

# Akram S. Alishahi

## *Curriculum Vitae*

🏠 Room 613, MC 4430  
2990 Broadway  
New York, NY 10027

☎ (+1) 212-854-2192  
✉ alishahi@math.columbia.edu

### ACADEMIC POSITIONS

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Ritt Assistant Professor <i>Columbia University, New York, NY</i>	JUL 2015 – PRESENT
Postdoctoral Research Fellow <i>Max Planck Institute for Mathematics, Bonn, Germany</i>	MAR 2014 – JUN 2015
Student Researcher <i>Max Planck Institute for Mathematics, Bonn, Germany</i>	NOV 2013 – FEB 2014
Student Researcher <i>Institute for Research in Fundamental Sciences (IPM), Tehran, Iran</i>	OCT 2009 – SEP 2013
Visiting Student and Research Collaborator <i>Princeton University, Princeton, NJ</i>	JAN 2012 – MAY 2012
Program associate in “Homology Theories of Knots and Links” <i>Mathematical Science Research Institute, MSRI, Berkeley, CA</i>	FEB 2010 – MAR 2010

### EDUCATION

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Ph.D. in Mathematics, Advisors: Eaman Eftekhary, Alireza Bahraini

Feb 2009–Feb 2014 Sharif University of Technology (Iran)

M.Sc. in Mathematics

Sep 2007–Feb 2009 Sharif University of Technology (Iran)

B.S. in Mathematics

Sep 2004–Jun 2007 Sharif University of Technology (Iran)

### RESEARCH INTEREST

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- Low dimensional topology: Heegaard Floer homology and knot homology theories
- Contact and symplectic geometry

### PUBLICATIONS

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#### PAPERS

1. With N. Dowlin, *A link invariant related to Khovanov homology and knot Floer homology*, ArXiv:1810.13406, 53 pages.
2. With E. Eftekhary, *Knot Floer homology and the unknotting number*, ArXiv:1810.05125, 18 pages, submitted.
3. With N. Dowlin, *The Lee spectral sequence, unknotting number, and the knight move conjecture*, accepted to Topology and its Applications, ArXiv:1710.07875, 12 pages.
4. *Unknotting number and Khovanov homology*, ArXiv:1710.07874, accepted to Pacific Journal of Mathematics, 15 pages.

5. With R. Lipshitz *Bordered Floer homology and incompressible surfaces*, accepted to Ann. Inst. Fourier, ArXiv:1708.05121, 36 pages.
6. With E. Eftekhary *Tangle Floer homology and cobordisms between tangles*, ArXiv:1610.07122, 66 pages, submitted.
7. With E. Eftekhary *A refinement of sutured Floer homology*, J. Symplectic Geom., 13(3): 609-743, 2015
8. With E. Eftekhary *On the construction of sutured Floer complex*, Proceeding of 20th Gokova Geometry-Topology conference 97-109.

## THESIS

- PhD thesis on “*Heegaard Floer homology and the sutured manifolds*” (in Persian),  
*Advisors:* Eaman Eftekhary, Alireza Bahraini, Feb 2014.
- Master thesis on “*Seiberg-Witten invariants and low dimensional topology*” (in Persian),  
*Advisors:* Eaman Eftekhary, Alireza Bahraini, Feb 2009.

## AWARDS AND GRANTS

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- NSF Topology grant: DMS-1811210, *Principal investigator*, July 2018-June 2021  
*Title: Homological Invariants in Low Dimensional Topology*
- Junior Faculty Teaching Excellence Award, Columbia University Mathematics Department, 2017
- Outstanding Student: awarded to 2 or 3 top students and guarantees admission without entrance exam to the Ph.D. program, Sharif University of Technology (Iran), 2008
- Outstanding Student: awarded to 2 or 3 top students and guarantees admission without entrance exam to the M.Sc. program, Sharif University of Technology (Iran), 2007
- Silver Medal in the National Mathematical Olympiad for high school students, 2003

## CONFERENCE TALKS

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UCLA Topology workshop 2018 <i>Bordered Floer homology and compressibility</i>	January 2018
Western Sectional Meeting of the AMS, University of Denver <i>Heegaard Floer homology for tangles and tangle cobordisms</i>	October 2016
Homological invariants in low dimensional topology, IPM <i>Heegaard Floer homology for tangles and tangle cobordisms</i>	August 2016
Frontiers in Mathematical Sciences, Sharif University of Technology <i>Heegaard Floer homology for tangles and tangle cobordisms</i>	July 2016
Topology and invariants of 4-manifolds, Simons center for geometry and physics <i>Cobordisms between tangles</i>	August 2014
Frontiers in Mathematical Sciences, Sharif University of Technology <i>A refinement of sutured Floer homology</i>	December 2012

