Dror Bar-Natan — Curriculum Vitae

Web := `http://www.math.toronto.edu/~drorbn`

See a fully linked version at Web/Profile/BarNatanCV.pdf

Last updated: Apr. 18, 2009

- Email: drorbn@math.toronto.edu; Phone: +1-416-946-5438; Fax: +1-416-978-4107;

- **Age now:** 43. Born January 30th, 1966. Married to Yael, father of Assaf and Itai. Holds Israeli and US citizenships and Canadian permanent residency.
- **1982–1984:** B.Sc. in mathematics, Tel Aviv University, *summa cum laude*.
- **1984–1987:** Military service (taught high school level mathematics).
- **1987–1991:** Ph.D. in mathematics, Princeton University. Title: *Perturbative aspects of the Chern-Simons topological quantum field theory.* Advisor: Professor Edward Witten.
- **1991–1995:** Benjamin Peirce Assistant Professor at Harvard University.
- **1995–1997:** Senior Lecturer of Mathematics at the Hebrew University, Jerusalem.
- **1997–2004:** Associate Professor of Mathematics at the Hebrew University, Jerusalem.
- **1999-2000:** On sabbatical in Berkeley; fall semester as a "Visiting Miller Professor" at the University of California, spring semester at MSRI.
- **2002-2006:** Associate Professor of Mathematics at the University of Toronto.
- **From July 2006:** Professor of Mathematics at the University of Toronto.

Publications in peer reviewed journals and conference proceedings (the symbol "∗" indicates the most significant): (See also Web/LOP.html)

1. *Two Examples in Non-Commutative Probability,* Foundations of Physics **19** (1989) 97–104.
2. *Perturbative Chern-Simons Theory,* Journal of Knot Theory and its Ramifications, **4-4** (1995) 503–548.
3. With E. Witten, *Perturbative Expansion of Chern-Simons Theory with Non-Compact Gauge Group,* Commun. Math. Phys. **141** (1991) 423–440.
4. ∗ *On the Vassiliev Knot Invariants,* Topology **34** (1995) 423–472. (Reported at the prestigious Séminaire Bourbaki. See P. Vogel, *Invariants de Vassiliev des nœuds [d'après D. Bar-Natan, M. Kontsevich et V. A. Vassiliev],* Séminaire Bourbaki **761** (1993) 1–17 & Asterisque **216** (1993) 213–232).
5. *Vassiliev Homotopy String Link Invariants,* Journal of Knot Theory and its Ramifications **4** (1995) 13–32.
6. ∗ *Non-Associative Tangles,* in *Geometric topology* (proceedings of the Georgia international topology conference), (W. H. Kazez, ed.), 139–183, Amer. Math. Soc. and International Press, Providence, 1997.
7. ∗ With S. Garoufalidis, *On the Melvin-Morton-Rozansky Conjecture,* Inventiones Mathematicae **125** (1996) 103–133.
8. *Vassiliev and Quantum Invariants of Braids,* Proceedings of Symposia in Applied Mathematics **51** (1996) 129–144, *The interface of knots and physics,* (L. H. Kauffman, ed.), American Mathematical Society.
9. *Polynomial Invariants are Polynomial,* Mathematical Research Letters **2** (1995) 239–246.

