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Born: 18 January 1980 – Tokyo, Japan
Nationality: Japanese
Marital status: Married

Current position

Assistant Professor, Graduate School of Science, Kyoto University

Education

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| Graduate School of Science, University of Tokyo Ph.D., Physics (advisor: Professor Hideo Aoki) | Tokyo, Japan March 2007 |
| Graduate School of Science, University of Tokyo M.Sc., Physics (advisor: Professor Hideo Aoki) | Tokyo, Japan March 2004 |
| University of Tokyo B.Sc., Physics | Tokyo, Japan March 2002 |

Appointments Held

1. Research

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|---|------------------------------------|
| Graduate School of Science, Kyoto University Assistant Professor (current position) | April 2010 – present |
| Graduate School of Science, Kyoto University Research Fellow (host: Professor Norio Kawakami) | October 2009 – March 2010 |
| Graduate School of Science, University of Tokyo JSPS Research Fellow-PD (host: Professor Masahito Ueda) | April 2008 – September 2009 |
| Graduate School of Science, Tokyo Institute of Technology JSPS Research Fellow-PD (host: Professor Masahito Ueda) | April 2007 – March 2008 |

Steering Committee member of Division 8

April 2012 – March 2013

Journal Referees

Physical Review Letters (> 25 manuscripts), Physical Review X, Physical Review A, Physical Review B, Physical Review E, New Journal of Physics, Journal of the Physical Society of Japan, Progress of Theoretical and Experimental Physics, International Journal of Modern Physics B and numerous conference proceedings

Languages

Japanese (native speaker), *English* (fluent), *German* (intermediate), *French* (basic).

1. Refereed original journal articles

Masanori Hanada, Antal Jevicki, Xianlong Liu, Enrico Rinaldi, and Masaki Tezuka (in alphabetical order), “A model of randomly-coupled Pauli spins”, *J. High Energ. Phys.* **2405**, 280 (2024).
doi: 10.1007/JHEP05(2024)280

Pak Hang Chris Lau, Chen-Te Ma, Jeff Murugan, and Masaki Tezuka (in alphabetical order), “On the Backreaction of Dirac Matter in JT Gravity and SYK Model”, *Phys. Lett. B* **853**, 138702 (2024).
doi: 10.1016/j.physletb.2024.138702

Yoshifumi Nakata and Masaki Tezuka, “Hayden-Preskill recovery in Hamiltonian system”, *Phys. Rev. Research* **6**, L022021 (2024).
doi: 10.1103/PhysRevResearch.6.L022021

Masanori Hanada, Junyu Liu, Enrico Rinaldi, and Masaki Tezuka (in alphabetical order), “Estimating truncation effects of quantum bosonic systems using sampling algorithms”, *Mach. Learn.: Sci. Technol.* **4**, 045021 (2023).
doi: 10.1088/2632-2153/ad035c

Eric Mascot, Masahiro Nozaki, and Masaki Tezuka (in alphabetical order), “Local operator entanglement in spin chains”, *SciPost Phys. Core* **6**, 070 (2023).
doi: 10.21468/SciPostPhysCore.6.4.070

Masaki Tezuka, Onur Oktay, Enrico Rinaldi, Masanori Hanada, and Franco Nori, “Binary-coupling sparse Sachdev-Ye-Kitaev model: An improved model of quantum chaos and holography”, *Phys. Rev. B* **107**, L081103 (2023).
doi: 10.1103/PhysRevB.107.L081103

Tzu-Chen Huang, Ying-Hsuan Lin, Kantaro Ohmori, Yuji Tachikawa, and Masaki Tezuka (in alphabetical order), “Numerical evidence for a Haagerup conformal field theory”, *Phys. Rev. Lett.* **128**, 231603 (2022).
doi: 10.1103/PhysRevLett.128.231603

Kazuki Yamamoto, Masaya Nakagawa, Masaki Tezuka, Masahito Ueda, and Norio Kawakami, “Universal properties of dissipative Tomonaga-Luttinger liquids: Case study of a non-Hermitian XXZ spin chain”, *Phys. Rev. B* **105**, 205125 (2022).
doi: 10.1103/PhysRevB.105.205125

Chen-How Huang, Masaki Tezuka, and Miguel A. Cazalilla, “Topological Lifshitz Transitions, Orbital Currents, and Interactions in Low-dimensional Fermi Gases in Synthetic Gauge Fields”, *New J. Phys.* **24**, 033043 (2022).
doi: 10.1088/1367-2630/ac5a87

