

# THANG T. Q. LE

Curriculum Vitae

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## Education:

**Ph.D.** in Mathematics, Moscow State University, November 1991.

Thesis advisor: Sergei Novikov.

**Honored Diploma (M.S.)** in Mathematics, Moscow State University 1988.

## Research interests:

Low dimensional topology, differential topology, quasi-crystals.

## Employment:

Professor, Georgia Institute of Technology, 01/2004 – present.

Associate Professor, SUNY Buffalo 1999-2003.

Assistant Professor, SUNY Buffalo, 1994-1999.

Research fellow, Max-Planck Institut für Mathematik, Bonn, Germany, 1992–1994.

Visiting professor at Geneva University (6/2005 & 6/2004), Université Paris VII, (7/2002 & 5/2000), Université Grenoble (6/2002 & 6/2006), Research Institute for Mathematical Sciences (Kyoto 7/2001–9/2001), Mittag-Leffler Institute (Sweden, 5/1999), Osaka University (11/1996), Tokyo University (6/1994).

Visiting Mathematician, International Center for Theoretical Physics (Trieste, Italy), 3/1994–8/1994.

Post-doctoral fellow, Mathematical Sciences Research Institute (Berkeley, CA), academic year 1996-1997.

**Selected recent invited conference lectures:**

Conference “The Volume conjectures” 2 talks, U. of Grenoble,	06/2006.
Conference “Around the Volume Conjectures”, Columbia Uni, Two lectures	03/2006.
Conference “Classical and quantum gravity in 3 dimensions”, Pisa, Italy	9/2005.
Conference “Braid groups, quantum invariants and geometry of 3 manifolds”, Marseille, France.	6/2005.
Spring Topology Conference, Berry College, Georgia	3/2005.
Mini-Conference on Knots, George Washington U.	4/2004.
Conference ”Knots in Poland”, Banach Center, Warsaw, <i>plenary</i> talk	7/2003.
Conference ”Knots and Primes”, Johns Hopkins University, <i>plenary</i> talk	3/2003.
Journee “Invariants of 3-manifolds”, main speaker (3 lectures), Grenoble	6/2002.
Conference “Quantum Topology”, University of Warwick, UK	3/2002.
Conference “Invariants of links and 3-manifolds”, Kyoto University, <i>plenary</i> talk	9/2001.
Workshop on invariants of 3-manifolds, Jerusalem, Israel	5/2001.
Cascade topology conference, University of Oregon	11/2000.
“The Chow-Chen memorial conference”, Nankai Institute of Mathematics, China	10/2000.
Conference “associateurs et diagrams”, Universite Paris VII	6/2000.
Summer school on invariants of 3-manifolds, Institut Fourier, Grenoble, (France), invited main speaker (series of 7 lectures)	7/1999.
Conference on quantum invariants of 3-manifolds, Pacific Institute of Mathematical Sciences, Calgary	7/1999.
Conference “Knots in Hellas”, Delphi (Greece), <i>plenary</i> talk	8/1998.
Conference “Knots in Washington”, <i>plenary</i> talk	2/1998.

**Selected Recent Invited Colloquia and Seminar Lectures:**

Tulane University, Colloquium	10/2006.
Columbia University, Topology seminar	10/2006.
Université Paris VII, Topology seminar,	6/2006.
Oklahoma State University, Colloquium	04/2006.
University of Geneva (colloquium and a short course of 3 lectures).	5/2005.
SUNY Buffalo, colloquium	4/2005.
University of Miami, colloquium	4/2005.
Geneva University (Switzerland) (2 lectures, colloquium and algebra seminar),	6/2004.
University of Zurich (Switzerland), math physics seminar	6/2004.
Arhus University (Denmark), topology seminar	5/2004.
Georgia Institute of Technology, Atlanta	3/2003.
SUNY Buffalo, topology seminar	3/2003.
University of Tokyo, topology seminar	11/2002.
Georgia Institute of Technology, Colloquium talk	11/2002.
Université Paris VII, topology seminar	7/2002.
Cornell University, topology seminar	5/2002.

