

TIBOR RAKOVSKY

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PROFESSIONAL APPOINTMENTS

Budapest University of Technology and Economics, Budapest, Hungary
Associate Professor of Physics , 2024 -
Stanford University, Stanford, CA, USA
Bloch Postdoctoral Fellow in Quantum Science and Engineering, 2020 - 2024

EDUCATION

Technical University of Munich, Munich, Germany
Ph.D. in Physics, July 2020. Advisor: Prof. Frank Pollmann
Thesis: Far-from-equilibrium universality in interacting quantum matter
Eotvos Lorand University, Budapest, Hungary
M.Sc. in Physics with honours grade, July 2016. Advisor: Prof. Gábor Takács
Thesis: Quantum Quenches in One Dimensional Field Theories
Eotvos Lorand University, Budapest, Hungary
B.Sc. in Physics with outstanding grade, June 2014. Advisor: Dr. János Asbóth
Thesis: Localization and Delocalization in Quantum Walks

FELLOWSHIPS AND AWARDS

- Quantum Science Seed Grant, Stanford University, 2024
- HUN-REN “Hazahívo” Grant, 2023
- Bloch Postdoctoral Fellow in Quantum Science and Engineering, Stanford University, 2020.
- Graduate Fellowship, Kavli Institute for Theoretical Physics, UC Santa Barbara, 2019.
- Scholarship of the Hungarian Republic, 2015.

TEACHING, SERVICE AND OUTREACH

- **Teaching:**
 - Teaching assistant for *Topology and New Kinds of Order in Condensed Matter Physics* course, TU Munich, 2017, 2020.
 - Teaching assistant for *Theoretical Solid State Physics* course, TU Munich, 2018.
 - Teaching assistant for *Statistical Physics* course, TU Munich, 2018.
 - Teaching assistant for *Quantum Mechanics* course, TU Munich, 2017.
 - Teacher for one semester Physics course at the Pre-Medical Program of McDaniel College, Budapest, 2016.
- **Mentoring:**
 - Co-supervised multiple BSc students in the group of Prof. Frank Pollmann at TU Munich.
 - Mentoring Ph.D. students in the group of Prof. Vedika Khemani at Stanford University.
- **Service and outreach:**
 - Referee for several journals (PRX, PRX Quantum, PRL, PRB, PRA, JSTAT, SciPost)
 - Helped organize seminars and journal clubs at TU Munich and Stanford.
 - Organizer of the Dürer Competition in the natural sciences for high school students (2012-19); Main organizer of the Physics section of the competition in 2015-2016

