Mohammad Farajzadeh-Tehrani

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Interests – Symplectic Topology, Complex Algebraic Geometry, Information Theory

Employment
- Associate Professor, The University of Iowa 07/2022 –
- Assistant Professor, The University of Iowa 08/2018 – 06/2022
- Research Assistant Professor, Stony Brook University
  Simons Center for Geometry and Physics 09/2013 – 08/2018
- Visiting Assistant Professor, Cornell University 08/2012 – 05/2013

Education
- Ph.D. in Mathematics, Princeton University 09/2007 – 08/2012
  - Thesis Title: On Moduli Spaces of Real Curves in Symplectic Manifolds
  - Thesis Adviser: Gang Tian
  - Visitor at Peking University-BICMR, China, Spring 2009
- B.Sc. Electrical Engineering and Mathematics (Double Major)
  Sharif University of Technology, Iran 09/2002 – 01/2007

Grants
- MAA Dolciani Mathematics Enrichment Grant, 2022-2023, PI
  Iowa Junior Academy of Math, with Weiyu Xu
- NSF-RTG DMS-2038103, 2021-2026, Co-PI ($2,083,686)
  Geometry and Topology at U Iowa
- NSF standard grant DMS-2003340, 2020-2023, PI ($178,389)
  Logarithmic moduli spaces for symplectic geometry: construction, applications, and beyond
- Simons Collaboration Grant 702088, 2020-2025, PI ($42K, withdrawn[1])
- IMA, Panorama of Geometry and Topology symposium, Sep 2020, Co-PI

Teaching

U Iowa, Department of Mathematics:
- MATH 6410, Introduction to Differential Topology, Spring 2023
- MATH 6400, Algebraic Topology, Fall 2022
- MATH 7400, Current Geometry & Topology I (Complex Geometry), Fall 2021
- MATH 6410, Introduction to Differential Topology, (Hybrid) Spring 2021
- MATH 2700, Introduction to Linear Algebra, (F2F+Zoom) Fall 2020
- MATH 5400, General Topology, (F2F+Zoom) Fall 2020
- MATH 7450, Topics in Geometry and Topology, Spring 2020
- MATH 6410, Introduction to Differential Topology, Spring 2020
- MATH 7400, Topology of Manifolds (Intro to Symplectic Topology), Fall 2019

[1] due to conflict with DMS-2003340

– MATH 3550, Engineering Mathematics V: Vector Calculus, Spring 2019
– MATH 1850, Calculus I (2 sessions), Fall 2018

Stony Brook, Department of Mathematics:
– MAT 211, Introduction to Linear Algebra, Spring 2015
– MAT 122, Overview of Calculus with Applications, Spring 2014

Cornell, Department of Mathematics:
– MATH 1110 Calculus I (2 sessions/semester), Fall 2012 and Spring 2013

Princeton, Department of Mathematics:
– FSI (Freshman Scholars Institute) Instructor, Summer 2012
– MAT 201, Multivariable Calculus, Spring 2010

Monographs

Gromov-Witten theory via Kuranishi structures, with K. Fukaya
AMS Mathematical Surveys and Monographs Vol: 237 (2019)
Virtual Fundamental Cycles in Symplectic Topology p. 111–253
with K. Fukaya, D. Joyce, D. McDuff, and J. Morgan

Papers

24) *On compactifications of the* $\mathrm{SL}(2,\mathbb{C})$ *character varieties of punctured surfaces*
with C. Frohman, arXiv:2305.12306

23) *BPS invariants of symplectic log Calabi-Yau fourfolds*
arXiv:2206.13589

22) *Normal crossings singularities for symplectic topology: structures*
arXiv:2112.13125, with M. McLean and A. Zinger

21) *RIS-aided mmWave beamforming for two-way communications between Multiple Pairs*, with N. Torkzaban, A. Khojastepour, J. S. Baras
ITU Journal on Future and Evolving Technologies
Volume 4 (2023), Issue 1, Pages 87–101 (Best Paper Award)

20) *Relative Seiberg-Witten invariants and a sum formula*
arXiv:2009.09531, with P. Safari

19) *Limits of stable maps in a semi-stable degeneration,*
Geometriae Dedicata volume 216, Article number: 66 (2022)

18) *Deformation theory of log pseudo-holomorphic curves and logarithmic Ruan-Tian perturbations*,
Peking Mathematical Journal, accepted (2023), arXiv:1910.05201

17) *Normal crossings singularities for symplectic topology II*
arXiv:1908.09390, with M. McLean and A. Zinger

16) *Pseudoholomorphic curves relative to a normal crossings symplectic divisor: compactification*,
Geometry & Topology 26 (2022) 989–1075

