# Abstracts

## ■ Foam evaluation, Tait colorings and link homology

Mikhail Khovanov (Columbia University)

In this series of three talks we'll discuss a categorification of the number of Tait colorings of planar 3-valent graphs. Tait colorings of these graphs are closely related to the 4-Color Theorem. We explain how foam evaluation leads to a construction of state spaces for these graphs that are functorial with respect to cobordisms between the graphs. Conjecturally, the dimension of the state space of a graph equals the number of its Tait colorings. In the case of bipartite graphs, the state spaces can be used to define a bigraded link homology theory that categorifies the Kuperberg bracket of links.

## ■ Virtual and Combinatorial Knot Theory

Louis H. Kauffman (University of Illinois Chicago)

Lecture 1: Introduction to combinatorial knot theory and virtual knot theory
Invariants - bracket and Jones polynomials, parity, parity bracket polynomial, affine index polynomial. This lecture will introduce the basic ideas and graphical methods of combinatorial knot theory. We will discuss the geometric and diagrammatic interpretations of virtual knots and show how many invariants can be extended to virtual knot theory and how there is always a need for new invariants.

Lecture 2: Knotoids
Knotoids are diagrams of classical knots and links with ends that can be in distinct regions. Arcs cannot move across the ends and so the knotoids become an extension of classical knot theory. We discuss how knotoids are informed by virtual knot theory and we discuss a new generalization of the classical Alexander polynomial that applies to knotoids.

Lecture 3: Introduction to Khovanov Homology for classical and for virtual knots.
This lecture will discuss the idea and construction of Khovanov homology, how it is generalized to virtual knot theory and how it can be applied to prove theorems about four ball genus of virtual knots. We will emphasize geometric ideas and show how algebra and invariants arise form concepts related to cobordism.