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Some aspects on the AJ conjecture

In its original formulations, the AJ conjecture, which gives a strong relation between the A-polynomial and the coloured Jones, takes inspiration from their meaning for the $\mathrm{SU}(2)$-Chern-Simons theory, so that an analogous statement is expected within the $\mathrm{SL}(2,\mathbb{C})$ version of the theory. In a joint work with Andersen, we propose a precise formulation of this, which we prove to hold true for the first two hyperbolic knots. The statement is obtained by using the so-called Weil-Gel'fand-Zak transform to bring together two different approaches to $\mathrm{SL}(2,\mathbb{C})$-Chern-Simons theory (for genus one): the Teichmüller TQFT and geometric quantisation on the moduli space of flat connections.

In this presentation I will discuss some aspects of the work mentioned above, with a particular stress on the side of geometric quantisation.