Goettingen

January-30-10
9:39 AM

In preparation – do not advertise yet!

Overall title: “u, v, and w-knots: topology, combinatorics and low and high algebra”.

Overall abstract: I will discuss three types of knotted objects - the "u" type, for "usual", the "v" type, for "virtual", and the "w" type, for "welded", or "weakly virtual", or "warm up". I will then discuss an abstract and general yet rather simple machine that in a uniform manner associates to each such class of knotted objects a "combinatorics", and a "low algebra", and a "high algebra". The latter is high indeed - it is the theory of Drinfel'd associators in the u case, most likely it is the Etingof-Kazhdan theory of quantization of Lie bi-algebras in the v case, and it is the Kashiwara-Vergne theory of convolutions on Lie groups and algebras in the w case. Thus these three pieces of high algebra have a simple topological origin. And as on the level of topology u, v, and w are tied together, their respective high algebra theories are closely related, with some of these relationships clearly understood, and some that are yet to be explored.

Day 1 title: "u, v, w: topology and philosophy".

Day 1 topics:

- Knots, planer diagrams, Reidemeister moves, virtual knots are to knots as manifolds are to Euclidean spaces, flying rings and knotted tubes in 4D and w-knots.
- The abstract machine - filtered and graded spaces, expansions and homomorphic expansions, equations in graded spaces.
- Planar algebras and circuit algebras.

Day 2 title: "u, v, w: combinatorics and low algebra".

Day 2 topics:

- Finite type invariants, weight systems, chord diagrams, arrow diagrams, 4T relations, STU and IHX relations, maps into various kinds of universal enveloping algebras.

Day 3 title: "u, v, w: high algebra"

Day 3 topics:

- Kashiwara-Vergne and Alekseev-Torossian: convolutions, integrals, measure preserving transformations, unitary operators, universal formulas and universal equations.
- A word on knotted trivalent graphs, Drinfel'd associators, and Chern-Simons-Witten theory.
- Dreams on v-knots, Etingof-Kazhdan, and quantization of Lie bi-algebras.
- Hallucinations on knot homologies and on further physics.