LANGUAGE SKILLS	• Hungarian (native) • English (fluent) • French (intermediate)
SELECTED INVITED TALKS	• “<i>Defining phases of active quantum matter</i> ” International Workshop on Quantum Interactive Dynamics, MPI-PKS, Dresden, March 2024 • “<i>The dissipation-assisted approach to quantum transport: extensions and new results</i> ” FOR5522 Collaboration Meeting on Transport, Munich, January 2024 • “<i>Defining stable phases of open quantum systems</i> ” TOPO 2023 Workshop, Sydney, November 2023 • “<i>Non-local and non-equilibrium quantum phases of matter</i> ” Harvard University, October 2023 • “<i>The physics of (good) LDPC codes</i>” New Frontiers in Quantum Dynamics workshop, Aspen, August 2023 • “<i>Gauge dualities for (good) LDPC codes</i>” California Institute of Technology, April 2023 • “<i>Dissipation Assisted Approach to the Classical Simulation of Quantum Transport</i> ” CCQ 2nd Plenary Meeting, Flatiron Institute, March 2023 • “<i>Operator backflow and the classical simulation of quantum transport</i>” GeoFlow Meeting, Stanford University, March 2022 • “<i>Non-unitary entanglement phases and space-time duality</i>” Harvard University, October 2021 • “<i>Numerical approaches to simulating quantum dynamics</i> ” Workshop on Non-equilibrium universality, Kavli Institute for Theoretical Physics, September 2021 • “<i>Dissipation-assisted operator evolution method for capturing hydrodynamic transport</i>” Harvard University, September 2020 • “<i>Universality in the dynamics of quantum information</i>” Stanford University, October 2019 • “<i>Breaking quantum ergodicity via Hilbert space fragmentation</i>” University of California, Berkeley, October 2019 • “<i>Thermalization time scales from the entanglement spectrum</i>” International workshop on “Snapshots of quantum dynamics: constraints, integrability and hidden orders”, CUNY, March 2019 • “<i>Signatures of information scrambling in the dynamics of the entanglement spectrum</i>” Massachusetts Institute of Technology, February 2019 • “<i>Dynamics of entanglement in spin chains with diffusive transport</i>” Workshop on Dynamics of Quantum Information, KITP, September 2018 • “<i>Dynamics of entanglement in spin chains with diffusive transport</i>” University of Oxford, July 2018 • “<i>Hydrodynamics of quantum information in charge-conserving random circuits</i>” International Workshop on Chaos and Dynamics in Correlated Quantum Matter, MPI-PKS, Dresden, March 2018 • “<i>Operator hydrodynamics and entanglement growth in systems without conservation laws</i>” Condensed Matter Physics in the City, London, United Kingdom, July 2017
WORKSHOP PARTICIPATION	• <i>New Frontiers in Quantum Dynamics</i> Aspen Center for Physics, August 2023 • <i>Quantum Many-Body Dynamics and Noisy Intermediate-Scale Quantum Systems</i>. Kavli Institute for Theoretical Physics, September 2022 • <i>Programmable Quantum Matter: Many-Body Physics in the Era of Quantum Advantage</i> Aspen Center for Physics, July 2022 • <i>Non-Equilibrium Universality: From Classical to Quantum and Back</i> Kavli Institute for Theoretical Physics, September 2021

- *From Chaos to Hydrodynamics in Quantum Matter* Aspen Center for Physics, August 2021
- *Dynamics of Quantum Information* Kavli Institute for Theoretical Physics, August 2019
- *Entanglement in Strongly Correlated Systems* Centro de Ciencias de Benasque Pedro Pascual, February 2018

5 most important publications designated by [*]

