

DAVID SHEA VELA-VICK

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RESEARCH INTERESTS

DIFFERENTIAL GEOMETRY: contact and symplectic geometry, Riemannian geometry

GEOMETRIC TOPOLOGY: low-dimensional topology, knot theory

ACADEMIC APPOINTMENTS

COLUMBIA UNIVERSITY	New York, NY
NSF Postdoctoral Fellow	2009-
Sponsoring Scientist: Peter Ozsváth	
MATHEMATICAL SCIENCE RESEARCH INSTITUTE	Berkeley, CA
Research Member	2009-2010
GEORGIA INSTITUTE OF TECHNOLOGY	Atlanta, GA
Visiting Scholar	Fall 2007

EDUCATION

UNIVERSITY OF PENNSYLVANIA	Philadelphia, PA
Ph.D. in Mathematics, May 2009	
Advisor: John B. Etnyre	
RICE UNIVERSITY	Houston, TX
B.A. in Mathematics <i>magna cum laude</i> , May 2004	

HONORS AND AWARDS

NSF MATHEMATICAL SCIENCES POSTDOCTORAL RESEARCH FELLOWSHIP	2009-
Columbia University	
CHAUVENET PRIZE FOR EXPOSITORY MATHEMATICAL WRITING	2012
Awarded by the Mathematical Association of America for <i>The Four Vertex Theorem and its Converse</i> , published in the Notices of the AMS.	
DEAN'S AWARD FOR DISTINGUISHED TEACHING BY A GRADUATE STUDENT	Spring 2009
University of Pennsylvania	
PENN PRIZE FOR EXCELLENCE IN TEACHING	Fall 2005
Honorable Mention: University of Pennsylvania	
DEPARTMENTAL GOOD TEACHING AWARD	2005, 2006, 2008
University of Pennsylvania	
BENJAMIN FRANKLIN FELLOWSHIP	2004-2009
University of Pennsylvania	

FRANK JONES SCHOLARSHIP
Rice University

Summer 2003

PUBLICATIONS

ON THE TRANSVERSE INVARIANT FOR BINDINGS OF OPEN BOOKS

J. Differential Geom. **88** (2011), no. 3, 533-552, [arXiv:0806.1729\[math.SG\]](#).

LEGENDRIAN CONTACT HOMOLOGY AND NONDESTABILIZABILITY

Joint with Clayton Shonkwiler: *J. Symplectic Geom.* **9** (2011), no. 1, 33-44,
[arXiv:0910.3914\[math.GT\]](#).

HIGHER-DIMENSIONAL LINKING INTEGRALS

Joint with Clayton Shonkwiler: *Proc. Amer. Math. Soc.* **139** (2011), no. 4, 1511-1519,
[arXiv:0801.4022\[math.GT\]](#).

TORSION AND OPEN BOOK DECOMPOSITIONS

Joint with John B. Etnyre: *Int. Math. Res. Not.* (2010), no. 2, 4385-4398,
[arXiv:0909.3465\[math.SG\]](#).

TRIPLE LINKING NUMBERS, HOPF INVARIANTS AND INTEGRAL FORMULAS FOR THREE-COMPONENT LINKS

Joint with Dennis DeTurck, Herman Gluck, Rafal Komendarczyk, Paul Melvin, and Clayton Shonkwiler: *Mat. Contemp.* **34** (2008), 251-283 [arXiv:0901.1612\[math.GT\]](#).

THE FOUR VERTEX THEOREM AND ITS CONVERSE

Joint with Dennis DeTurck, Herman Gluck, and Daniel Pomerleano: *Notices Amer. Math. Soc.* **54** (2007), no. 2, 192-207, [arXiv:0609268\[math.DG\]](#).

PREPRINTS

ON THE EQUIVALENCE OF LEGENDRIAN AND TRANSVERSE INVARIANTS IN KNOT FLOER HOMOLOGY

Joint with John A. Baldwin and Vera Vértési: Submitted [arXiv:1112.5970\[math.SG\]](#).

GENERALIZED GAUSS MAPS AND INTEGRALS FOR THREE-COMPONENT LINKS

Joint with Dennis DeTurck, Herman Gluck, Rafal Komendarczyk, Paul Melvin, and Clayton Shonkwiler: Submitted [arXiv:1101.3374\[math.GT\]](#).

