (http://dx.doi.org/10.1038/nmat4023)

[21] E. da Silva Neto*, P. Aynajian*, A. Frano, R. Comin, E. Schierle, E. Weschke, **A. Gyenis**, J. Wen, J. Schneeloch, Z. Xu, S. Ono, G. Gu, M. Le Tacon, A. Yazdani. "Ubiquitous Interplay between Charge Ordering and High-Temperature Superconductivity in Cuprates". *Science* **343**, 393 (2014) (http://dx.doi.org/10.1126/science.1243479)

[22] S. Misra, B. Zhou, I. Drozdov, J. Seo, **A. Gyenis**, S. Kingsley, H. Jones, A. Yazdani. "Design and performance of an ultra-high vacuum scanning tunneling microscope operating at dilution refrigerator temperatures and high magnetic fields". *Rev. Sci. Instrum.* **84**, 103903 (2013) (http://dx.doi.org/10.1063/1.4822271)

[23] **A. Gyenis**, I. Drozdov, S. Nadj-Perge, O. Jeong, J. Seo, I. Pletikosic, T. Valla, G. Gu, A. Yazdani. "Quasiparticle Interference on the Surface of Topological Crystalline Insulator $Pb_{1-x}Sn_xSe$". *Phys. Rev. B* **88**, 125414 (2013) (http://dx.doi.org/10.1103/PhysRevB.88.125414)

[24] P. Aynajian*, E. da Silva Neto*, **A. Gyenis**, R. Baumbach, J. Thompson, Z. Fisk, E. Bauer, A. Yazdani. "Visualizing heavy fermions emerging in a quantum critical Kondo lattice". *Nature* **486**, 201 (2012) (http://dx.doi.org/10.1038/nature11204)

[25] A. Geresdi, A. Halbritter, **A. Gyenis**, P. Makk, G. Mihaly. "From stochastic single atomic switch to nanoscale resistive memory device". *Nanoscale* **3**, 1504 (2011) (http://dx.doi.org/10.1039/C0NR00951B)

*Authors contributed equally to the work.

Teaching

University of Colorado Boulder

- "Semiconducting and Superconducting Quantum Computers", graduate level course (2021 Fall)
- supervising 1 graduate and 2 undergraduate students

Princeton University

- teaching assistant for undergraduate (introductory physics lab) and graduate (condensed matter physics) courses
- mentor for two undergraduate senior theses & one junior project, supervising four graduate students

Talks

[1] †"Experimental demonstration of a superconducting 0-π qubit", APS March Meeting (2021)

[2] †"Experimental demonstration of the error-protected superconducting 0-π qubit", Microsoft Station Q Fall Meeting (2020)

[3] † "Experimental demonstration of the error-protected superconducting 0-π qubit", Byron Bay Quantum Computing Workshop (2020)

[4] † "Experimental demonstration of the error-protected superconducting 0-π qubit", University of Colorado Boulder, CO (2020)

[5] † "Experimental demonstration of the error-protected superconducting 0-π qubit", University of British Columbia, Vancouver, BC, Canada (2020)

[6] † "Experimental demonstration of the error-protected superconducting 0-π qubit", University of Copenhagen, Denmark (2020)

[7] "Intrinsically error protected superconducting architecture based on superinductance", APS March Meeting, Boston, MA (2019)

[8] "Spectroscopic measurements on error protected superconducting qubit design based on Josephson junction arrays", APS March Meeting, Los Angeles, CA (2018)

[9] "Mapping Dimensionality and Directionality of Electronic Behavior in $CeCoIn_5$: the Normal State", APS March Meeting, Baltimore, MD (2016)

[10] "Atomic scale imaging and spectroscopic investigation of Cd_3As_2 with the STM", APS March Meeting, Denver, CO (2014)

[11] "Scanning tunneling microscopy studies of topological crystalline insulators", APS March Meeting, Baltimore, MD (2013)

[12] "Scanning tunneling microscopy studies of heavy fermion compound $CeCo(In_{1-x}Cd_x)_5$", APS March Meeting, Boston, MA (2012)

[13] "Giant magnetoresistance in granular materials", Seminar of the European Graduate College "Electron-Electron Interactions in Solids," Section of Magnetism, Rackeve, Hungary (2009)

[14] "Spin transfer torques", Seminar of the European Graduate College "Electron-Electron Interactions in Solids," Section of Characterization of Semiconductor Structures, Riezlern, Austria (2008)

† Invited talk.

Service

Reviewer for PRX, PRL, PRB, PRA, Science Adv., JLTP and APL.

Awards

- International Physics Olympiad, Bronze Medal, Salamanca, Spain (2005)
- Scientific Undergraduate Student Research, Experimental Physics, 1st place (2008)
- National Scientific Undergraduate Student Research, Nanotechnology, 3rd place (2009)