LOUIS KAUFFMAN, University of Illinois at Chicago, Mathematics, 851 South Morgan Street, Chicago, Illinois 60607-7045

q-Deformed Spin Networks and Topological Quantum Computation

This talk will discuss how q-deformed $SU(2)$ spin networks (aka Temperley–Lieb Recoupling Theory) can produce unitary representations of the Artin Braid Group. These representations include the well-known Fibonacci model that is quantum-computationally universal. Our approach to these networks is based on the bracket polynomial state sum for the Jones polynomial. The talk will discuss quantum algorithms for computing the colored Jones polynomials and the Witten–Reshetikhin–Turaev invariant. We also discuss the background of these spin networks (they are a braided version of the original spin networks of Roger Penrose) and the role of these networks in loop quantum gravity.