15) *Normal crossings degenerations of symplectic manifolds*
Peking Mathematical Journal Vol. 2 (2019), 275–351, with A. Zinger

14) *Singularities and semistable degenerations for symplectic topology*
Comptes Rendus Mathematique vol. 356 issue 4(2018) pp. 420–432,
with M. McLean and A. Zinger

13) *The smoothability of normal crossings symplectic varieties*
arXiv:1410.2573, with M. McLean and A. Zinger

12) *Normal crossings singularities for symplectic topology*
Advances in Mathematics, 339 (2018) pp. 672–748

11) *On the refined symplectic sum formula for Gromov-Witten invariants*
Int. J. of Mathematics,Vol. 31, No. 04 (2020), with A. Zinger

10) *On the rim tori refinement of relative Gromov-Witten invariants*
Comm in Contemporary Mathematics, Vol. 23, No. 5 (2021), with A. Zinger

09) *A sufficiency condition for interference alignment*
proceedings of IEEE ISIT, (2015) pp. 1497–1501, with A. Khojastepour

08) *Scaling wireless full-duplex in multi-cell networks*
proceedings of IEEE Infocom, (2015) pp. 1751–1759
with A. Khojastepour, K. Sandaresan, S. Rangarajan

07) *Absolute vs. relative Gromov-Witten invariants*
J. Symplectic Geometry, 14 (2016) no. 4 pp. 1189–1250, with A. Zinger

06) *On symplectic sum formulas in Gromov-Witten theory*
arXiv:1404.1898 (expository article), with A. Zinger

05) *Characterizing per node degrees of freedom in an interference network*
proceedings of IEEE ISIT, (2014) pp. 1016–1020, with A. Khojastepour

04) *Degrees of freedom per communication node*
proceedings of IEEE WiOpt, (2014) pp. 707–714
with A. Khojastepour, K. Sandaresan, S. Rangarajan

03) *Counting genus zero real curves in symplectic manifolds*

Geometry & Topology, 20 (2016), no. 2 pp. 629–695, Part II with A. Zinger

02) *Automorphism group of Batyrev Calabi-Yau threefolds*
Manuscripta Mathematica, 146 (2015) no. 1 pp. 299–306

01) *Open Gromov-Witten theory on symplectic manifolds and symplectic cutting*
Advances in Mathematics, 232 (2013) pp. 238–270

00) *An explicit formula for the inverse of Cauchy matrices*
Sharif Mathematics Journal (in Farsi), Aug 2002

Awards & Honors

– **Flex Load Award**, The University of Iowa, Spring 2022
– **Old Gold Summer Fellowship**, The University of Iowa, 2019
– **Centennial Fellowship**, Math Department, Princeton University, 2007–2008
– **Ranked 1st**, National Graduate School Entrance Exam in Math, Iran, 2006
– **Second Prize**, International Mathematical Competition, Bulgaria, 2005
– **Gold Medal**, Iran National Mathematical Competition, 2005
– **First Prize**, International Mathematical Competition, Romania, 2003
– **Gold Medal**, Iran National Mathematical Competition, 2003
– **Gold Medal**, Iran National Mathematical Olympiad, 2001

Students

– **Quinn Langfit** (undergraduate, Summer 2021-Fall 2022)
Honors Thesis: Analysis of Public-Key Quantum Money and its Feasibility

Service to

Profession

– Journal referee for: Annals of Mathematics, Journal of the AMS, GAFA
Geometry & Topology, JSG, JDG, AIM, IMRN, Comm. Anal. Geom.
Science China Math, Topology & Analysis, Peking Mathematical Journal
Compositio Mathematica
– Zentralblatt MATH reviewer
– NSF Grant panelist
– Grant Reviews: Dutch Research Council (2020), NWO Talent Programme (2021)
ISF (2023)
– Co-organizer of Frontiers of Geometric Analysis, Santa Cruz, Summer 2024

University of Iowa

– Member of CLAS Faculty Assembly, 2019–2022

UIowa Math Department

Organizational activities

– Organizer of NSF-RTG undergraduate seminar, Fall 2022
– Co-organizer of Panorama of Geometry and Topology, Sep 2020-ongoing
– Co-organizer of RTG colloquium, 2021-ongoing
– Co-organizer of Topology Seminar, 2019-ongoing
– Co-chair of Math Colloquium, Fall 2018-Spring 2020

– Co-organizer of Graduate Geometry Seminar, 2018-2020

Thesis Defense Committee
– Rebeccah Mackinnon (Summer 2019)
– Mohamed Imad Bakhira (Spring 2021)
– Jose R. Aranda Cuevas (Spring 2021)
– Pedro Valentin De Jesus (Summer 2021)
– Elaina Aceves (Sspring 2022)
– Biao Ma (Spring 2022)
– Anup Poudel (Summer 2022)
– Gilbert Cody (Spring 2023)
– Pravakar Paul (Spring 2023)

