A HOMOLOGICAL MODEL FOR THE COLOURED JONES POLYNOMIALS

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In 1991, Reshetikhin and Turaev defined a method that starts with a quantum group and leads to link invariants. This construction is purely algebraic and combinatorial. The coloured Jones polynomials $J_N(L, q)$ are a family of quantum invariants constructed from the representation theory of $U_q(sl(2))$. We will describe a geometrical interpretation for the coloured Jones polynomials.

R. Lawrence defined a sequence of representations of the braid groups, using the homology of a certain covering of a configuration space. In 2012, Kohno proved a deep connection between the representations of the braid group on the highest weight spaces of $U_q(sl(2))$-modules and the Lawrence representations. Using this, we give a homological model for $J_N(L, q)$. We prove that the coloured Jones polynomials can be described as a graded intersection pairing between two homology classes on a covering of the configuration space of the punctured disc.

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