Felipe Monteiro, Masaki Tezuka, Alexander Altland, David A. Huse, and T. Micklitz, “Quantum ergodicity in the many-body localization problem”, *Phys. Rev. Lett.* **127**, 030601 (2021).
doi: 10.1103/PhysRevLett.127.030601

Pak Hang Chris Lau, Chen-Te Ma, Jeff Murugan, and Masaki Tezuka (in alphabetical order), “Correlated disorder in the SYK2 model”, *J. Phys. A* **54**, 095401 (2021).
doi: 10.1088/1751-8121/abde77

Felipe Monteiro, Tobias Micklitz, Masaki Tezuka, and Alexander Altland, “Minimal model of many-body localization”, *Phys. Rev. Research* **3**, 013023 (2021).
doi: 10.1103/PhysRevResearch.3.013023

- Fuyuki Matsuda, [Masaki Tezuka](#), and Norio Kawakami, “Two-Dimensional Thouless Pumping of Ultracold Fermions in Obliquely Introduced Optical Superlattice”, *J. Phys. Soc. Jpn.* **89**, 114708 (2020). [Editors’ Choice]
doi: 10.1088/1751-8121/abde77
- Hrant Gharibyan, Masanori Hanada, Brian Swingle, and [Masaki Tezuka](#) (in alphabetical order), “Characterization of quantum chaos by two-point correlation functions”, *Phys. Rev. E* **102**, 022213 (2020).
doi: 10.1103/PhysRevE.102.022213
- Pak Hang Chris Lau, Chen-Te Ma, Jeff Murugan, and [Masaki Tezuka](#) (in alphabetical order), “Randomness and Chaos in Qubit Models”, *Phys. Lett. B* **795**, 230-235 (2019).
doi: 10.1016/j.physletb.2019.05.052
- Hrant Gharibyan, Masanori Hanada, Brian Swingle, and [Masaki Tezuka](#) (in alphabetical order), “Quantum Lyapunov Spectrum”, *J. High Energ. Phys.* **1904** (2019) 082.
doi: 10.1007/JHEP04(2019)082
- Antonio M. García-García and [Masaki Tezuka](#) (in alphabetical order), “Many-body localization in a finite-range Sachdev-Ye-Kitaev model and holography”, *Phys. Rev. B* **99**, 054202 (2019).
doi: 10.1103/PhysRevB.99.054202
- Mitsutoshi Fujita, Rene Meyer, Sumiran Pujari, and [Masaki Tezuka](#) (in alphabetical order), “Effective Hopping in Holographic Bose and Fermi Hubbard Models”, *J. High Energ. Phys.* **1901** (2019) 045.
doi: 10.1007/JHEP01(2019)045
- Hrant Gharibyan, Masanori Hanada, Stephen H. Shenker, and [Masaki Tezuka](#) (in alphabetical order), “Onset of random matrix behavior in scrambling systems”, (Open Access) *J. High Energ. Phys.* **1807** (2018) 124.
doi: 10.1007/JHEP07(2018)124
- Antonio M. García-García, Bruno Loureiro, Aurelio Romero-Bermúdez, [Masaki Tezuka](#) (in alphabetical order), “Chaotic-Integrable Transition in the Sachdev-Ye-Kitaev Model”, (Open Access) *Phys. Rev. Lett.* **120**, 241603 (2018).
doi: 10.1103/PhysRevLett.120.241603
- Masanori Hanada, Hidehiko Shimada, and [Masaki Tezuka](#) (in alphabetical order): “Universality in Chaos: Lyapunov Spectrum and Random Matrix Theory” *Phys. Rev. E* **97**, 022224 (2018).
doi: 10.1103/PhysRevE.97.022224
- Ipei Danshita, Masanori Hanada, and [Masaki Tezuka](#) (in alphabetical order), “Creating and probing the Sachdev–Ye–Kitaev model with ultracold gases: Towards experimental studies of quantum gravity” *Prog. Theor. Exp. Phys.* **2017**, 083I01 (2017).
doi: 10.1093/ptep/ptx108
- Jordan S. Cotler, Guy Gur-Ari, Masanori Hanada, Joseph Polchinski, Phil Saad, Stephen H. Shenker, Douglas Stanford, Alexandre Streicher, and [Masaki Tezuka](#) (in alphabetical order): “Black holes and random matrices” *J. High Energ. Phys.* **1705**, 118 (2017).
doi: 10.1007/JHEP05(2017)118
- Jun’ichi Ozaki, [Masaki Tezuka](#), and Norio Kawakami: “Drag dynamics in one-dimensional Fermi systems” *Physical Review A* **92**, 023607 (2015).
doi: 10.1103/PhysRevA.92.023607
- [Masaki Tezuka](#), Antonio M. García-García, and Miguel A. Cazalilla: “Destruction of long-range order by quenching the hopping range in one dimension” *Physical Review A* **90**, 053618 (2014).
doi: 10.1103/PhysRevA.90.053618