IN PREPARATION

BORDERED SUTURED FLOER HOMOLOGY AND INVARIANTS OF LEGENDRIAN AND TRANSVERSE KNOTS

Joint with John B. Etnyre and Rumen Zarev: ETA Spring 2012 – Draft Available

GENERALIZED GAUSS MAPS AND INTEGRALS FOR THREE-COMPONENT LINKS: PART II

Joint with Dennis DeTurck, Herman Gluck, Rafal Komendarczyk, Paul Melvin, Haggai Nuchi, and Clayton Shonkwiler: ETA Spring 2012 – Draft Available

RULING INVARIANTS AND AUGMENTATIONS OF BORDERED LEGENDRIAN KNOTS

Joint with Joshua Sabloff and Clayton Shonkwiler: ETA Spring 2012

LEGENDRIAN AND TRANSVERSE INVARIANTS IN HEEGAARD FLOER HOMOLOGY: A SURVEY

Joint with John A. Baldwin: ETA Summer 2012

CONTACT GEOMETRY AND HEEGAARD FLOER INVARIANTS OF NONCOMPACT 3-MANIFOLDS

Joint with John B. Etnyre and Rumen Zarev: ETA Summer 2012

THE GEOMETRY OF TRIPLE LINKING: A SURVEY

Joint with Dennis DeTurck, Herman Gluck, Rafal Komendarczyk, Paul Melvin, Haggai Nuchi, and Clayton Shonkwiler: ETA Summer 2012 – Draft Available

 CONFERENCE, COLLOQUIUM AND SERIES TALKS

RECOVERING $\text{HFK}^-(Y, K)$ FROM SUTURED FLOER HOMOLOGY AND CONTACT INVARIANTS FOR OPEN 3-MANIFOLDS BIRS Workshop: Banff, Canada	Spring 2011
RECOVERING $\text{HFK}^-(Y, K)$ FROM SUTURED FLOER HOMOLOGY AND CONTACT INVARIANTS FOR OPEN 3-MANIFOLDS AMS Sectional Meeting: Georgia Southern University	Spring 2011
RECOVERING $\text{HFK}^-(Y, K)$ FROM SUTURED FLOER HOMOLOGY AND CONTACT INVARIANTS FOR OPEN 3-MANIFOLDS Joint Meetings: New Orleans, LA	Fall 2010
ARNOLD'S DREAM: A SEARCH FOR HIGHER ORDER HELICITY INVARIANTS Colloquium: Rice University	Fall 2010
RECOVERING $\text{HFK}^-(Y, K)$ FROM SUTURED FLOER HOMOLOGY AND CONTACT INVARIANTS FOR OPEN 3-MANIFOLDS PATCH Seminar: Temple University	Fall 2010
PONTRYAGIN INVARIANTS AND INTEGRAL FORMULAS FOR MILNOR'S TRIPLE LINKING NUMBER Knot Concordance and Homology Cobordism Workshop, Wesleyan University	Summer 2010
LEGENDRIAN CONTACT HOMOLOGY AND NONDESTABILIZABILITY Istanbul Contact Geometry and Topology Workshop: Bogazici University	Summer 2010
LECTURES ON BORDERED FLOER HOMOLOGY Geometry-Topology Reading Seminar: Georgia Tech	Fall 2009
TRANSVERSE INVARIANTS AND BINDINGS OF OPEN BOOKS AMS Sectional Meeting: North Carolina State University	Spring 2009
TRIPLE LINKING NUMBERS, AMBIGUOUS HOPF INVARIANTS AND INTEGRAL FORMULAS FOR THREE-COMPONENT LINKS Haverford College Colloquium	Spring 2009
ON THE TRANSVERSE INVARIANT FOR BINDINGS OF OPEN BOOKS AMS Sectional Meeting: Wesleyan University	Fall 2008
LEGENDRIAN AND TRANSVERSE LINK INVARIANTS AIM Workshop: Palo Alto, CA	Fall 2008

