Curriculum Vitae

Aleksey Zinger

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Department of Mathematics
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Research Interests

Geometric properties of Gromov-Witten invariants in algebraic geometry and symplectic topology via analytic and topological methods; connections with enumerative geometry and string theory

Employment

Stony Brook University, Department of Mathematics
Professor, 09/14-Present
Associate Professor, 01/09-08/14
Assistant Professor, 09/05-01/09

Max-Planck-Institut für Mathematik
Visiting Scientist, 09/15-05/16

Institute for Advanced Study, School of Mathematics
Member, 09/11-08/13

Stanford University, Department of Mathematics
NSF Postdoc/Instructor, 09/02-08/05

Education

Massachusetts Institute of Technology (97-02)
Ph.D. in Mathematics, June 02
Thesis Title: *Enumerative Algebraic Geometry via Techniques of Symplectic Topology and Analysis of Local Obstructions*
Thesis Adviser: Tomasz Mrowka

Massachusetts Institute of Technology (93-97)
B.S. in Mathematics with minors in Physics and Economics, June 97

Grants and Honors

NSF Grant, 06/15-05/18
IAS von Neumann Fellowship, 09/11-05/12
NSF CAREER Award, 08/09-08/15
Sloan Research Fellowship, 09/06-09/10
NSF Grant, 07/06-06/10
NSF PostDoctoral Research Fellowship, 09/02-08/05
Clay Math Institute Liftoff Program, Summer 02
Research Assistantship under Tomasz Mrowka, 01-02
NSF Graduate Research Fellowship, 98-01
John A. Bucsela Prize, MIT Department of Mathematics, May 97

Student Advising, etc.

Stony Brook Department of Mathematics

Thesis Advisees: Jingchen Niu (symplectic topology), September 11-present
Alexandra Popa (mirror symmetry), September 08-July 12
Ritwik Mukherjee (enumerative geometry), December 06-December 11

Minor Advisees: Jun Wen (mirror symmetry), October 10-March 11
Mark Hughes (complex geometry), March 10-February 11
Zhiyu Tian (pseudo-holomorphic maps), February 09-May 09
Canor Koca (Morse theory), April 07-February 08
Christopher Bay (spectral sequences), December 06-May 07

Thesis Committees: Yaim Cooper (algebraic geometry), May 13 (Princeton)
Aaron Pixton (algebraic geometry), May 13 (Princeton)
Mohammad Tehrani (symplectic topology), August 12 (Princeton)
Zhiyu Tian (algebraic geometry), April 11
Michael Chance (symplectic topology), July 09
Matt Deland (algebraic geometry), May 09 (Columbia)
Yakov Savelyev (symplectic topology), June 08
Yusuf Mustopa (algebraic geometry), April 08
Emiko Dupont (symplectic topology), July 07
Zhigang Han (symplectic topology), July 06

Oral Exam Committee: Yi Zhu (algebraic geometry), March 09
Gabriel Drummond-Cole (algebraic topology), May 06

Grader of Comprehensive Written Examinations: 01/06, 08/07, 08/09, 01/11, 08/13

Advising at Incoming Student Orientations: Summer 06, 09, 10

Service

Conferences and Seminars co-organized:

IAS-PU Joint Symplectic Geometry Seminar, Fall 12-Spring 13

Stony Brook Mathematics Colloquium, Fall 07-Spring 09

New York Area Symplectic Seminar, Fall 05-Spring 09

24th Annual Geometry Festival, April 17-19, 09, Stony Brook

RTG Workshop on Algebraic and Symplectic Geometry of Uniruled and Rationally Connected Manifolds, Stony Brook, March 1-2, 08

DusaFest (conference in symplectic topology in honor of Dusa McDuff's 60th birthday), Stony Brook, October 12-15, 06

Mini-Workshop at DusaFest (short presentations by young researchers), Stony Brook, October 13, 06

AMS Special Session on New Developments in Symplectic Topology, San Antonio, January 14-15, 06

WAGS (Western Algebraic Geometry Seminar), Stanford, April 19-20, 03

Appointments Committee, Fall 10-Spring 12, Fall 13-Spring 15

Graduate Committee, Fall 10-Spring 12

Math Club Committee, Fall 09-Spring 11

Library Committee, Fall 06-Spring 09

Referee of papers for 19 different journals

NSF Review Panels, 4 times

Teaching

SUNY Stony Brook Department of Mathematics

Course Instructor for MAT127 (Calculus C), Spring 15
MAT566 (Differential Topology), Spring 15
MAT648 (Mirror Symmetry), Fall 14
MAT645 (J-Holomorphic Curves), Spring 14
MAT620 (Enumerative Geometry), Fall 13
MAT127 (Calculus C), Fall 09*, 10*
MAT615 (Complex Geometry II), Spring 09
MAT401 (Intro to Enumerative Geometry), Fall 08
MAT545 (Complex Geometry), Fall 08
MAT614 (Enumerative Geometry), Fall 07
MAT566 (Differential Topology), Fall 06
MAT531 (Differential Geometry), Spring 06, 10, 11
MAT131 (Calculus I), Fall 06
MAT530 (General Topology), Fall 06