Fuyuki Matsuda, [Masaki Tezuka](#), and Norio Kawakami: “Topological Properties of Ultracold Bosons in One-Dimensional Quasiperiodic Optical Lattice” *Journal of the Physical Society of Japan* **83**, 083707 (2014). (Letter) doi: 10.7566/JPSJ.83.083707

Monodeep Chakraborty, [Masaki Tezuka](#), and B. I. Min: “Interacting-Holstein and extended-Holstein bipolarons” *Physical Review B* **89**, 035146 (2014).
doi: 10.1103/PhysRevB.89.035146

[Masaki Tezuka](#) and Norio Kawakami: “Reentrant topological transitions with Majorana end states in one-dimensional superconductors by lattice modulation” *Physical Review B* **88**, 155428 (2013).
doi:10.1103/PhysRevB.88.155428

Alejandro M. Lobos, [Masaki Tezuka](#) and Antonio M. García-García: “Restoring phase coherence in a one-dimensional superconductor using power-law electron hopping” *Physical Review B* **88**, 134506 (2013).
doi:10.1103/PhysRevB.88.134506

Jun’ichi Ozaki, [Masaki Tezuka](#) and Norio Kawakami: “Collision of one-dimensional fermion clusters” *Physical Review A* **86**, 033621 (2012).
doi:10.1103/PhysRevA.86.033621

[Masaki Tezuka](#), and Norio Kawakami: “Reentrant topological transitions in a quantum wire / superconductor system with quasiperiodic lattice modulation” *Physical Review B* **85**, 140508(R) (2012).
doi:10.1103/PhysRevB.85.140508

[Masaki Tezuka](#) and Antonio M. García-García: “Testing the universality of the many-body metal-insulator transition by time evolution of a disordered one-dimensional ultracold fermionic gas” *Physical Review A* **85**, 031602(R) (2012).
doi:10.1103/PhysRevA.85.031602

[Masaki Tezuka](#) and Antonio M. García-García: “Stability of the superfluid state in a disordered 1D ultracold fermionic gas” *Physical Review A* **82**, 043613 (2010).
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[Masaki Tezuka](#) and Masahito Ueda: “Ground states and dynamics of population-imbalanced Fermi condensates in one dimension” *New Journal of Physics* **12**, 055029 (2010).
doi:10.1088/1367-2630/12/5/055029

[Masaki Tezuka](#) and Masahito Ueda: “Density-Matrix Renormalization Group Study of Trapped Imbalanced Fermi Condensates” *Physical Review Letters* **100**, 110403 (2008).
doi:10.1103/PhysRevLett.100.110403

[Masaki Tezuka](#), Ryotaro Arita and Hideo Aoki: “Phase diagram for the one-dimensional Hubbard-Holstein model: A density-matrix renormalization group study” *Physical Review B* **76**, 155114 (2007).
doi:10.1103/PhysRevB.76.155114

[Masaki Tezuka](#): “An Improved Initialization Procedure for the Density-Matrix Renormalization Group” *Journal of the Physical Society of Japan* **76**, 053001 (Letter) (2007).
doi:10.1143/JPSJ.76.053001

[Masaki Tezuka](#), Ryotaro Arita and Hideo Aoki: “Density-matrix renormalization group study of pairing when electron-electron and electron-phonon interactions coexist: effect of the electronic band structure” *Physical Review Letters* **95**, 226401 (2005).
doi:10.1103/PhysRevLett.95.226401

2. Refereed conference proceedings

Fuyuki Matsuda, [Masaki Tezuka](#), and Norio Kawakami: “Correlation Effects in One-Dimensional Quasiperiodic Anderson-Lattice Model” *Physics Procedia* **75**, 245-251 (2015).
doi: 10.1016/j.phpro.2015.12.030

[Masaki Tezuka](#), Alejandro M. Lobos and Antonio M. García-García: “Restoring long-range order in one-dimensional superconductivity by power-law hopping” *JPS Conference Proceedings* **3**, 016004 (2014).
doi:10.7566/JPSCP.3.016004