COMP Committee
– Anup Poudel (Spring 2019)
– Gilbert Cody (Summer 2020)
– Pravakar Paul (Fall 2020)
– Rebecca Sorsen (Fall 2021)
– Jinyang Wu (Fall 2022)

Mentorship (Graduate students)
– A. Abdul Sattar, 2022-
– Nicholas Cecil, Fall 2022
– Miguel Barquinero, 2021-
– Joseph Sauder, 2019-2021
– Quentin Chediak, AMCS:7990:9903 reading and research, Summer 2020

Departmental Committees
– Hiring Committee 2022-
– Qualifying Exam Committee Aug 21, Jan 22, Aug 22

Other
– First Year Graduate Student Seminar Guest Speaker, Fall 2020
– Undergraduate Research Seminar, Guest Speaker, Spring 2020 and 2021
– Career Development Seminar, Panelist, Fall 2019
– Prospective Graduate Students Orientation, Panelist, Spring 2019
– Several talks at Topology and DG seminars

Public
– Iowa City Math Club (for middle and high school students), Jan 2021-ongoing
– Princeton University ASC interviewer, Fall 2018-ongoing

Other
– Co-organizer of Simons Center-Math Department seminar in Topology and Symplectic Geometry, 2015–2016

– Co-organizer of IAS-PU Symplectic Geometry Seminar, Fall 2010 and 2011-2012
– Co-organizer of Princeton Graduate Seminar, Fall 2008

Talks

– *BPS invariants of log CY fourfolds*
University of Georgia Geometry Seminar Fall 2022

– *Logarithmic structures in symplectic geometry*
University of Georgia and University of Minnesota, Fall 2021

– *Relative Seiberg-Witten invariants and a sum formula*
Texas A&M, Topology Seminar, Winter 2021

– *Deformation theory of pseudoholomorphic curves relative to an snc divisor*
Fukaya Category and Homological Mirror Symmetry conference
in honor of Fukaya's 60th birthday, BICMR & Peking University, Summer 2019

– *Gromov-Witten theory relative to snc divisors*
University of Missouri-Columbia Geometry/Topology Seminar, Spring 2019

– *On moduli spaces of holomorphic curves in symplectic manifolds*
The University of Iowa Math Department Colloquium, Winter 2018

– *Compactification of moduli spaces of J-holomorphic maps relative to snc divisors*
Stony Brook and IAS-PU Symplectic Geometry Seminar, Fall 2017

– *On the compactification problem for moduli spaces of J-holomorphic maps*
Simons Center Colloquium, Fall 2017

– *Log Gromov-Witten theory for symplectic category*
QGM, Arhus University, Denmark, Spring 2017

– *Symplectic normal crossings (sub-)varieties & their smoothings*
QGM, Arhus University, Denmark, Spring 2017

– *Normal crossings divisors and varieties for symplectic topology*
Frontiers in Mathematical Sciences 4th, Iran, Summer 2016

– *Absolute vs. relative Gromov-Witten invariants*
Rutgers University & IAS-Princeton symplectic geometry seminar, Fall 2015

– *Symplectic normal crossings configurations & their smoothings*
UPenn, Stony Brook, & Northern California Symplectic Seminar, Fall 2015;
UCSC, Winter 2016

– *Normal crossings divisors & configurations for symplectic topology*

Columbia University, Fall 2015, & Georgia Topology Conference, Spring 2015

– *Symplectic sum formulas: an overview*
Workshop on moduli spaces of pseudoholomorphic curves,
Simons Center, Spring 2014

– *Counting real curves in Symplectic Manifolds*
IPM, Iran, Summer 2013

– *Real Gromov-Witten theory in genus zero and beyond*
Simons Center, Spring 2013

– *Counting real curves in symplectic manifolds*
University of Michigan and Columbia University, Fall 2012

– *Degeneration techniques in symplectic geometry*
Rochester and Cornell University, Fall 2012

– *Kähler cone & Automorphism group of Calabi-Yau threefolds*
Rutgers University, Fall 2011

– *Open Gromov-Witten theory*
Rutgers University, Fall 2010

– *Lagrangian intersection Floer Homology*
Rutgers University, Fall 2010

– *Open Gromov-Witten theory in Calabi-Yau threefolds*
Columbia University, Fall 2009

– *Lagrangian intersection Floer homology*
BICMR, China, Spring 2009

– *Teichmüller space & Weil-Peterson metric*
IPM, Iran, Spring 2007

Last updated: May 22, 2023