*course head and instructor for 2 sections

Stanford Department of Mathematics, Winter and Autumn 04

Course Instructor for Math53 (Ordinary Differential Equations)

MIT Department of Mathematics

Recitation Instructor for 18.02 (Multivariable Calculus), Fall 00
Graduate Tutor for introductory courses, Fall 97 and Spring 98
Undergraduate Tutor for upper-level courses, Fall 96 and Spring 97
introductory courses, Fall 95 and Spring 96
Grader for 18.02 (Multivariable Calculus), Fall 94

MIT Experimental Studies Group, Fall 97

Course Tutor for 18.02 (Multivariable Calculus)

Johns Hopkins Center for Talented Youth Program, Summer 97

Teaching Assistant for high-school geometry

References

Jun Li, Department of Mathematics, Stanford
Rahul Pandharipande, Department of Mathematics, ETH Zürich
Gang Tian, Department of Mathematics, Princeton
Ravi Vakil, Department of Mathematics, Stanford

Publications and Preprints

1. M. Farajzadeh Tehrani and A. Zinger, *Normal crossings degenerations of symplectic manifolds*, math/1603.07661

2. P. Georgieva and A. Zinger, *Real orientations, real Gromov-Witten theory, and real enumerative geometry*, math/1512.07220

3. P. Georgieva and A. Zinger, *On the topology of real bundle pairs over nodal symmetric surfaces*, math/1512.07216

4. J. Niu and A. Zinger, *Lower bounds for the enumerative geometry of positive-genus real curves*, math/1511.02206

5. P. Georgieva and A. Zinger, *Real Gromov-Witten theory in all genera and real enumerative geometry: computation*, math/1510.07568

6. P. Georgieva and A. Zinger, *Real Gromov-Witten theory in all genera and real enumerative geometry: properties*, math/1507.06633

7. P. Georgieva and A. Zinger, *Real Gromov-Witten theory in all genera and real enumerative geometry: construction*, math/1504.06617

8. M. Farajzadeh Tehrani and A. Zinger, *On the refined symplectic sum formula for Gromov-Witten invariants*, math/1412.8205

9. M. Farajzadeh Tehrani and A. Zinger, *On the rim tori refinement of relative Gromov-Witten invariants*, math/1412.8204

10. M. Farajzadeh Tehrani, M. McLean, and A. Zinger, *The smoothability of normal crossings symplectic varieties*, math/1410.2573v2

11. M. Farajzadeh Tehrani, M. McLean, and A. Zinger, *Normal crossings singularities for symplectic topology*, math/1410.0609v3

12. M. Farajzadeh Tehrani and A. Zinger, *Absolute vs. relative Gromov-Witten invariants*, math/1405.2045, to appear in J. Symplectic Geom.

13. M. Farajzadeh Tehrani and A. Zinger, *On symplectic sum formulas in Gromov-Witten theory*, math/1404.1898

14. P. Georgieva and A. Zinger, *A recursion for counts of real curves in $\mathbb{CP}^{2n-1}$: another proof*, math/1401.1750

15. P. Georgieva and A. Zinger, *Enumeration of real curves in $\mathbb{CP}^{2n-1}$ and a WDVV relation for real Gromov-Witten invariants*, math/1309.4079

16. P. Georgieva and A. Zinger, *Orientability in real Gromov-Witten theory*, math/1308.1347

17. P. Georgieva and A. Zinger, *The moduli space of maps with crosscaps: the relative signs of the natural automorphisms*, math/1308.1345, to appear in J. Symplectic Geom.

18. A. Zinger, *Double and triple Givental's J-function for stable quotients invariants*, Pacific J. Math. 272 (2014), no. 2, 439–507

19. A. Zinger, *The determinant line bundle for Fredholm operators: construction, properties, and classification*, math/1304.6368, to appear in Math. Scand.

20. P. Georgieva and A. Zinger, *The moduli space of maps with crosscaps: Fredholm theory and orientability*, Comm. Anal. Geom. 23 (2015), no. 3, 81–140

21. M. Farajzadeh Tehrani and A. Zinger, *Counting genus zero real curves in symplectic manifolds*, Part II, math/1205.1809, to appear in Geom. Topol.