Fuyuki Matsuda, [Masaki Tezuka](#), and Norio Kawakami: “Topological Properties of 1D Quasicrystal Bose-Mott Insulators” *JPS Conference Proceedings* **3**, 016013 (2014).
doi:10.7566/JPSCP.3.016013

Jun’ichi Ozaki, [Masaki Tezuka](#), and Norio Kawakami: “Quantum effects on one-dimensional collision dynamics of fermion clusters” *Journal of Physics: Conference Series* **400**, 012059 (2012).
doi:10.1088/1742-6596/400/1/012059

[Masaki Tezuka](#), Ryotaro Arita and Hideo Aoki: “Density-Matrix Renormalization Group Study of Phase Diagram in Systems with Strong Electron-Electron and Electron-Phonon Interactions”, *AIP Conference Proceedings* **850** (24th International Conference on Low Temperature Physics), 551-552 (2006).
doi:10.1063/1.2354829

[Masaki Tezuka](#), Ryotaro Arita and Hideo Aoki: “A DMRG study of correlation functions in the Holstein-Hubbard model”, *Physica B* **359-361** (Proceedings of the International Conference on Strongly Correlated Electron Systems), 708-710 (2005).
doi:10.1016/j.physb.2005.01.20

3. Review articles

[Masaki Tezuka](#): “The Sachdev-Ye-Kitaev (SYK) model, quantum scrambling and many-body localization” (in Japanese), *Kotai Butsuri* **57**, 217 (2022).

Fuyuki Matsuda, [Masaki Tezuka](#), and Norio Kawakami: “Two-Dimensional Extension of Thouless Pumping and Diophantine Equation in Ultracold Atoms” (in Japanese), *Kotai Butsuri* **56**, 409 (2021).

Ipei Danshita, [Masaki Tezuka](#), and Masanori Hanada: “Sachdev–Ye–Kitaev model, black holes, and ultra-cold gases” (in Japanese), *Butsuri* **73**, 569 (2018).

[Masaki Tezuka](#): “Superfluidity in imbalanced systems — Fermi condensates observed in trapped neutral atoms” (in Japanese), *Bussei Kenkyu (Kyoto)* **95**, 34 (2010).

Invited talks at scientific meetings

Masaki Tezuka

「ボソン系の量子シミュレーション」, 「場の理論の新しい計算方法 2023」, 大阪大学南部陽一郎ホール, 11 October 2023.

“Fock space localization and quantum error correction in SYK-like models”, Numerical Methods in Theoretical Physics 2023, APCTP, Pohang, Korea, 13 July 2023.

「Sachdev-Ye-Kitaev 型模型における多体波動関数の振舞と量子誤り訂正」, 神戸大学理学研究科物理学専攻・理学部物理学科 先端科学融合特論 A 談話会, 28 June 2023.

“Binary-coupling sparse SYK model: spectral form factor and scrambling dynamics”, 2023 Annual Meeting of the Physical Society of Taiwan, National Cheng-Kung University, Tainan, Taiwan, 17 January 2023.

“Spectral correlation and eigenstate entanglement entropy in Sachdev-Ye-Kitaev-type models”, pre TPS mini workshop, National Tsing-Hua University, Hsinchu, Taiwan, 11 January 2023.

“Spectral form factor and eigenstate entanglement entropy in Sachdev-Ye-Kitaev-type models”, Second Annual Meeting of the Extreme Universe Collaboration, 神戸コンベンションセンター, 28 December 2022.

“Recent developments on SYK model”, 第一回ブラックホール/量子重力勉強会, 大阪大学南部陽一郎ホール, 15 October 2022.

“Binary-Coupling Sparse Sachdev-Ye-Kitaev Model”, Nonperturbative and Numerical Approaches to Quantum Gravity, String Theory, International Centre for Theoretical Sciences (ICTS), Bengaluru, India, 29 August 2022. (online)

“Fock space localization in a perturbed Sachdev-Ye-Kitaev model”, 17th Slovenia–Japan Seminar on Nonlinear Science, 22 March 2022. (online)

「Sachdev-Ye-Kitaev 模型における多体局在の定量的研究」, 「離散的手法による場と時空のダイナミクス 2021」, Kyoto University, 26 December 2021.