10. With J. Fulman and L. Kauffman, *An Elementary Proof that All Seifert Surfaces of a Link are Tube-Equivalent,* Journal of Knot Theory and its Ramifications **7-7** (1998) 873–879.
11. $*$ *Lie Algebras and the Four Color Theorem,* Combinatorica **17-1** (1997) 43–52.
12. With A. Stoimenow, *The Fundamental Theorem of Vassiliev Invariants,* in *Geometry and Physics,* (J. E. Andersen, J. Dupont, H. Pedersen, and A. Swann, eds.), lecture notes in pure and applied mathematics **184**, Marcel Dekker, New-York 1997, pp. 101–134.
13. $*$ *On Associators and the Grothendieck-Teichmuller Group,* Selecta Mathematica (New Series) **4** (1998) 183–212.
14. $*$ With S. Garoufalidis, L. Rozansky, and D. P. Thurston, *Wheels, Wheeling, and the Kontsevich Integral of the Unknot,* Israel Journal of Mathematics **119** (2000) 217–237.
15. $*$ With S. Garoufalidis, L. Rozansky, and D. P. Thurston, *The Århus Integral of Rational Homology 3-Spheres I: A Highly Non Trivial Flat Connection on S^3,* Selecta Mathematica, New Series **8** (2002) 315–339.
16. With S. Garoufalidis, L. Rozansky, and D. P. Thurston, *The Århus Integral of Rational Homology 3-Spheres II: Invariance and Universality,* Selecta Mathematica, New Series **8** (2002) 341–371.
17. $*$ With B. McKay, M. Bar-Hillel and G. Kalai, *Solving the Bible Code Puzzle,* Statistical Science **14-2** (1999) 150–173.
18. With R. Lawrence, *A Rational Surgery Formula for the LMO Invariant,* Israel Journal of Mathematics **140** (2004) 29–60.
19. *On Khovanov's Categorification of the Jones Polynomial,* Web/papers/Categorification, Algebraic and Geometric Topology **2-16** (2002) 337–370.
20. *Bracelets and the Goussarov Filtration of the Space of Knots, Invariants of Knots and 3-Manifolds (Kyoto 2001),* Geometry and Topology Monographs **4** 1–12.
21. $*$ With T. Q. T. Le and D. P. Thurston, *Two Applications of Elementary Knot Theory to Lie Algebras and Vassiliev Invariants,* Geometry and Topology **7-1** (2003) 1–31.
22. With S. Garoufalidis, L. Rozansky, and D. P. Thurston, *The Århus Integral of Rational Homology 3-Spheres III: The Relation with the Le-Murakami-Ohtsuki Invariant,* Selecta Mathematica, New Series **10** (2004) 305–324.
23. *Khovanov Homology for Knots and Links with up to 11 Crossings,* Proceedings of the NATO Advanced Research Workshop on New Techniques in Topological Quantum Field Theory, Calgary Summer 2001, about 74 pp.
24. *Finite Type Invariants, Encyclopedia of Mathematical Physics* (eds. J.-P. Francoise, G. L. Naber and Tsou S. T.) vol. **2** pp. 340, Elsevier, Oxford 2006.
25. $*$ *Khovanov's Homology for Tangles and Cobordisms,* Geometry and Topology **9-33** (2005) 1443–1499.
26. $*$ *Fast Khovanov Homology Computations,* Journal of Knot Theory and its Ramifications **16-3** (2007) 243–255.
27. With S. Morrison, *The Karoubi Envelope and Lee's Degeneration of Khovanov Homology,* Algebraic and Geometric Topology **6** (2006) 1459–1469.

Publications (other):

28. *Random Dot Stereograms,* The Mathematica Journal **1-3** (1991) 69–75.
29. *Weights of Feynman Diagrams and the Vassiliev Knot Invariants,* February 1991 preprint, 22 pp.
30. *Some Computations Related to Vassiliev Invariants,* Web/papers/table.dvi, July 1994, 18 pp.
31. With B. McKay, *Equidistant Letter Sequences in Tolstoy's "War and Peace",* Web/Codes/WNP, September 1997, 12 pp.

32. With B. McKay and S. Sternberg, *On the Witztum-Rips-Rosenberg Sample of Nations,* Web/Codes/Nations, March 1998, 52 pp.
33. With M. Bar-Hillel and B. McKay, *The Torah Codes: Puzzle and Solution,* Chance **11-2** (1998) 13–19.
34. *Mutation Invariance of Khovanov Homology,* Web/Paperlets.html, 2006 weblication.
35. *Algebraic Knot Theory — A Call for Action,* Web/Paperlets.html, 2006 weblication.
36. *The Existence of the Exponential Function,* Web/Paperlets.html, 2006 weblication (parts by O. A. Camarena).
37. Finite Type Invariants of W-Knotted Objects: From Alexander to Kashiwara and Vergne, Web/papers/WKO/, in preparation.

