Yuki Takahashi

CONTACT INFORMATION

Saitama University
Department of Mathematics

ytakahas@rimath.saitama-u.ac.jp
www.rimath.saitama-u.ac.jp/staff/ytakahashi/

RESEARCH INTERESTS

Dynamical Systems, Spectral Theory and Fractal Geometry.

EMPLOYMENT

Department of Mathematics, Saitama University

- Assistant Professor (tenure-track), October 2020 - present
  (Leading Initiative for Excellent Young Resarcher)

Department of Mathematics, Michigan State University

- Visiting Assistant Professor, January 2020 - August 2020
  (research mentor: I. Kachkovskiy)

AIMR Mathematical Science Group, Tohoku University

- Assistant Professor (non tenure-track), April 2019 - December 2019
  (Chiba research group)

Department of Mathematics, Bar-Ilan University

- Postdoc, June 2017 - March 2019 (supervisor: B. Solomyak)

EDUCATION

Department of Mathematics, University of California, Irvine

- Ph.D. in Mathematics, May 2017 (advisor: A. Gorodetski)
  Ph.D. Thesis: Sums and products of Cantor sets and separable two-dimensional quasicrystal models

The University of Tokyo

- M.S. in Mathematics, March 2012
  Master's Thesis: Irregular solutions of the periodic discrete Toda lattice equation (in Japanese)
- B.A. in Mathematics, March 2009

GRANTS

Spring	2021	KAKENHI (Grant-in-Aid for Early Career Scientists)
Spring	2020	Leibniz Fellowship Grant (cancelled due to the pandemic) (Mathematisches Forschungsinstitut Oberwolfach)
Fall	2019	FY2019 WPI-AIMR Fusion Research (Microfluidic, energy, and spin devices with fractal space-filling geometries, together with H. Izuchi, H. Kai and K. Kizu)
Winter	2018	Leibniz Fellowship Grant (declined) (Mathematisches Forschungsinstitut Oberwolfach)
Fall	2017	Postdoctoral Fellowship Grant (Institut Mittag-Leffler, postdoctoral fellowship)

HONORS AND AWARDS

Spring	2017	Dissertation Fellowship (UC Irvine, department fellowship)
Winter	2017	Department Fellowship (UC Irvine, department fellowship)
Spring	2014	Connelly Award (UC Irvine, department award)
Spring	2013	Euler Outstanding Promise as a Graduate Student Award (UC Irvine, department award)

Papers

1. Y. Takahashi, Invariant measures for Iterated Function Systems with inverses, to appear in *J. Fractal Geom.*
2. B. Solomyak, Y. Takahashi, Diophantine property of matrices and attractors of projective iterated function systems in $\mathbb{RP}^1$, to appear in *Int. Math. Res. Not.*
3. Y. Takahashi, Sums of two self-similar Cantor sets, *J. Math. Anal. Appl.* **477** (2019) 613–626.
4. Y. Takahashi, Sums of two homogeneous Cantor sets, *Trans. Amer. Math. Soc.* **372** (2019) 1817–1832.
5. Y. Takahashi, Products of two Cantor sets, *Nonlinearity* **30** (2017) 2114–2137.
6. Y. Takahashi, Quantum and spectral properties of the Labyrinth model, *J. Math. Phys.* **57** (2016).
7. J. Fillman, Y. Takahashi, W. Yessen, Mixed spectrum regimes of the square tridiagonal Fibonacci Hamiltonian, *J. Fractal Geom.* **3** (2016) 377–405.
8. M. Kanki, Y. Takahashi, T. Tokihiro, Graphs emerging from the solutions to the periodic discrete Toda equation over finite fields, *Nonlinear Theory and Its Applications* **7** (2016) 338–353.