“Many-body localization in quasiperiodic systems and effect of nonhermitian terms”, IRN-APERIODIC “Open space between aperiodic order and physics & chemistry of materials”, Carry le Rouet, France, 6 October 2021. (online)

“Fock-space localization and entanglement in the Sachdev-Ye-Kitaev model”, YITP workshop “Recent progress in theoretical physics based on quantum information theory”, Kyoto, Japan, 1 March 2021. (online)

“Characterization of chaos in many-body quantum systems”, Pioneer Symposium, 2019 Korean Physical Society Fall Meeting, Gwangju, Korea, 23 October 2019.

“The Sachdev-Ye-Kitaev model as a maximally chaotic lattice model: study towards experimental realization, and new characterizations of chaos”, Workshop on Holography and Quantum Matter, Beijing, China, 26 August 2019.

“The Sachdev-Ye-Kitaev model, scrambling and chaos”, Youth Symposium on theoretical high energy physics in Southeast University, Nanjing, China, 20 August 2019.

“The Sachdev-Ye-Kitaev model, random matrices and quantum chaos”, KMI Interdisciplinary Seminar “Recent developments in SYK model and wormholes”, Nagoya, Japan, 22 July 2019.

“Characterization of chaotic dynamics in quantum systems”, 3rd French Russian Conference on Random Geometry and Physics: Sachdev-Ye-Kitaev Model and Related Topics, Moscow, Russia, 5 June 2019.

“Sachdev-Ye-Kitaev model, topological materials and chaos”, 第4回「トポロジーが紡ぐ物質科学のフロンティア」領域研究会, Nagoya, Japan, 22 January 2019.

“Level statistics and Lyapunov spectrum of the SYK model”, Discrete Approaches to the Dynamics of Fields and Space-Time (「離散的手法による場と時空のダイナミクス」研究会 2018), Sendai, Japan, 11 September 2018.

「Sachdev-Ye-Kitaev 模型と量子カオス」, 量子カオスとホログラフィー (30 March 2018), Kyoto, Japan, 13:30 - 14:30, 30 March 2018.

“The Sachdev-Ye-Kitaev model, random matrices and Lyapunov exponents”, Black Holes, Quantum Chaos, and Solvable Quantum Systems (22-26 January 2018), Sanya, China, 14:00 - 15:00, 25 January 2018.

“Proposal for a cold atom realization of the Sachdev-Ye-Kitaev model: a desktop quantum gravity laboratory”, The 2nd Tokyo-Beijing Workshop on Ultracold Atoms (1-2 October 2017), Tokyo, Japan, 10:50 - 11:30, 1 October 2017.

“The Sachdev-Ye-Kitaev model: proposal for ultracold gas realization and numerical study of the dynamics”, Quantum Simulations and Numerical Studies on Many-Body Physics (9-11 December 2016), Hsinchu, Taiwan, 11:30 - 12:20, 11 December 2016.

“Topological properties of quasi-periodic quantum systems”, Quantum Science Symposium Europe-2016 (1-2 November 2016), Cambridge, UK, 10:05 - 10:30, 1 November 2016.

“Fermions on quasiperiodically modulated lattices: pairing, localization, and topology”, EMN Meeting on Quantum 2016 (8-10 April 2016), Phuket, Thailand, 11:35 - 12:00, 9 April 2016.

“Dynamics of interacting fermions on a bichromatic optical lattice”, Correlations and coherence in quantum systems (8-12 October 2012), Evora, Portugal, 16:00 - 16:30, 8 October 2012.

“Dynamics of two-component Fermi gas close to insulating transition in a quasiperiodic potential”, Ultracold Gases: Superfluidity and Strong Correlations (USS-2012) (11-13 January 2012), Tokyo, 17:40-18:10, 12 January 2012.

“Dynamics of an interacting one-dimensional Fermi system in a quasiperiodic potential”, New Electronic Properties through Structure and Correlation (Japan Swiss Workshop 2011), Zurich, Switzerland, 14:30 - 15:00, 16 September 2011.

“One-dimensional Fermi gases: Density-matrix renormalization group study of ground state properties and dynamics”, Renormalization Group Approach from Ultra Cold Atoms to the Hot QGP, Kyoto, 17:00 - 18:00, 30 August 2011.

“Population-imbalanced Fermi Condensates: Effect of Trap Geometry”, Ultracold Fermi Gas: Superfluidity and Strong-Correlation (USS-2010), Ueno, Tokyo, 14:10 - 14:40, 13 May 2010.

「電子格子系及び調和型トラップ中の粒子数不均衡フェルミオン系の DMRG」, 密度行列繰り込み群法を用いた物性研究の新展開 (16-17 December 2008), Kyoto, 17:30 - 18:00, 16 December 2008.

References

Available upon request.

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