University of North Carolina at Chapel Hill, colloquium	11/2001.
Kyoto University, topology seminar	9/2001.
Tokyo Institute of Technology, topology seminar	8/2001.
The Hebrew University of Jerusalem, colloquium talk	5/2001.
Tel Aviv University, topology Seminar	5/2001.
Universite Paris VII, topology seminar	6/2000.
Arhus University (Denmark), topology seminar	5/2000.
Georgia Tech Institute, topology seminar	4/2000.
The University of Iowa, colloquium talk	11/1999.
Borel seminar (4 lectures), Bern University, Switzerland	6/1999.
Mittag-Leffler Institute, Sweden, colloquium talk	5/1999.
Aarhus University, Denmark, colloquium talk	11/1998.
Harvard university, topology seminar	9/1998.
Brandeis-Harvard-MIT-Northeastern joint colloquium, Boston	9/1998.

**Ph.D. students:**

Qi Chen, PhD obtained 4/2004 (SUNY Buffalo).

Huynh Vu, Dorin Cheptea, J. Fan PhD obtained 4/2005 (all SUNY at Buffalo).

**Professional Services:**

Associate Editor for *The Journal of Knot theory and its Ramifications*.

# LIST OF PUBLICATIONS

Thang T. Q. Le

## Book editor:

*Invariants of knots and 3-manifolds*, Geometry and Topology Monographs, vol 4, 2002. T. Ohtsuki, T. Kohno, T. Le, J. Murakami, J. Roberts and V. Turaev (editors).

## Papers published:

- L01.** *Structure of level surfaces of closed 1-forms*, (Russian) Mat. Zametki **44** (1988), no. 1, 124–133; translation in Math. Notes **44** (1988), no. 1-2, 556–562.
- L02.** *Novikov's numbers*, (Russian) Mat. Zametki **47** (1990), no. 1, 98–104, 172; translation in Math. Notes **47** (1990), no. 1-2, 64–68.
- L03.** *Varieties of representations and their subvarieties of cohomology jumps for certain knot groups* (Russian) Uspekhi Mat. Nauk **46** (1991), no. 2(278), 223–224; translation in Russian Math. Surveys **46** (1991), no. 2, 250–251.
- L04.** (with S. Piunikhin and V. Sadov) *Local rules for quasiperiodic tilings of quadratic 2-planes in  $\mathbf{R}^4$* , Commun. Math. Phys. **150** (1992), 23–44.
- L05.** *Varieties of representations and their subvarieties of cohomology jumps for knot groups*, (Russian) Mat. Sb. **184** (1993), no. 2, 57–82; translation in Russian Acad. Sci. Sb. Math. **78** (1994), no. 1, 187–209.
- L06.** (with S.Piunikhin and V.Sadov) *The geometry of quasicrystals*, (Russian) Uspekhi Mat. Nauk **48** (1993), no. 1(289), 41–102; translation in Russian Math. Surveys **48** (1993), no. 1, 37–100.
- L07.** (with S.Piunikhin) *Local rules for multidimensional quasiperiodic tilings*, Differential Geometry and its applications, **5** (1995), 13–31.
- L08.** *Local rules for pentagonal quasiperiodic tilings*, Discrete and Computational Geometry, **14** (1995), 31–70.
- L09.** (with J.Murakami) *Kontsevich's integrals for Homfly polynomials and relations between multiple zeta values*, Topology and its Applications, **62** (1995), 193–206.
- L10.** (with J.Murakami) *Representation of the category of Tangles by Kontsevich iterated integrals*, Commun. Math. Physics **168** (1995), 535–562.
- L11.** (with M. Kontsevich), *Aktueller Forschungsschwerpunkt: Invarianten von Knoten* in “Max-Planck-Gesellschaft Jahrbuch 1994”, pp 451–455. Max-Planck-Gesellschaft.
- L12.** (with J. Murakami, H. Murakami, T. Otsuki) *A 3-manifold invariant derived from the universal Vassiliev-Kontsevich invariant*, Proceeding of the Japan Academy, series A, Mathematical Sciences, v. **LXXI** (1995), ser. A, N 6, pp. 125–127.
- L13.** (with J.Murakami) *The Kontsevich integral for Kauffman's polynomials*, Nagoya Mathematical Journal, **142** (1996), pp. 39–66.
- L14.** (with J.Murakami) *The Universal Vassiliev-Kontsevich Invariant for framed oriented links*, Compositio Mathematica, **102** (1996), pp. 41–64.