Referencing Experience

- Fractals
- Bulletin of the London Mathematical Society
- Nonlinearity
- Journal of Fractal Geometry
- Erogodic Theory & Dynamical Systems
- Journal of Mathematical Analysis and Applications

Mentoring

January 2020 - July 2020 Undergraduate research project (together with I. Kachkovskiy)

Instructor Experience (Saitama University)

Summer	2021	Calculus A
Fall	2020	Recitation in Modern Mathematics

Instructor Experience (MSU)

Fall	2020	Calculus 2 (MTH 133)
Spring	2020	Survey of Calculus (MTH 124), Calculus 2 (MTH 133)

Instructor Experience (UC Irvine)

Fall	2014	Calculus (Math 2A)
Summer	2014	Calculus (Math 2B)

TA Experience (UC Irvine)

Summer	2016	Introduction to Linear Algebra (3A)
Spring	2016	Introduction to Graduate Analysis (205C, graduate course)
Winter	2016	Introduction to Graduate Analysis (205B, graduate course)
Fall	2015	Introduction to Graduate Analysis (205A, graduate course)
Summer	2015	Calculus (Math 2B), Introduction to Graduate Analysis (accelerated version of 205ABC for new Ph.D. students)
Spring	2015	Elementary Analysis (140B), Introduction to Topology (141)
Winter	2015	Dynamical Systems (117), Probability and Stochastic Process (130A)
Summer	2014	Calculus (Math 2B)
Spring	2014	Introduction to Graduate Analysis (205C, graduate course)
Winter	2014	Vector Calculus (Math 2E)

Fall	2013	Elementary Analysis (140A)
Summer	2013	Vector Calculus (Math 2E), Multivariable Calculus (Math 2D), Calculus (Math 2B)
Spring	2013	Calculus (Math 2B)
Winter	2013	Calculus (Math 2B)

Grader Experience (UC Irvine)

Fall	2017	Algebra (230A, graduate course)
Fall	2012	Introduction to Abstract Mathematics (Math13)

Conference Talks

October	2021	*Mathematics of quasiperiodic order and related topics*, Kyoto University
September	2021	*Integrated Research on Random Dynamical Systems and Multi-Valued Dynamical Systems*, Kyoto University (through zoom)
December	2019	*Workshop on Geometry of Foliations and Its Applications*, Kyoto University of Education
November	2019	*Ergodic Theory and Related Topics*, Nagaoka University of Technology
November	2019	*Nonlinear Waves and Related Topics*, Kyushu University
October	2019	*Aperiodic Tilings and Related Topics*, Kyoto University
September	2019	*Random Matrix Products and Anderson Localization*, BIRS
August	2019	*Random Dynamical Systems and Fractal Geometry*, Kyoto University
June	2019	*Dynamical System Conference*, Kyoto University
June	2018	*The Geometric Measure Theory and Its Connections*, University of Helsinki (poster)
April	2018	*From Order to Chaos*, Centro di Ricerca Matematica Ennio De Giorgi (poster)
November	2017	*Tiling Dynamical System*, CIRM
October	2017	*Fractal Geometry and Dynamics*, Institut Mittag-Leffler
June	2017	*School on Hyperbolic Dynamics*, Centro di Ricerca Matematica Ennio De Giorgi
March	2017	*Workshop on Dynamical Systems and Related Topics*, University of Maryland
November	2016	*Midwest Dynamical Systems Seminar*, Indiana University Purdue University Indianapolis (poster)
October	2016	*Semi-Annual Workshop in Dynamical Systems and Related Topics*, Pennsylvania State University
October	2016	*Doctoral School, Applications of Ergodic Theory in Number Theory*, CIRM (poster)
August	2016	*Frontiers in Mathematical Physics*, CRM (poster)
August	2016	*Connections Between Complex Dynamics, Statistical Physics, and Limiting Spectra of Self-similar Group Actions*, Indiana University Purdue University Indianapolis
July	2016	*School on Algebraic, Geometric and Probabilistic Aspect of Dynamical Systems and Control Theory*, ICTP (poster)
June	2016	*Summer School on Fractal Geometry & Complex Dimensions*, California Polytechnic State University, San Luis Obispo
June	2016	*Great Lakes Mathematical Physics Meeting*, Michigan State University
June	2016	*Between Dynamics and Spectral Theory*, Stony Brook University
March	2016	*Fractal Geometry, Hyperbolic Dynamics and Thermodynamical Formalism Semester Workshop*, Brown University (poster)

