Mathematics, Statistics, and Computer Science   **@ UIC**

Quantum Topology / Hopf Algebra Seminar

On Two Invariants of Three Manifolds from Hopf Algebras

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Abstract: We prove a conjecture concerning two quantum invariants of three manifolds that are constructed from finite dimensional Hopf algebras, namely, the Kuperberg invariant and the Hennings-Kauffman-Radford invariant. The two invariants can be viewed as a non-semisimple generalization of the Turaev-Viro-Barrett-Westbury (TVBW) invariant and the Witten-Reshetikhin-Turaev (WRT) invariant, respectively. By a classical result relating TVBW and WRT, it follows that the Kuperberg invariant for a semisimple Hopf algebra is equal to the Hennings-Kauffman-Radford invariant for the Drinfeld double of the Hopf algebra. However, whether the relation holds for non-semisimple Hopf algebras has remained open, partly because the introduction of framings in this case makes the Kuperberg invariant significantly more complicated to handle. We give an affirmative answer to this question. An important ingredient in the proof involves using a special Heegaard diagram in which one family of circles gives the surgery link of the three manifold represented by the Heegaard diagram. https://arxiv.org/pdf/1710.09524.pdf

Thursday, February 8 at 3:00 PM in SEO 612