Link homology and categorification

May 10 – 25, 2007

RIMS (14 – 18) and Fac. of Science Bldg. No. 3, Daikaigi
shitsu (10, 11, 21–25), Kyoto University

Program

First Week (at Fac. of Science Bldg. No. 3)

5/10 (Thu.)

13:30 – 14:30	Aaron Lauda	(Columbia)	Jones polynomial and its extension to tangles
15:00 – 16:30	Dror Bar-Natan	(Toronto)	Overview of Khovanov Homology

5/11 (Fri.)

10:00 – 12:00	Aaron Lauda	A homological invariant of tangles and tangle cobordisms

(with break)

14:00 – 15:00	Dror Bar-Natan	Overview of Khovanov Homology, II
15:30 – 16:30	Aaron Lauda	$sl(3)$ link homology

Second Week (at RIMS)
5/14 (Mon.)

9:30 – 10:30	Scott Morrison	(Berkeley)	An introduction to Khovanov homology
11:00 – 12:00	Lev Rozansky	(North Carolina)	An introduction to matrix factorizations
13:30 – 14:30	Ciprian Manolescu	(Columbia)	Knot Floer homology I
15:00 – 16:00	Sergei Gukov	(Caltech)	Link Homologies and Open Gromov-Witten Invariants

5/15 (Tue.)

9:30 – 10:30	Scott Morrison		More about Khovanov homology: genus bounds and spectral sequences the easy way
11:00 – 12:00	Lev Rozansky		Categorification of the $SU(N)$ HOMFLY-PT polynomial
13:30 – 14:30	Ciprian Manolescu		Knot Floer homology II
15:00 – 16:00	Sergei Gukov		Gauge Theory and Categorification
16:30 – 17:30	Marko Stosic	(Inst. Super. Téc.)	Homology of torus knots and links

5/16 (Wed.)

9:30 – 10:30	Joel Kamnitzer	(Berkeley)	Knot homology via derived categories of coherent sheaves:motivation and geometric setup
11:00 – 12:00	Raphael Rouquier	(Oxford)	$sl(2)$-categorification
13:30 – 14:30	Catharina Stroppel	(Glasgow)	An introduction into representation theory of Lie algebras
15:00 – 16:00	Marco MacKaay	(Algarve)	Towards an $sl(n)$ link homology theory using foams (joint work with Marko Stosic and Pedro Vaz)
16:30 – 17:30	Alexander Shumakovitch	(Washington)	Naive Categorification of the Skein $sl(N)$ Polynomial

5/17 (Thu.)

9:30 – 10:30	Sabin Cautis	(Harvard)	Knot homology via derived categories of coherent sheaves: spherical twists and relation to Khovanov homology
11:00 – 12:00	Raphael Rouquier		Higher representation theory
13:30 – 14:30	Catharina Stroppel		Khovanov's algebra H_n appearing naturally in representation theory
15:00 – 16:00	Joshua Sussan	(Yale)	Category $\mathcal{O}$ and the colored Jones polynomial

5/18 (Fri.)

9:30 – 10:30	Dror Bar-Natan		The Virtues of Being an Isomorphism
11:00 – 12:00	Lev Rozansky		Categorification of the $SO(2N)$ Kauffman polynomial
13:30 – 14:30	Peter Ozsvath	(Columbia)	Knot Floer homology III
14:45 – 15:45	Ciprian Manolescu		Knot Floer homology IV

(We must evacuate the room at 16:00.)

Third Week (at Fac. of Science Bldg. No. 3)

5/21 (Mon.)

| 10:30 – 11:30 | Susumu Ariki | (RIMS) | Integrable $\dot{U}(\hat{sl}_e)$-modules via cyclotomic Hecke algebras |

13:30 – 14:30   Peter Ozsvath   Knot Floer homology V

15:00 – 16:00   Kokoro Tanaka   (Gakushuin)   Khovanov-Jacobsson numbers of surface-knots and their extension

5/22 (Tue.)

9:30 – 10:30   Catharina Stroppel   Invariants of tangles and Cobordisms: From Jones to Kauffman and BMW

11:00 – 12:00   Yasuyoshi Yonezawa   (Nagoya)   Matrix factorizations and planar diagrams in MOY link invariant

(Big lunch break !)

15:00 – 16:00   Peter Ozsvath   Knot Floer homology VI

16:30 – 17:00   Radmila Sazdanovic   (George Washington)   Torsion in Chromatic Graph Cohomology

5/23 (Wed.)

9:30 – 10:30   Joel Kamnitzer   The affine Grassmannian and the geometric Satake correspondence I

11:00 – 12:00   Scott Morrison   Functoriality and duality in Khovanov homology

(free afternoon)

Mikhail Kapranov (Yale) give a colloquium talk at 14:40 at RIMS 402

5/24 (Thu.)

9:30 – 10:30   Joel Kamnitzer   The affine Grassmannian and the geometric Satake correspondence II

11:00 – 12:00   Stephan Wehrli   (Columbia)   Mutation invariance of Khovanov homology over $\mathbf{Z}/2\mathbf{Z}$

Abstract of Dror Bar-Natan's talk:

I'm over forty, I'm a full professor, and it's time that I come out of the closet. I don't understand quantum groups and I never did. I wish I could tell you in my talk about one of the major stumbling blocks I have encountered - I don't understand the amazing Etingof-Kazhdan work on quantization of Lie bialgebras. But hey, I can't tell you about what I don't understand! So instead, I will tell you about how I hope to understand the Etingof-Kazhdan work, one day, as an isomorphism between a topologically defined space and a combinatorially defined one. The former would be the unipotent completion of a certain algebra of virtually-knotted (trivalent?) graphs. The latter would be the associated graded space of the former.

I'll start and spend a good chunk of my time with an old but not well known analogy, telling you why a Drinfel'd associator, the embodiment of the spirits of all quasi-Hopf algebras, is best viewed as an isomorphism between the unipotent completion of the algebra of honestly-knotted trivalent graphs and its associated graded space, a certain combinatorially-defined algebra of chord diagrams. A few words will follow, about the relationship between diagrammatic Lie bialgebras and finite type invariants of virtual knots.

Contact H. Nakajima (nakajima@math.kyoto-u.ac.jp) for any question.