## SEMINAR AND COLLOQUIUM TALKS

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Joint GT-UGA geometry and topology seminar, University of Georgia <i>Homological knot invariants and the unknotting number</i>	August 2018
Geometry and Topology seminar, Binghamton University <i>Khovanov homology and unknotting number</i>	April 2018
Geometry/Topology seminar, Duke <i>Trivial tangles, compressible surfaces and Floer homology</i>	April 2018
Topology and Symplectic Geometry seminar, Stony Brook University <i>Trivial tangles, compressible surfaces and Floer homology</i>	March 2018
Topology seminar, University of Oregon <i>Trivial tangles, compressible surfaces and Floer homology</i>	March 2018
Topology seminar, Princeton University <i>Trivial tangles, compressible surfaces and Floer homology</i>	February 2018
Colloquium, Rutgers University-Newark <i>Khovanov homology and unknotting number</i>	February 2018
Undergraduate Mathematics Society seminar, Columbia University <i>Slice knots and concordance group</i>	November 2017
Topology Seminar, Caltech <i>Heegaard Floer homology for tangles and cobordisms between them</i>	February 2017
Topology Seminar, Princeton University <i>Heegaard Floer homology for tangles and cobordisms between them</i>	November 2015
Topology Seminar, UCLA <i>Heegaard Floer homology for tangles and cobordisms between them</i>	November 2015
Topology in Pairs seminar, MPIM <i>Heegaard Floer theory for 3-manifolds, tangles and cobordisms between them</i>	June 2015
Topology and Geometry seminar, IPM <i>On Heegaard Floer homology for tangles and associated cobordism maps</i>	February 2015
Algebraic and Symplectic geometry seminar, Oxford University <i>Tangle Floer homology and cobordisms between tangles</i>	November 2014
"Sarenakh" Seminar, Sharif University of Technology <i>Knot invariants and the topology of 3-manifolds</i>	October 2012
Topology seminar, Brandeis University <i>A refinement of sutured Floer homology</i>	February 2012
Topology and Geometry seminar, IPM <i>On sutured Floer homology</i>	August 2010
Topology and Geometry seminar, IPM <i>Seiberg-Witten invariants and 4-manifolds</i>	December 2009

## TEACHING EXPERIENCE

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### INSTRUCTOR

#### *Columbia University*

Fall 2018	Calculus III (169 students)
Spring 2018	Algebraic Topology II (Graduate course, 9 students)
Fall 2017	Calculus III (82 students)
Spring 2017	Introduction to algebraic topology (8 students)
Fall 2016	Calculus III (125 students)
Summer 2016	Ordinary differential equations (16 students)
Spring 2016	Linear algebra (80 students)
Fall 2015	Calculus II (17 students)

#### *Sharif University of Technology*

Spring 2011	Elementary differential equations
Fall 2009	An introduction to linear algebra
Fall 2008	An introduction to linear algebra

### INDEPENDENT STUDY SUPERVISION

#### *Columbia University*

Spring 2018	independent reading course in "Morse theory and h-cobordism theorem"
Spring 2017	independent reading course in "Knot Theory"
Spring 2016	independent reading course in "Morse Theory"

### TEACHING ASSISTANT

#### *Sharif University of Technology (Iran)*

Fall 2012	Differential topology
Fall 2010	Geometry of manifolds
Spring 2009	Analysis I
	Complex analysis
Spring 2008	Calculus II
	Elementary differential geometry II
Fall 2007	Elementary differential geometry I
Fall 2005	Foundations of mathematics

### HIGHSCHOOL TEACHER

#### *Farzanegan highschool, Tebran, Karaj, Shiraz, Mashhad (Iran)*

Fall 2009	Geometry and Combinatorics for IMO prepration
Spring 2008	Geometry, Combinatorics and Number theory for IMO prepration
Fall 2007	Geometry, Combinatorics and Number theory for IMO prepration

### SERVICES AND OTHER ACTIVITIES

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Mentorship	- REU project at Columbia University, Joint with Linh Truong (6 Students)	Summer 2018
Conference Organizer	- Homological invariants in low dimensional topology workshop, Institute for Research in Fundamental Sciences (IPM), Tehran, Iran	August 2016
Seminar Organizer	- Symplectic Geometry, Gauge Theory, and Categorification Seminar, Columbia University	2016-present
	- Student/ Low dimensional topology reading seminar, Columbia University	2016-2017
	- Student/ Knot invariants reading seminar, Sharif University of Technology	2012

Referee	-	Proceedings of the London Mathematical Society	2017
Others	-	Departmental representative (official faculty contact and organizer) for Columbia Summer Session in Mathematics	Summer 2017
	-	PhD Dissertation Committee Member for 2 students, Columbia University	2017-2018
	-	Teacher, National Olympiad summer camp, Tehran	2005-2006