	October	2015	*The 2015 Midwest Dynamics Meeting*, The Ohio State University (poster)
	October	2015	*AMS Sectional Meeting, Special Session on Spectral Theory of Ergodic Schrödinger Operators and Related Models*, California State University, Fullerton
	September	2015	*Spectral Properties of Quasicrystals via Analysis, Dynamics, and Geometric Measure Theory*, Oaxaca
	June	2015	*Rocky Mountain Dynamical Systems Conference*, Brigham Young University
	April	2014	*AMS Western Spring Sectional Meeting, Special Session on Hyperbolic Dynamics, Dynamically Defined Fractals, and Applications*, University of New Mexico
Seminar Talks	June	2021	*One and two dimensional quasicrystal models*, Waseda University
	December	2020	*Invariant measures for Iterated Function Systems with inverses*, Saitama Mathematical Science seminar (through zoom)
	July	2020	*Monotonic quasiperiodic cocycles with singularities and application to the Maryland model*, Hokkaido Dynamical Systems web seminar (through zoom)
	January - February	2020	*Parametric Furstenberg theorem on random products of* $SL(2,\mathbb{R})$ *matrices I, II, III*, MSU, learning seminar
	December	2019	*One and two dimensional quasicrystal models*, Tohoku University
	October	2019	*Diophantine properties of matrices*, Tohoku University
	October	2019	*Diophantine properties of matrices and absolute continuity of the Furstenberg measure*, Kyushu University
	September	2019	*One and two dimensional quasicrystal models*, Tokyo Institute of Technology
	July	2019	*Sums of two Cantor sets*, Keio University
	July	2019	*Sums and products of Cantor sets and separable two-dimensional quasicrystal models*, Tsukuba University
	June	2019	*Quasicrystals, hyperbolic dynamics and fractal geometry*, Josai University
	May	2019	*Sums and products of Cantor sets and separable two-dimensional quasicrystal models*, Tohoku University, AIMR Math Group seminar
	November	2018	*Diophantine property of matrices and attractors of projective iterated function systems in* $\mathbb{RP}^1$, Bar-Ilan University, Analysis seminar
	May	2017	*Sums and products of two Cantor sets and separable two dimensional quasicrystal models*, UC Irvine, Ph.D. defense
	May	2017	*On the dimension of Furstenberg measure for* $SL(2,\mathbb{R})$ *random matrix products I, II*, UC Irvine, Ergodic Schrödinger Operator seminar
	March - May	2017	*On self-similar sets with overlaps and inverse theorems for entropy I, II, III*, UC Irvine, Dynamical System seminar
	March	2017	*Furstenberg correspondence principle I, II*, UC Irvine, Ergodic Schrödinger Operator seminar
	January - March	2017	*Recent developments on projections of self-similar fractals I, II*, UC Irvine, Dynamical System seminar
	September - October	2016	*Proof of the Furstenberg's theorem I, II*, UC Irvine, Ergodic Schrödinger Operator seminar

