Knotted Trivalent Graphs, Tetrahedra and Associators
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Goal: \( Z: \{ \text{knots} \} \rightarrow \{ \text{chord diagrams}\} / 4T \) so that

Extend to Knotted Trivalent Graphs (KTG’s):

Need a new relation:

Easy, powerful moves:

Using moves, KTG is generated by ribbon twists and the tetrahedron

Modulo the relation(s):

Claim. With \( \Phi := Z(\Delta) \), the above relation becomes equivalent to the Drinfel’d’s pentagon of the theory of quasi Hopf algebras.

Proof.

Further directions:
1. Relations with perturbative Chern–Simons theory.
2. Relations with the theory of 6j symbols.
3. Relations with the Turaev–Viro invariants.
4. Can this be used to prove the Witten asymptotics conjecture?
5. Does this extend/improve Drinfel’d’s theory of associators?

This handout is at http://www.ma.huji.ac.il/~drorbn/Talks/HUJI–001116