Invited Addresses: (See also Web/Talks)

1. *Perturbative Chern-Simons Theory,* Austin, Texas September 1990.
2. *Chern-Simons Theory with "Formal" Gauge Group,* MSRI, Berkeley, June 1991 and again after a year of progress, Kiev, June 1992.
3. *Vassiliev Invariants and Lie Algebras,* Lebedev Physical Institute, Moscow, June 1992.
4. *On the Vassiliev Knot Invariants,* series of three lectures, given at the Newton Institute, November 1992 and in UC San Diego, January 1993.
5. *Computing Vassiliev Invariants,* Georgia International Topology Conference, and, Workshop on Conformal Field Theory, Operator Algebras and Low-Dimensional Topology, Warwick, August 1993.
6. *Vassiliev and Quantum Invariants of Braids,* AMS short course, San Francisco, January 1995.
7. *Pure Braids, the Grothendieck-Teichmuller Groups and Associators,* Workshop of Low Dimensional Topology, the Fields Institute, Waterloo, April 1995
8. *Lie algebras and the Four Color Theorem,* conference on Operads and Homotopical Algebra, Luminy, June 1995.
9. *The Fundamental Theorem of Vassiliev Invariants,* series of four lectures in a summer school on Geometry and Physics, Odense, July 1995.
10. *On the Melvin-Morton-Rozansky Conjecture,* conference on Geometry and Physics, Århus, July 1995.
11. *Physics in Lillienblum Street,* Hebrew University Colloquium, November 1995.
12. *Finite-Type Invariants of Knots and 3-Manifolds,* series of 12 lectures in the Mathematics Research at the Korea Advanced Institute of Science and Technology (KAIST), August 1996.
13. *Wheels, Wheeling, and the Kontsevich Integral of the Unknot,* Mathematical Sciences Research Institute, Berkeley, January 1997.
14. *The Århus Integral of Rational Homology 3-Spheres,* Israel Mathematical Union plenary address, May 1997.
15. *Integration on Spaces of Diagrams,* Delphi, August 1998.
16. *1+1=2, The Hopf Link, and the Harish-Chandra-Duflo Isomorphism,* Århus, November 1998.
17. *From Astrology to Topology via Feynman Diagrams and Lie Algebras,* series of three lectures in a conference in Srni, the Czech Republic, January 1999. See Web/Talks/Srni-9901.
18. *On Maps, Machines and Roaches,* Berkeley, October 1999. See Web/Talks/Machines.
19. *On Links, Functions, Integrals and 3-Manifold Invariants,* University of Maryland, October 1999. See Web/Talks/UMD-991029.
20. *Embedded Trivalent Graphs and an Infant Conjecture,* Berkeley, February 2000. See Web/Talks/UCB-000215.

21. *From Stonehenge to Drinfel'd skipping all the details,* Berkeley, April 2000. See Web/Talks/UCB-000420.
22. *Knot Invariants, Associators and a Strange Breed of Planar Algebras,* The Fields Institute, January 2001. See Web/Talks/Fields-010111.
23. *The 17 Worlds of Planar Ants,* Jerusalem, January 2001. See Web/Gallery/Symmetry/Tilings/Talk.
24. *A Categorification Quickie,* Calgary, August 2001. See Web/Talks/Calgary-010824.
25. *Bracelets and the Goussarov Filtration on the Space of Knots,* Kyoto, September 2001. See Web/Talks/Kyoto-0109.
26. *The Unreasonable Affinity of Knot Theory and the Algebraic Sciences,* Toronto, February 2002. See Web/Talks/Affinity/.
27. Khovanov's Homology for Tangles and Cobordisms, North Carolina, February 2003. See Web/Talks/Categorification/.
28. Probability: Fact, Fiction and Quantum, University of Western Ontario, February 2004. See Web/Talks/QuantumProbability/UWO-040213.html
29. New and Newer Knot Invariants, 3 lectures in Oporto (Portugal), July 2004. See Web/Talks/Oporto-0407/
30. I've Computed Kh(T(9,5)) and I'm Happy, Plenary lecture in Knots in Washington XX, George Washington University, February 2005. See Web/Talks/GWU-050213/
31. Local Khovanov Homology — Computations and Mutations, Quantum Topology — Contemporary Issues and Perspectives, Utah, June 2005, See Web/Talks/Utah-0506/
32. Algebraic Knot Theory, Jerusalem, December 2006. See Web/Talks/HUJI-061228/
33. Following Lin: Expansions for Groups, Hanoi, August 2007. See Web/Talks/Hanoi-0708/
34. A Very Non-Planar Very Planar Algebra, The Fields Institute, September 2007. See Web/Talks/Fields-0709/
35. Local Khovanov Homology, Zurich Colloquium in Mathematics, May 2008.
36. Non-Commutative Gaussian Elimination and Rubik's Cube, Canadian Undergraduate Mathematics Conference, Toronto July 2008.
37. Projectivization, W-Knots, Kashiwara-Vergne and Alekseev-Torossian, MSRI, August 2008.
38. The Penultimate Alexander Invariant, Sandbjerg (Denmark), October 2008.
39. (u, v, and w knots) x (topology, combinatorics, low algebra, and high algebra), Twenty-Seventh Annual Friends of Mathematics Lecture, Kansas State University, April 2009.
40. The Hardest Math I've Ever Really Used, Friends of Mathematics Banquet Lecture, Kansas State University, April 2009.