22. J. Chen and A. Zinger, *The robustness of zero-determinant strategies in iterated prisoner's dilemma games*, J. Theoret. Biol. 357 (2014), 46–54

23. Y. Cooper and A. Zinger, *Mirror symmetry for stable quotients invariants*, Mich. Math. J. 63 (2014), no. 3, 571–621

24. A. Zinger, *The genus 0 Gromov-Witten invariants of projective complete intersections*, Geom. Top. 18 (2014), no. 2, 1035-1114

25. A. Zinger, *On transverse triangulations*, Münster J. Math. 5 (2012), 99–106

26. A. Popa and A. Zinger, *Mirror symmetry for closed, open, and unoriented Gromov-Witten invariants*, Adv. Math. 259 (2014), 448–510

27. A. Zinger, *A comparison theorem for Gromov-Witten invariants in the symplectic category*, Adv. Math. 228 (2011), no. 1, 535–574

28. R. Pandharipande and A. Zinger, *Enumerative geometry of Calabi-Yau 5-folds*, *New Developments in Algebraic Geometry, Integrable Systems and Mirror Symmetry*, Advanced Studies in Pure Mathematics 59 (2010), 239–288

29. D. Zagier and A. Zinger, *Some properties of hypergeometric series associated with mirror symmetry*, *Modular Forms and String Duality*, Fields Inst. Commun. 54 (2008), 163–177

30. A. Zinger, *Standard vs. reduced genus-one Gromov-Witten invariants*, Geom. Top. 12 (2008), no. 2, 1203–1241

31. A. Zinger, *Genus-zero two-point hyperplane integrals in the Gromov-Witten theory*, Comm. Analysis Geom. 17 (2010), no. 5, 1–45

32. A. Zinger, *The reduced genus-one Gromov-Witten invariants of Calabi-Yau hypersurfaces*, J. Amer. Math. Soc. 22 (2009), no. 3, 691–737

33. A. Zinger, *Pseudocycles and integral homology*, Trans. AMS 360 (2008), no. 5, 2741–2765

34. A. Zinger, *Intersections of tautological classes on blowups of moduli spaces of genus-one curves*, Mich. Math. 55 (2007), no. 3, 535–560

35. R. Vakil and A. Zinger, *A desingularization of the main component of the moduli space of genus-one stable maps into $\mathbb{P}^n$*, Geom. Top. 12 (2008), no. 1, 1–95

36. R. Vakil and A. Zinger, *A natural smooth compactification of the space of elliptic curves in projective space*, ERA AMS 13 (2007), 53–59

37. J. Li and A. Zinger, *On the genus-one Gromov-Witten invariants of complete intersections*, J. Diff. Geom. 82 (2009), no. 3, 641-690

38. A. Zinger, *Reduced genus-one Gromov-Witten invariants*, J. Diff. Geom. 83 (2009), no. 2, 407–460

39. J. Li and A. Zinger, *On Gromov-Witten invariants of a quintic threefold and a rigidity conjecture*, Pacific J. Math 233 (2007), no. 2, 417–480

40. A. Zinger, *On the structure of certain natural cones over moduli spaces of genus-one holomorphic maps*, Adv. Math. 214 (2007), no. 2, 878–933

41. A. Zinger, *A sharp compactness theorem for genus-one pseudo-holomorphic maps*, Geom. Top. 13 (2009), no. 5, 2427–2522

42. A. Zinger, *Counting rational curves of arbitrary shape in projective spaces*, Geom. Top. 9 (2005), 571–697

43. A. Zinger, *Enumeration of one-nodal rational curves in projective spaces*, Topology 43 (2004), no. 4, 793–829

44. A. Zinger, *Enumeration of genus-three plane curves with a fixed complex structure*, J. Algebraic Geom. 14 (2005), no. 1, 35–81

45. A. Zinger, *Enumeration of genus-two curves with a fixed complex structure in* $\mathbb{P}^2$ *and* $\mathbb{P}^3$, J. Diff. Geom. 65 (2003), no. 3, 341–467

46. A. Zinger, *Enumerative vs. symplectic invariants and obstruction bundles*, J. Sympl. Geom. 2 (2004), no. 4, 445–543

47. A. Zinger, *Completion of Katz-Qin-Ruan's enumeration of genus-two plane curves*, J. Algebraic Geom. 13 (2004), no. 3, 547–561

48. M. Kalka, E. Mann, D. Yang, and A. Zinger, *The exponential decay rate of the lower bound for the first eigenvalue of compact manifolds*, Inter. J. Math. 8 (1997), no. 3, 345-355

Expository Notes

- A. Zinger, *Foundations of Smooth Manifolds and Vector Bundles*, in preparation
- A. Zinger, *The Virtual Fundamental Class in Gromov-Witten Theory: the Li-Tian Construction and Beyond*, in preparation
- A. Zinger, *Equivariant Localization and Mirror Symmetry*, in preparation
- A. Zinger, *Basic Riemannian geometry and Sobolev estimates used in symplectic topology*, math/1012.3980
- A. Zinger, *Counting plane rational curves: old and new approaches*, math/0507105