

Curriculum Vitae
Aleksey Zinger

May 14, 2021

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**Research
Interests** Geometric properties of Gromov-Witten invariants in algebraic geometry
and symplectic topology via analytic and topological methods; mirror
symmetry and other connections with string theory and enumerative geometry

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, 09/20-05/21

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 CAREER and standard grants, 07/06-05/22; total \$1,281,059
Simons Fellowship, 09/20-08/21
IAS von Neumann Fellowship, 09/11-05/12
Sloan Research Fellowship, 09/06-09/10
NSF PostDoctoral Research Fellowship, 09/02-08/05
Clay Math Institute Liftoff Fellowship, Summer 02
NSF Graduate Research Fellowship, 98-01
John A. Bucsela Prize, MIT Department of Mathematics, May 97

PhD Students Stony Brook Department of Mathematics
Xujia Chen^{1,2} (real Gromov-Witten theory), March 17-May 21
Jingchen Niu (pseudoholomorphic curves), September 11-July 16
Alexandra Popa¹ (mirror symmetry), September 08-July 12
Ritwik Mukherjee (enumerative geometry), December 06-December 11
¹Chairman's award for the best research by a finishing student (SBU Math)
²President's award to distinguished doctoral students (SBU)

Postdoc Mentees Penka Georgieva (Princeton/IMJ-PRG), Summer 12-Spring 16
Mohammad Tehrani (SCGP), Fall 13-Spring 17

Teaching Stony Brook Department of Mathematics
Course Instructor for MAT312 (Applied Algebra), Spring 19, Fall 19
MAT320 (Intro to Analysis), Spring 18,19
MAT324 (Real Analysis), Fall 17
MAT542 (Algebraic Topology), Fall 16
MAT648 (Mirror Symmetry), Fall 14
MAT645 (*J*-Holomorphic Curves), Spring 14
MAT620 (Enumerative Geometry), Fall 13
MAT127 (Calculus C), Fall 09*,10*, Spring 15,17*
MAT615 (Complex Geometry II), Spring 09, 20
MAT401 (Intro to Enumerative Geometry), Fall 08,18
MAT545 (Complex Geometry), Fall 08, 19
MAT614 (Enumerative Geometry), Fall 07
MAT566 (Differential Topology), Fall 06, Spring 15,18
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
Course Instructor for Math53 (ODEs), Winter and Autumn 04

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 Ilia Itenberg, IMJ-PRG, France
Jun Li, Department of Mathematics, Stanford
Chiu-Chu Liu, Department of Mathematics, Columbia
Rahul Pandharipande, Department of Mathematics, ETH Zürich
Gang Tian, BICMR, Beijing, and Department of Mathematics, Princeton
Ravi Vakil, Department of Mathematics, Stanford

Other Department and University Service at Stony Brook

- Thesis exam committee member for
 - Mu Zhao, (symplectic topology), July 20
 - Yuhan Sun (symplectic topology), May 20
 - Yuan Gao (symplectic topology), May 18
 - Zhiyu Tian (algebraic geometry), April 11
 - Michael Chance (symplectic topology), July 09
 - Yakov Savelyev (symplectic topology), June 08
 - Yusuf Mustopa (algebraic geometry), April 08
 - Emiko Dupont (symplectic topology), July 07
 - Zhigang Han (symplectic topology), July 06
- Minor topic advisor for the oral graduate student exam for:
 - Dahye Cho (complex geometry), July 17-January 18
 - Jun Wen (mirror symmetry), October 10-March 11
 - Mark Hughes (complex geometry), March 10-February 11
 - Zhiyu Tian (pseudo-holomorphic curves), February 09-May 09
 - Canor Koca (Morse theory), April 07-February 08
 - Christopher Bay (spectral sequences), December 06-May 07
- Department representative for the oral graduate student exam for:
 - Hang Yuan (symplectic topology), May 17
 - Yuhan Sun (symplectic topology), October 16
 - Yi Zhu (algebraic geometry), March 09
 - Gabriel Drummond-Cole (algebraic topology), May 06
- Member of
 - Graduate Committee, Fall 17-present
 - Chair Selection Committee, Fall 18-Spring 19
 - Appointments Committee, Fall 10-Spring 12, Fall 13-Spring 15 (Chair, Fall 14-Spring 15)
 - Simons Lecture Committee, Fall 13-Spring 15
 - Graduate Committee, Fall 10-Spring 12
 - Math Club Committee, Fall 09-Spring 11
 - Library Committee, Fall 06-Spring 09

- Co-organizer of
 - SCGP workshop on *Moduli Spaces of Pseudo-Holomorphic Curves*, March 14
 - *Stony Brook Mathematics Colloquium*, Fall 07-Spring 09
 - *New York Area Symplectic Seminar*, Fall 05-Spring 09
 - *24th Annual Geometry Festival*, April 09
 - RTG Workshop on *Algebraic and Symplectic Geometry of Uniruled and Rationally Connected Manifolds*, March 08
 - *DusaFest* (conference in symplectic topology in honor of D. McDuff's 60th birthday), October 06
 - *Mini-Workshop at DusaFest* (short presentations by young researchers), October 06
- Grader of comprehensive written graduate student exams:
 - 01/06, 08/07, 08/09, 01/11, 08/13, 08/16, 01/18
- Advisor at incoming student orientations: Summer 06,09,10,16-19