Other lectures in Trieste (summer 1990), Technion (June 1991, January 1994, May 1997), Tel Aviv University (July 1991, April 1997), the Weizmann Institute (July 1992, January 1994), Columbia University (October 1991, March 2003, February 2007), Athens Georgia (August 1992), Albany (October 1992), Dartmouth (April 1993), Ann Arbor (March 1994), Berkeley (April 1994, September 1999), Hartford (March 1995), Bern (May 1995, April 1999), Marseilles (June 1995), Odense (July 1995), Århus (July, August 1995, June 2007), Haifa (May 1996, February 1998, November 2001), Bonn (July 1997), Princeton (February 1998), San Diego (February 1998, January 2000), Microsoft (February 1998, April 2004), Ben Gurion University (November 1998), Sydney (September, October 1998), Canberra (October 1998), Grenoble (April 1999), Luminy (May 1995, June 1999), John Hopkins (October 1999, March 2003), Georgia Tech (December 1999, October 2005), Caltech (February 2000), Riverside (April 2000), Lehigh (June 2000), CUNY (December 2000), MSRI (December 2000), Siegen (January 2001), Davis (August 2001), Calgary (August 2001), Kyoto

(September 2001, May 2007), Bar Ilan University (March 2002), Université du Québec à Montréal (September 2002, October 2005), McMaster University (October 2002), Boston University (November 2002), North Carolina (February 2003), Harvard (April 2003, October 2004), Cornell (May 2003), Potsdam NY (June 2003), Warsaw (July 2003), UIC (September 2003), Wayne State (November 2003), Banff (November 2003), Queen's (January 2004), UWO (February 2004), Michigan State (February 2004), Rochester (April 2004), GWU (May 2004), Buffalo (October 2004, March 2007), York (November 2004), UIUC (March 2005), LSU (April 2005), Amsterdam (April 2005), Oberwolfach (June 2005, May 2008), Iowa (January 2006), Istanbul (June 2006), Uppsala (September 2006), Tokyo (May 2007), Tianjin (July 2007), Brown (November 2007), Geneva (May 2008, Copenhagen (October 2009), Northeastern (October 2009), PSU (February 2009), Bogota (February 2009), and many other lectures in Boston University, Brandeis, Harvard, MIT, the Hebrew University, and the University of Toronto.

Classes taught in the last seven years: (See also Web/classes)

- Math 401 — Polynomial Equations and Fields (Toronto, 2007-08, spring term).
- Math 1300 — Geometry and Topology (Toronto, 2007-08, all year).
- Math 401 — Polynomial Equations and Fields (Toronto, 2006-07, spring term).
- Math 1352 — Algebraic Knot Theory (Toronto, 2006-07, spring term).
- Math 1350 — Algebraic Knot Theory (Toronto, 2006-07, fall term).
- Math 240 — Algebra I (Toronto, 2006-07, fall term).
- Math 1300Y/427S — Topology (Toronto, 2005-06, all year).
- Math 157 — Analysis I (Toronto, 2004-05, all year).
- Math 1300Y/427S — Topology (Toronto, 2004-05, all year).
- Math 157 — Analysis I (Toronto, 2003-04, all year).
- Math 1350F — Knot Theory (Toronto, 2003-04, fall term).
- Math 157 — Analysis I (Toronto, 2002-03, all year).

Present students:

1. Karene Chu, Ph.D. student, working on virtual braids and combinatorial group theory.
2. Zsuzsanna Dancso, Ph.D. student, studying Vogel's theory of "diagrammatic Lie algebras", the Kontsevich integral for knotted trivalent graphs and Furusho's results on associators.
3. Louis Leung, Ph.D. student, studying weight systems associated with Lie bi-algebras.
4. Jana Archibald, M.Sc. project, 2005 and current Ph.D. student. Computed higher Alexander ideals of knots, studying the "envelope" of the Alexander polynomial via Fermion formulas. See Web/Students/#Archibald.
5. Peter Lee, Ph.D. student, studying new algebraic constructions of universal finite type invariants and quadratic algebras.