1. **Non-uniform noise rates and griffiths phases in topological quantum error correction** . Adithya Sriram, Nicholas O’dea, Yaodong Li, [Tibor Rakovszky](#), Vedika Khemani [arXiv:2409.03325](#)
2. **Probing hydrodynamic crossovers with dissipation-assisted operator evolution** . N. S. Srivatsa, Oliver Lunt, [Tibor Rakovszky](#), Curt von Keyserlingk [arXiv:2408.08249](#)
3. **The Physics of (good) LDPC Codes II. Product constructions.** [Tibor Rakovszky](#), Vedika Khemani [arXiv:2402.16831](#)
4. **Entanglement Properties of Gauge Theories from Higher-Form Symmetries** . Wen-Tao Xu, [Tibor Rakovszky](#), Michael Knap, Frank Pollmann, [arXiv:2311.16235](#)
5. **The Physics of (good) LDPC Codes I. Gauging and dualities.** [Tibor Rakovszky](#), Vedika Khemani, [arXiv:2310.16032](#)
6. **Defining stable phases of open quantum systems.** [Tibor Rakovszky](#), Sarang Gopalakrishnan, Curt von Keyserlingk, [arXiv:2308.15495](#), *Accepted for publication in Phys. Rev. X*
7. **Higgs Condensates are Symmetry-Protected Topological Phases: II. $U(1)$ Gauge Theory and Superconductors.** Ryan Thorngren, [Tibor Rakovszky](#), Ruben Verresen, Ashvin Vishwanath, [arXiv:2303.08136](#)
8. **The ballistic to diffusive crossover in a weakly-interacting Fermi gas.** Jerome Lloyd, [Tibor Rakovszky](#), Frank Pollmann, Curt von Keyserlingk, *Phys. Rev. B* **109**, 205108 (2024), *Editor’s Suggestion*
9. **Operator Relaxation and the Optimal Depth of Classical Shadows.** Matteo Ippoliti, Yaodong Li, [Tibor Rakovszky](#), Vedika Khemani, *Phys. Rev. Lett.* **130**, 230403 (2023)
10. **Fragmentation-induced localization and boundary charges in dimensions two and above.** Julius Lehmann, Pablo Sala, Frank Pollmann, [Tibor Rakovszky](#), *SciPost Phys.* **14**, 140 (2023)
11. **Topology, criticality, and dynamically generated qubits in a stochastic measurement-only Kitaev model.** Adithya Sriram, [Tibor Rakovszky](#), Vedika Khemani, Matteo Ippoliti, *Phys. Rev. B* **108**, 094304 (2023), *Editor’s Suggestion*
12. **Operator backflow and the classical simulation of quantum transport.** Curt von Keyserlingk, Frank Pollmann, [Tibor Rakovszky](#), *Phys. Rev. B* **105**, 245101 (2022)
13. **Dynamics in Systems with Modulated Symmetries.** Pablo Sala, Julius Lehmann, [Tibor Rakovszky](#), Frank Pollmann, *Phys. Rev. Lett.* **129**, 170601 (2022)
14. **Fractal, Logarithmic, and Volume-Law Entangled Nonthermal Steady States via Spacetime Duality.** Matteo Ippoliti, [Tibor Rakovszky](#), Vedika Khemani, *Phys. Rev. X* **12**, 011045 (2022)
15. [*] **Dissipation-assisted operator evolution method for capturing hydrodynamic transport.** [Tibor Rakovszky](#), Curt von Keyserlingk, Frank Pollmann, *Phys. Rev. B* **105**, 075131 (2022), *Editor’s Suggestion*
16. **Statistical localization: from strong fragmentation to strong edge modes.** [T. Rakovszky](#), P. Sala, R. Verresen, M. Knap, F. Pollmann, *Phys. Rev. B* **101**, 125126 (2020), *Editor’s Suggestion*
17. [*] **Ergodicity Breaking Arising from Hilbert Space Fragmentation in Dipole-Conserving Hamiltonians.** P. Sala, [T. Rakovszky](#), R. Verresen, M. Knap, F. Pollmann, *Phys. Rev. X* **10**, 011047 (2020)

18. **Entanglement growth after inhomogenous quenches.** Tibor Rakovszky, Curt von Keyserlingk, Frank Pollmann, *Phys. Rev. B* 100, 125139 (2019)
19. **[*] Sub-ballistic Growth of Rényi Entropies due to Diffusion .** Tibor Rakovszky, Frank Pollmann, Curt von Keyserlingk, *Phys. Rev. Lett.* 122, 250602 (2019), *Editor's Suggestion*
20. **Signatures of information scrambling in the dynamics of the entanglement spectrum.** T. Rakovszky, S. Gopalakrishnan, S. A. Parameswaran, F. Pollmann, *Phys. Rev. B* 100, 125115 (2019)
21. **[*] Diffusive Hydrodynamics of Out-of-Time-Ordered Correlators with Charge Conservation.** Tibor Rakovszky, Frank Pollmann, Curt von Keyserlingk, *Phys. Rev. X* 8, 031058 (2018)
22. **[*] Operator Hydrodynamics, OTOCs, and Entanglement Growth in Systems without Conservation Laws.** Curt von Keyserlingk, Tibor Rakovszky, Frank Pollmann, Shivaaji L. Sondhi, *Phys. Rev. X* 8, 021013 (2018)
23. **Detecting topological invariants in chiral symmetric insulators via losses.** Tibor Rakovszky, Andrea Alberti, János K. Asbóth, *Phys. Rev. B* 95, 201407(R) (2017), *Rapid Communication*
24. **Hamiltonian truncation approach to quenches in the Ising field theory .** T. Rakovszky, M. Mestyán, M. Collura, M. Kormos, G. Takács, *Nuclear Physics B* 911 (2016)
25. **Localization, delocalization, and topological phase transitions in the one-dimensional split-step quantum walk.** Tibor Rakovszky, János K. Asbóth, *Phys. Rev. A* 92, 052311 (2017)