

Seminar on Khovanov theory (Sundays 10-12)rm. 209

- 1) What is knot theory? Kauffman bracket construction of Jones polynomial of knots in a 3-sphere.
- 2) Witten's generalization of Jones polynomial to the case of knots in an arbitrary 3-manifold and the Reshetikhin-Turaev construction of Witten's invariants. Some background on $U_q sl_2$ and its representation theory.
- 3) Topological Quantum Field Theories, the 2-dimensional case [Frobenius algebras], and Reshetikhin-Turaev's example of a 3-dimensional Topological Quantum Field Theory.
- 4) Definition of Khovanov homology theories for links induced by Frobenius systems (a la Khovanov)
- 5) Universal Bar-Natan morphism between planar algebras of tangle diagrams and of complexes of cobordisms
- 6) Homotopy of complexes and reduction to Bar-Natan morphism from planar algebra of tangles to planar algebra of complexes up to homotopy type of cobordisms up to cobordism relations.
- 7) Beginnings of categorification of 3-manifold invariant (equivalent to 4-TQFT) in math.QA/0509083 "Hopfological algebra and categorifications at a root of unity"