Past students: (See also Web/Students)

1. Hernando Burgos, Ph.D., 2009 (formally in Bogota). Thesis title: *The Jones Polynomial and the planar algebra of alternating links.* See also Web/Students/#Burgos.
2. Iva Halacheva, undergraduate projects, 2007 and 2008. See Web/Students/#Halacheva.
3. Fionntan Roukema, M.Sc. project, 2007. Studied the Goussarov-Polyak-Viro "Gauss-diagram formulas". See Web/Students/#Roukema.
4. Gad Naot, Ph.D., 2007. Thesis title: *The Universal sl_2 link homology theory.* See also Web/Students/#Naot.
5. Zavosh Amir-Khosravi, undergraduate project, 2006. Participated in writing *VasCalc — A Vassiliev Invariants Calculator.*
6. Dan Carney, M.Sc. project, 2005. Computed braid representatives and multivariable Alexander polynomials of knots and links. See Web/Students/#Carney.
7. Siddarth Sankaran, undergraduate projects, 2005 and 2006. Wrote several knot theory programs, including part of *VasCalc — A Vassiliev Invariants Calculator.* See Web/Students/#Sankaran.
8. Jeremy Green, undergraduate projects, 2004 and 2005. Project titles: *A Table of Virtual Knots* and *JavaKh.* See Web/Students/#GreenJ.
9. Emily Redelmeier, undergraduate project, 2003. Project title: *Drawing Planar Diagrams.* See Web/Students/#Redelmeier.
10. Stephen Green, undergraduate project, 2003. Project title: *The Planar Enumerator.* See Web/Students/#Green.
11. Ami Haviv, Ph.D., 2003. Thesis title: *Towards a Diagrammatic Analogue of the Reshetikhin-Turaev Link Invariants.* See Web/Students/#Haviv.
12. Daniel Moskovich, research project, 2002. Paper's title: *Framing and the Self-Linking Integral.* See Web/Students/#Moskovich.
13. Dori Eldar, M.Sc., 1999. Thesis title: *Planar Machines Web Site: An Introduction to Topology.* See Web/People/Eldar/thesis.
14. Avishay Vaknin, M.Sc., 1997. Thesis title: *Associahedrons and the Mac-Lane Coherence Theorem.*

Further Activities:

1. **Member of the Editorial Board**, *Compositio Mathematica.*
2. 10 year **editor** of the Bibliography of Vassiliev Invariants (retired 2005).
3. **Founding editor** of *The Knot Atlas* (see http://katlas.org).
4. **Founding Contributor** to `KnotTheory‘`, a computer knot theory package (see http://katlas.org/wiki/KnotTheory).
5. **Member** of the Electronic Services Committee of the Canadian Mathematical Society.
6. **Main organizer** of *Knot at Lunch*, a weekly knot theory meeting at the University of Toronto. See Web/KAL.html.

Dror Bar-Natan

I'm hyper-famous! Click to see how

Professor, Department of Mathematics, University of Toronto, Toronto, Ontario, Canada.

E-Mail: *drorbn@math.toronto.edu*.

Slow Mail: *Department of Mathematics, University of Toronto, Toronto, Ontario, Canada M5S 2E4*.

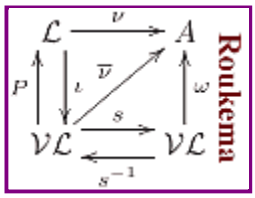
Office: *Bahen Centre Room 6178, +1-416-946-5438;* Fax: *+1-416-978-4107*.

Academic Profile (CV, research and teaching statements).

Publications

Talks

Classes



Students

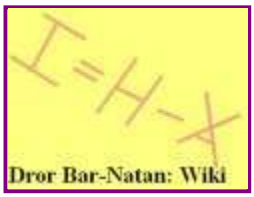
Image Gallery

Bible Codes

(I'm out ! [1], [2])

The Knot Atlas

(retired version is here)



Wiki

Odds, Ends, Unfinished

Site News