 SEMINAR TALKS

2011

• Harvard University; Cambridge, MA • SUNY at Stony Brook; Stony Brook, NY • University of Georgia; Athens, GA • Columbia University; New York, NY • SUNY at Stony Brook; Stony Brook, NY

2010

• University of Pennsylvania; Philadelphia, PA • Columbia University; New York, NY • Rice University; Houston, TX • Tulane University; New Orleans, LA

2009

• University of Massachusetts; Amherst, MA • Rice University; Houston, TX • Rochester University; Rochester, NY • Duke University; Durham, NC • Georgia Institute of Technology; Atlanta, GA • Wesleyan University; Middletown, CT • Texas Christian University; Fort Worth, TX (two talks) • Eidgenössische Technische Hochschule; Zürich, Switzerland • University of Pennsylvania; Philadelphia, PA

2008

- Temple University; Philadelphia, PA • University of Southern California; Los Angeles, CA • University of Georgia; Athens, GA • University of Pennsylvania; Philadelphia, PA

2006

- Georgia Institute of Technology; Atlanta, GA • University of Georgia; Athens, GA • University of Pennsylvania; Philadelphia, PA • PACT Seminar; Philadelphia, PA

TEACHING EXPERIENCE

REU SUPERVISOR

- 2011** • Noncommutative Knot Invariants – Columbia University
- 2010** • Abelianized Characterized of Legendrian Knots – Columbia University

COURSE INSTRUCTOR

- 2011** • Linear Algebra • Calculus I • Independent Study in Noncommutative Knot Theory (two students) – Columbia University
- 2010** • Calculus II (two sections) – Columbia University
- 2007** • Calculus III – University of Pennsylvania
- 2006** • Calculus I – University of Pennsylvania

COURSE TEACHING ASSISTANT

- Contact Geometry in Low-Dimensions – Park City Mathematics Institute
- Algebraic Topology • Honors Calculus • Calculus III • Calculus II • Ideas in Mathematics – University of Pennsylvania

PROFESSIONAL SERVICE

UNDERGRADUATE RESEARCH AND MENTORSHIP

- Research supervisor for Eden Prywes, John Schultz and Josh Tobin – Columbia University, Fall 2011 • REU supervisor for Rankeya Datta, Stephen Fitz, Eden Prywes, John Schultz, Josh Tobin and Kitty Yang – Columbia University, Summer 2011 • REU supervisor for Atanas Atanasov, Jeffery Irwin, Daniel Kotzen, Christopher Lopez and Eliot Wycoff – Columbia University, Summer 2010 • Mentor to Dimitri Dziabenko and Nick Watson as part of the Undergraduate Seminar – University of Pennsylvania, Spring 2009

CONFERENCES, SEMINARS AND PANELS CO-ORGANIZED

- 2011 Geometry Festival; University of Pennsylvania • Undergraduate Seminar; University of Pennsylvania • Low-Dimensional Topology Seminar; University of Pennsylvania • Graduate Student General Seminar; University of Pennsylvania • Landing a Job: A panel discussion on the application process; University of Pennsylvania

CURRICULUM DEVELOPMENT

- Together with Asher Auel and Andrew Obus, spearheaded the development of the University of Pennsylvania's Math 116/260, a rigorous introduction to calculus.

ADMINISTRATION

- Contributor, Founding Editorial Board Member: AMS Graduate Student Blog • Representative: Graduate Student Associations Council; University of Pennsylvania

REFEREE

- Journal of Topology • Pacific Journal of Mathematics • Algebraic and Geometric Topology

REVIEWER

- Math Reviews • Zentralblatt MATH
-

VOLUNTEER

- Rice Alumni Volunteer for Admission

PROFESSIONAL MEMBERSHIPS

AMERICAN MATHEMATICAL SOCIETY	2003-
MATHEMATICAL ASSOCIATION OF AMERICA	2008-
PHI BETA KAPPA	2004-

REFERENCES

John B. Etnyre Georgia Institute of Technology	Thesis Advisor
Herman Gluck University of Pennsylvania	Research Reference
Ko Honda University of Southern California	Research Reference
Peter Ozsváth Princeton University	Research Reference
Paul Melvin Bryn Mawr College	Research Reference
Michael Thaddeus Columbia University	Teaching Reference