Other Professional Service

- Thesis exam committee member for
 - Yaim Cooper (algebraic geometry), Princeton, May 13
 - Aaron Pixton (algebraic geometry), Princeton, May 13
 - Mohammad Tehrani (symplectic topology), Princeton, August 12
 - Matt Deland (algebraic geometry), Columbia, May 09
- Co-organizer of
 - *IAS-PU Joint Symplectic Geometry Seminar*, Princeton, Fall 12-Spring 13
 - AMS Special Session on *New Developments in Symplectic Topology*, San Antonio, January 06
 - *WAGS* (Western Algebraic Geometry Seminar), Stanford, April 03
- Mentor (replacement PhD advisor) for Yaim Cooper, Princeton, Fall 11 - Spring 13
- Referee of papers for 27 different journals
- Reviewer on NSF grant and fellowship panels, 4 times
- Outside grant reviewer for Simons Foundation, NSA, NSERC (Canada), and Israel Science Foundation

Publications

1. X. Chen and A. Zinger, *WDVV-type relations for Welschinger's invariants: applications*, math/1809.08938v3, to appear in Kyoto Math. J.
2. M. Farajzadeh Tehrani and A. Zinger, *On the rim tori refinement of relative Gromov-Witten invariants*, math/1412.8204, to appear in Commun. Cont. Math
3. X. Chen and A. Zinger, *WDVV-type relations for disk Gromov-Witten invariants in dimension 6*, Math. Ann. 379 (2021), no. 3-4, 1231-1313
4. M. Farajzadeh Tehrani and A. Zinger, *On the refined symplectic sum formula for Gromov-Witten invariants*, Internat. J. Math. 31 (2020), no. 4, 2050032, 60 pp
5. A. Zinger, *Some questions in the theory of pseudoholomorphic curves*, *Geometric Analysis, in Honor of Gang Tian's 60th Birthday*, Progress in Math. 333 (2020), 587–616
6. A. Zinger, *Some conjectures on the asymptotic behavior of Gromov-Witten invariants*, *Handbook for Mirror Symmetry of Calabi-Yau and Fano Manifolds*, ALM 47, 523–550, Higher Education Press and International Press, 2019
7. M. Farajzadeh Tehrani and A. Zinger, *Normal crossings degenerations of symplectic manifolds*, Peking Math. J. 2 (2019), no. 3-4, 275–351
8. A. Zinger, *Energy bounds and vanishing results for the Gromov-Witten invariants of the projective space*, J. Geom. Phys. 145 (2019), 103479
9. P. Georgieva and A. Zinger, *Real Gromov-Witten theory in all genera and real enumerative geometry: computation*, J. Diff. Geom. 113 (2019), no. 3, 417-491
10. P. Georgieva and A. Zinger, *Real Gromov-Witten theory in all genera and real enumerative geometry: properties*, J. Symplectic Geom. 17 (2019), no. 4, 1083–1158
11. P. Georgieva and A. Zinger, *Real Gromov-Witten theory in all genera and real enumerative geometry: construction*, Ann. Math. 188 (2018), no. 3, 685-752
12. M. Farajzadeh Tehrani, M. McLean, and A. Zinger, *Normal crossings singularities for symplectic topology*, Adv. Math. 339 (2018), 672-748
13. J. Niu and A. Zinger, *Lower bounds for the enumerative geometry of positive-genus real curves*, Adv. Math. 339 (2018), no. 1, 191–247
14. M. Farajzadeh Tehrani, M. McLean, and A. Zinger, *Singularities and semistable degenerations for symplectic topology*, C. R. Math. Acad. Sci. Paris 356 (2018), no. 4, 420-432
15. P. Georgieva and A. Zinger, *A recursion for counts of real curves in $\mathbb{C}P^{2n-1}$: another proof*, Internat. J. Math. 29 (2018), no. 4, 1850027, 21pp
16. P. Georgieva and A. Zinger, *Enumeration of real curves in $\mathbb{C}P^{2n-1}$ and a WDVV relation for real Gromov-Witten invariants*, Duke Math. 166 (2017), no. 17, 3291-3347