- L15.** *A quantum  $sl_2$ -invariant of 3-manifolds which contains all the Witten-Reshetikhin-Turaev invariants.* Lect. Notes in Pure and Appl. Math., vol. 184, Marcel Dekker Inc. 1996. Eds. Jørgen E. Andersen, Johan Dupont, Henrik Pedersen and A. Swann. pp. 399-409.
- L16.** *An invariant of integral homology 3-spheres which is universal for all finite types invariants,* in “Soliton, Geometry, and Topology: On the Crossroad”, AMS Translations series 2, **179** (1997) Eds. V. Buchstaber and S. Novikov, pp. 75–100.
- L17.** (with Murakami) *The parallel version of the Kontsevich integral*, J. Pure and Applied Algebra, **121** (1997), 271–291.
- L18.** *Theory of local rules for quasi-periodic tilings*, in “The Mathematics of Long Range Aperiodic Order”, NATO ASI series C, vol. **489**, Kluwer 1997, Ed. R. Moody, 331–366.
- L19.** (with J. Murakami, T. Ohtsuki) *A universal perturbative invariant of 3-manifolds*, Topology, **37** (1998), 539–574.
- L20.** *On the denominators of the Kontsevich integral and the universal perturbative invariant*, Invent. Math, **135** (1999), no. 3, 689–722.
- L21.** (with J. Murakami, H. Murakami, T. Ohtsuki) *3-manifold invariant derived from the Kontsevich integral*, Osaka J. Math. **36** (1999), no. 2, 365–395.
- L22.** *On the perturbative  $PSU(n)$  invariants of rational homology 3-spheres*, Topology **39** (2000), no. 4, 813–849.
- L23.** *Integrality and symmetry of quantum link invariants*, Duke Math. J. **102** (2000), no. 2, 273–306.
- L24.** *Quantum 3-manifolds invariants: integrality, splitting, and perturbative expansion*, Topology and its applications, **127** (2003), 125–152.
- L25.** (With D. Bar-Natan and D. Thurston) *Two applications of elementary knot theory to Lie algebras and Vassiliev invariants*, Geometry and Topology, **7** (2003), 1–31.
- L26.** (with V. Turaev) *Homotopy quantum field theory and quantum groups*, J. Applied and Pure Algebra, **178** (2003), 169–185.
- L27.** (with Qi Chen) *Quantum Invariants of Periodic Links and Periodic 3-Manifolds.*, Fund. Math. **184** (2004), 55–71.
- L28.** (with S. Garoufalidis) *The colored Jones function is  $q$ -holonomic*, Geom. Topol. **9** (2005), 1253–1293.
- L29.** (with Qi Chen) *Almost integral TQFTs from simple Lie algebras*, Algebr. Geom. Topol. **5** (2005), 1291–1314.
- L30.** (with V. Huynh) *On the Colored Jones Polynomial and the Kashaev invariant*, Fundam. Prikl. Mat. **11** (2005), no. 5, 57–78.
- L31.** (with S. Garoufalidis and D. Zeiberger) *The quantum MacMahon Master Theorem*, Proceedings of the Nat. Acad. Sci., **103** (2006), N 38, 13928–13931.
- L32.** *The Colored Jones Polynomial and the  $A$ -Polynomial of Knots*, Adv. in Math, **207** (2006), 782–804.

**L33.** *Finite type invariants of 3-manifolds*, in “Encyclopedia of Mathematical Physics”, pp 384–356, Elsevier 2006.

**L34.** (with S. Garoufalidis) *Is the Jones polynomial of a knot really a polynomial?* J. Knot Theory and its Ramification, **15** (2006), 983–1000.

#### Accepted papers

**L35.** (with D. Cheptea) *A TQFT associated to the LMO invariant of three-dimensional manifolds*, to appear in Commun. Math. Physics. Preprint math.GT/0508220.

**L36.** *Strong Integrality of Quantum Invariants of 3-manifolds*, to appear in Trans. AMS. Preprint math.GT/0512433.

**L37.** (with V. Huynh) *Twisted Alexander Polynomial of links in the projective space*, to appear in J. Knot Theory and its Ramifications.

#### Preprints

**L38.** (with S. Garoufalidis) *Asymptotics of the colored Jones function of a knot*, preprint math.GT/0508100.

**L39.** (with A. Beliakova and C. Blanchet) *Laplace transform and universal  $sl(2)$  invariants*, preprint math.QA/0509394.

**L40.** (With D. Cheptea) *3-cobordisms with their rational homology on the boundary*, preprint math.GT/0602097

**L41.** (With A. Beliakova) *Integrality of quantum 3-manifold invariants and rational surgery formula*, preprint math.GT/0608627

**L42.** (with S. Garoufalidis) *Gevrey series in quantum topology*, preprint math.GT/0609618