

LOUIS KAUFFMAN, University of Illinois at Chicago
Topological Quantum Computation

This talk will survey joint work with Sam Lomonaco on the use of topology in relation to quantum computation. We begin by a discussion of universal gates based on unitary solutions to the Yang–Baxter equation. We then discuss models based on topological quantum field theory and show, in particular, how to construct the Fibonacci model of Freedman, Kitaev and Wang by using knot theoretic methods based on q -deformations of Penrose spin networks (Temperley Lieb recoupling theory). These methods provide a very direct way to construct representations of the Artin Braid groups that are dense in the unitary groups. Many questions will be discussed in the light of these constructions.