17. P. Georgieva and A. Zinger, *Real orientations, real Gromov-Witten theory, and real enumerative geometry*, ERA MS 24 (2017), 87–99
18. P. Georgieva and A. Zinger, *On the topology of real bundle pairs over nodal symmetric surfaces*, Topology Appl. 214 (2016), 109–126
19. M. Farajzadeh Tehrani and A. Zinger, *Absolute vs. relative Gromov-Witten invariants*, J. Symplectic Geom. 14 (2016), no. 4, 1189–1250
20. P. Georgieva and A. Zinger, *The moduli space of maps with crosscaps: the relative signs of the natural automorphisms*, J. Symplectic Geom. 14 (2016), no. 2, 359–430
21. A. Zinger, *The determinant line bundle for Fredholm operators: construction, properties, and classification*, Math. Scand. 118 (2016), no. 2, 203–268
22. M. Farajzadeh Tehrani and A. Zinger, *Counting genus zero real curves in symplectic manifolds, Part II*, Geom. Topol. 20 (2016), no. 2, 629–695
23. 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
24. A. Zinger, *Double and triple Givental’s J -function for stable quotients invariants*, Pacific J. Math. 272 (2014), no. 2, 439–507
25. J. Chen and A. Zinger, *The robustness of zero-determinant strategies in iterated prisoner’s dilemma games*, J. Theoret. Biol. 357 (2014), 46–54
26. Y. Cooper and A. Zinger, *Mirror symmetry for stable quotients invariants*, Mich. Math. J. 63 (2014), no. 3, 571–621
27. A. Zinger, *The genus 0 Gromov-Witten invariants of projective complete intersections*, Geom. Top. 18 (2014), no. 2, 1035–1114
28. A. Popa and A. Zinger, *Mirror symmetry for closed, open, and unoriented Gromov-Witten invariants*, Adv. Math. 259 (2014), 448–510
29. A. Zinger, *On transverse triangulations*, Münster J. Math. 5 (2012), 99–106
30. A. Zinger, *A comparison theorem for Gromov-Witten invariants in the symplectic category*, Adv. Math. 228 (2011), no. 1, 535–574
31. 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
32. A. Zinger, *Genus-zero two-point hyperplane integrals in the Gromov-Witten theory*, Comm. Analysis Geom. 17 (2010), no. 5, 1–45
33. A. Zinger, *The reduced genus-one Gromov-Witten invariants of Calabi-Yau hypersurfaces*, J. Amer. Math. Soc. 22 (2009), no. 3, 691–737
34. J. Li and A. Zinger, *On the genus-one Gromov-Witten invariants of complete intersections*, J. Diff. Geom. 82 (2009), no. 3, 641–690

35. A. Zinger, *Reduced genus-one Gromov-Witten invariants*, J. Diff. Geom. 83 (2009), no. 2, 407–460
36. A. Zinger, *A sharp compactness theorem for genus-one pseudo-holomorphic maps*, Geom. Top. 13 (2009), no. 5, 2427–2522
37. 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
38. A. Zinger, *Standard vs. reduced genus-one Gromov-Witten invariants*, Geom. Top. 12 (2008), no. 2, 1203–1241
39. A. Zinger, *Pseudocycles and integral homology*, Trans. AMS 360 (2008), no. 5, 2741–2765
40. 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
41. A. Zinger, *Intersections of tautological classes on blowups of moduli spaces of genus-one curves*, Mich. Math. 55 (2007), no. 3, 535–560
42. R. Vakil and A. Zinger, *A natural smooth compactification of the space of elliptic curves in projective space*, ERA AMS 13 (2007), 53–59
43. 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
44. 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
45. A. Zinger, *Counting rational curves of arbitrary shape in projective spaces*, Geom. Top. 9 (2005), 571–697
46. A. Zinger, *Enumeration of genus-three plane curves with a fixed complex structure*, J. Algebraic Geom. 14 (2005), no. 1, 35–81
47. A. Zinger, *Enumeration of one-nodal rational curves in projective spaces*, Topology 43 (2004), no. 4, 793–829
48. A. Zinger, *Enumerative vs. symplectic invariants and obstruction bundles*, J. Sympl. Geom. 2 (2004), no. 4, 445–543
49. A. Zinger, *Completion of Katz-Qin-Ruan’s enumeration of genus-two plane curves*, J. Algebraic Geom. 13 (2004), no. 3, 547–561
50. 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
51. 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

Other Research Preprints on arXiv

1. A. Zinger, *Real topological recursions and WDVV relations*, math/2003.05860
2. M. Farajzadeh Tehrani, M. McLean, and A. Zinger, *Normal crossings singularities for symplectic topology, II*, math/1908.09390
3. X. Chen and A. Zinger, *Spin/Pin-Structures and Real Enumerative Geometry*, math/1905.11316v4
4. A. Zinger, *Real Ruan-Tian perturbations*, math/1701.01420
5. M. Farajzadeh Tehrani, M. McLean, and A. Zinger, *The smoothability of normal crossings symplectic varieties*, math/1410.2573v2
6. P. Georgieva and A. Zinger, *Orientability in real Gromov-Witten theory*, math/1308.1347 (superseeded by Publ. 11)

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, *Notes on J-holomorphic maps*, math/1706.00331
- M. Farajzadeh Tehrani and A. Zinger, *On symplectic sum formulas in Gromov-Witten theory*, math/1404.1898
- 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