

Curriculum Vitae
THEO JOHNSON-FREYD
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Education

2007– **Ph.D. Candidate in Mathematics**, University of California, Berkeley
Supervisor: N. Reshetikhin

2003–07 **B.S. in Mathematics**, Stanford University, *with distinction*
Supervisor: R. Vakil

2001–03 Non-matriculated, University of Oregon

As visitor

2011 Spring Northwestern University (Evanston, IL).

2009 Fall Center for the Topology and Quantization of Moduli Spaces (Århus, Denmark).

Selected Honors and Grants

2010. Graduate Division Summer Grant, UC Berkeley

2009. Honorable Mention, Ford Foundation Predoctoral Fellowship

2007–09. Honorable Mention, NSF Graduate Research Fellowship Program

2006. Top 26, William Lowell Putnam Mathematical Competition

2004. President's Award for Academic Excellence, Stanford University

2003–07. Scholarship, Robert C. Byrd Honors Scholar

2003–04. National Merit Scholarship

2003. Top 200, William Lowell Putnam Mathematical Competition

Research Interests

Mathematical physics, quantum field theory, representation theory, category theory

Publications and Preprints

1. *Berkeley Lectures on Lie Groups and Quantum Groups* (with R. Borchers, A. Geraschenko, M. Haiman, N. Reshetikhin, and V. Serganova). Draft of *Part I: Lie Groups* available at math.berkeley.edu/~theojf/LieQuantumGroups.pdf
2. The fundamental pro-groupoid of an affine 2-scheme (with A. Chirvasitu). *Applied Categorical Structures*. 2011. DOI:10.1007/s10485-011-9275-y. arXiv:1105.3104
3. How to derive Feynman diagrams for finite-dimensional integrals directly from the BV formalism (with O. Gwilliam). 2011. <http://math.berkeley.edu/~theojf/BVexample.pdf>
4. The formal path integral and quantum mechanics. *Journal of Mathematical Physics*. 51, 122103 (2010). DOI:10.1063/1.3503472. arXiv:1004.4305
5. On the coordinate (in)dependence of the formal path integral. 2010. arXiv:1003.5730

6. Feynman-diagrammatic description of the asymptotics of the time evolution operator in quantum mechanics. *Letters in Mathematical Physics*. 94(2):123–149 (2010). DOI:10.1007/s11005-010-0424-2. arXiv:1003.1156
7. Extended limits, non-standard analysis, and the Stone-Čech compactification (with K. Ross).

In preparation

- BRST gauge-fixed integrals for Lie algebroids and Q-manifolds (with D. Berwick Evans).
- Etingof-Kazhdan via Quantum Field Theory (with O. Gwilliam).
- One-dimensional factorization algebras with boundary

Selected Lectures

- 2012 Northeastern (Representation Theory): Wick-type theorems beyond the Gaussian
UC Berkeley (GRASP): Twisted $\mathcal{N} = 1$ and $\mathcal{N} = 2$ supersymmetry on \mathbb{R}^4
- 2011 Zürich (Talks in Mathematical Physics): Gauge-fixed integrals for Lie algebroids
Zürich (Classical and quantum geometry): Introduction to BV Integrals
UC Berkeley (GRASP): Asymptotics of oscillating integrals via homological perturbation theory
UC Berkeley (Witten): BRST Gauge Fixing: I. Introduction to Q-manifolds and BRST. II. Chern-Gauss-Bonnet, Morse Theory, and topological sigma models
U of Oregon (Cluster Algebras and Lusztig’s Semicanonical Basis): (Topological) duality of Hopf algebras
Northwestern (Geometry and Physics): Homological perturbation and factorization algebras
Northwestern (NUMS): On Atoms, Mountains, and Rain
UT Austin (GADGET): Feynman Diagrams for Schrodinger’s Equation
UC Berkeley (Student String Topology): E2 operad, Gerstenhaber and BV, and Formality
- 2010 UC Berkeley (Student Subfactors): Introduction to Tannaka-Krein theory
UC Berkeley (GRASP): Formal calculus, with applications to quantum mechanics
UC Berkeley (GRASP): Introduction to Vassiliev invariants
UC Berkeley (Subfactors): How to quantize infinitesimally-braided symmetric monoidal categories
UC Berkeley (Subfactors): The formal path integral in quantum mechanics
- 2009 Aarhus Universitet (Ph.d. seminar): What the hell is a Feynman diagram?
UC Berkeley (Many Cheerful Facts): On atoms, mountains, and rain
- 2008 Canada/USA Mathcamp: Combinatorial calculus, from Taylor series to Feynman diagrams
- 2007 UC Berkeley (QFT Mini Conference): Enriching Yoneda
UC Berkeley (Many Cheerful Facts): Divergent series
Canada/USA Mathcamp: Topics in quantum mechanics
- 2006 Canada/USA Mathcamp: Lies and estimations and order-of-magnitude physics

Professional Activities

- Reviewer for Mathematical Reviews.

- Co-organizer (with H. Williams) of weekly Geometry, Representations, And Some Physics (GRASP) graduate-student seminar at UC Berkeley.
- Co-organizer (with D. Berwick-Evans) of twice-weekly “Witten in the 80s” graduate student seminar at UC Berkeley, Fall 2011.
- Co-organizer (with N. Reshetikhin and H. Williams) for workshop on Representation Theory and Geometry at UC Berkeley, September 2011.

Teaching Activities

- 2011 Fall. Guest lecturer for Calculus (Math 1B) with N. Reshetikhin
- 2010 Spring. Guest lecturer for Precalculus (Math 32) with R. Bayer
- 2009 Summer. Guest lecturer for Complex Analysis (Math 185) with N. Reshetikhin
- 2009 Summer. Instructor for Second-semester Calculus (Math 1B)
Lectured, prepared homework and exams, etc. math.berkeley.edu/~theo/f/09Summer1B/
- 2009 Spring. Teaching assistant for First-semester Calculus (Math 1A) with Z. Stankova
Taught section 6 hours a week, held office hours, graded exams.
- 2008 Fall. Teaching assistant for Precalculus (Math 32) with C. Mitchell
Taught section 6 hours a week, held office hours, graded exams.
- 2008 Summer. Instructor for Second-semester Calculus (Math 1B)
Lectured, prepared homework and exams, etc. math.berkeley.edu/~theo/f/08Summer1B/
- 2008 Spring. Teaching assistant for Multivariable Calculus (Math 53) with J. Neu
Taught section 6 hours a week, held office hours, graded exams.
- 2007 Fall. Teaching assistant for Second-semester Calculus (Math 1B) with N. Reshetikhin
Taught section 6 hours a week, held office hours, graded exams.
- 2007 Fall. Attended Berkeley Mathematics Department training course for graduate student instructors, and the UC Berkeley Teaching Conference.
- 2007 Winter. Grader for Set Theory (Math 161) with M. Young
Held office hours, graded homework.
- 2006–2007 . Tutoring Coordinator, Stanford Undergrad Mathematics Organization
- 2006 Winter. Grader for Linear Algebra and Matrix Theory (Math 113) with R. Vakil
Held office hours, graded homework.
- 2005 Summer. Residential Counselor, Canada/USA Mathcamp
- 2004–2007. Tutor, Stanford Undergrad Mathematics Organization
- 2001–2003. Tutor, Academic Learning Services, University of Oregon