	April	2016	*Sums of two homogeneous Cantor sets I, II*, UC Irvine, Dynamical System seminar
	March - April	2016	*Repetitive Delone sets and quasicrystals I, II*, UC Irvine, Ergodic Schrödinger Operator seminar
	March	2016	*An Ergodic theorem for Delone dynamical systems and existence of the integrated density of states*, UC Irvine, Ergodic Schrödinger Operator seminar
	January - March	2016	*Stable intersections of regular Cantor sets with large Hausdorff dimensions IV, V, VI, VII, VIII, IX, X*, UC Irvine, Dynamical System seminar
	November	2015	*Stable intersections of regular Cantor sets with large Hausdorff dimensions I, II, III*, UC Irvine, Dynamical System seminar
	October	2015	*Opening gaps in the spectrum of strictly ergodic Schrödinger operators I, II*, UC Irvine, Ergodic Schrödinger Operator seminar
	November	2014	*Products of two Cantor sets and application to the Labyrinth model*, UC Irvine, Future Faculty Program
	November	2014	*Products of two Cantor sets I, II, III*, UC Irvine, Dynamical System seminar
	November	2014	*Equilibrium measures and capacities in spectral theory I, II, III*, UC Irvine, Ergodic Schrödinger Operator seminar
	May	2014	*Products of Cantor sets and spectral properties of the Labyrinth model*, UC Irvine, Advancement to Candidacy
	February	2014	*The spectrum of quasi-periodic Schrödinger operator I, II, III*, UC Irvine, Ergodic Schrödinger Operator seminar
Colloquium Talks	July	2019	*One and two dimensional quasicrystal models*, Keio University
	October	2016	*Spectra of self-similar groups*, UC Irvine, Math Grad Students Colloquium
	May	2016	*Sums of two Cantor sets and Palis conjecture*, UC Irvine, Math Grad Students Colloquium
	April	2016	*Products of two Cantor sets and application to the Labyrinth model*, UC Irvine, AGS Colloquium
	January	2016	*Products of two Cantor sets and application to the Labyrinth model*, UC Irvine, Undergraduate Math Club Talk
	November	2015	*The mathematical connection of juggling*, UC Irvine (sponsored by UCI Illuminations and Juggle Buddies)
	April	2015	*Products of two Cantor sets*, UC Irvine, Grad Slum competition, semi-final
	April	2015	*Quasicrystals, Labyrinth model, and products of two Cantor sets*, UC Irvine, Math Grad Students Colloquium
	March	2015	*Products of two Cantor sets and application to the Labyrinth model*, UC Irvine, AGS Symposium
	April	2014	*Products of Cantor sets and application to the Labyrinth model*, UC Irvine, Undergraduate Math Club Talk
Conferences and Schools Attended	December	2019	*Bifurcation and Stability in Complex Dynamics*, Kyoto University
	December	2019	*Spectral and Scattering Theory and Related Topics*, Kyoto University
	October	2019	*Analytic Number Theory and Related Topics*, Kyoto University
	September	2019	*Integrable Systems*, Kyoto University
	October	2018	*Rigidity of Stationary Measure*, MFO
	June	2018	*Algebra, Geometry, Dynamics and Applications*, Bar-Ilan University

December	2017	*Tilings and Recurrence*, CIRM
November	2017	*Zero Entropy System*, CIRM
October	2017	*Additive Combinatorics, Entropy and Fractal Geometry*, MFO
August	2017	*Workshop on Fractals II*, Hebrew University
June	2017	*Workshop on Hyperbolic Dynamics*, ICTP
February	2017	*Workshop: Groups of Dynamical Origin*, UNAM
February	2017	*Non Uniformly Hyperbolic Dynamical Systems, Coupling and Renewal Theory*, CIRM
February	2017	*Teichmuller Space, Polygonal Billiard, Interval Exchange*, CIRM
February	2017	*Winter School in Conservative Dynamics*, Engelberg
May	2015	*Houston Summer School on Dynamical Systems*, University of Houston
August	2014	*Summer School on Dynamical Systems*, University of Maryland
May	2014	*Houston Summer School on Dynamical Systems*, University of Houston

Work Experience

2006 - 2012 Waseda Academy (university-preparatory school), instructor (Mathematics)

References

Hayato Chiba Tohoku University AIMR,
(022) 217-6175, hchiba@tohoku.ac.jp

Anton Gorodetski Department of Mathematics, University of California, Irvine,
(949) 824-1381, asgor@math.uci.edu

Svetlana Jitomirskaya Department of Mathematics, University of California, Irvine,
(949) 824-3221, szhitomi@math.uci.edu

Ilya Kachkovskiy Department of Mathematics, Michigan State University,
(517) 844-1455, ikachkov@msu.edu

Shuji Machihara Department of Mathematics, Saitama University,
machihara@rimath.saitama-ac.jp

Boris Solomyak Department of Mathematics, Bar-Ilan University,
bsolom3@gmail.com