Intelligence of Low Dimensional Topology 2006

July 22 – July 26, 2006
at Hiroshima University, Hiroshima, Japan

ABSTRACT

PLENARY TALKS

J. Scott Carter and Masahico Saito
(University of South Alabama and University of South Florida)

Cohomology of Categorical Self-Distributivity

Cohomology of Categorical Self-Distributivity Abstract of your talk: Hopf algebras, groups, Lie Algebras, and other examples possess self-distributive binary products. In this talk, the relationships between self-distributivity and solutions to the Yang-Baxter equations will be discussed. A cohomology theory will be sketched in low-dimensions, that specializes to quandle cohomology and Lie Algebra cohomology. The theory is informed by the diagrammatics of self-distributive maps.

Gyo Taek Jin
(Korea Advanced Institute of Science and Technology)

Prime knots with arc index up to 10

Every knot can be embedded in the three dimensional Euclidean space so that it is contained in the union of finitely many half-planes with a common boundary line where each of the half-plane contains exactly one properly embedded arc of the knot. This is called an arc presentation of the knot. The arc index is the minimal number of half-planes required to have an arc presentation of a given knot. In this work, we give the list of prime knots with arc index up to 10. This is an extension of the works of I. Nutt and E. Beltrami.

Louis H Kauffman
(University of Illinois at Chicago)

Virtual Knot Theory

This talk will survey recent results in virtual knot theory including results of the speaker and Sofia Lambropoulou, new conjectures about virtual knots and Manturov's approach to the Khovanov homology of virtual knots.

Toshitake Kohno
(The University of Tokyo)

Hyperbolic volume functions and iterated integrals

Based on classical work due to Schläfli and Aomoto, it has been known that the volumes of hyperbolic simplices can be expressed by iterated integrals of logarithmic forms on the space of Gram matrices. In this talk we discribe flat connections on the moduli space such that the volume functions are considered to be a horizontal section. By using this method, we discuss asymptotic behaviour of the volume on the boundary of the moduli space. We also discuss how Chern-Simons invariants appear as natural imaginary part of these volume functions.

Masanori Morishita
(Kyushu University)

Variation of hyperbolic structures (joint work with Y. Terashima)

We will discuss analogies between arithmetic of the deformation of modular Galois representations and geometry of the deformation of hyperbolic structures on a knot complement.

Tomotada Ohtsuki
(RIMS, Kyoto University)

Equivariant quantum invariants of the infinite cyclic covers of knot complements

Invariants of 3-manifolds with 1-dimensional cohomology classes were introduced by Turaev-Viro, and developed by Gilmer for 3-manifolds obtained by 0-surgery along knots. They formulated the invariants as an equivariant version of quantum invariants for infinite cyclic covers of the 3-manifolds using TQFT functors of the quantum invariants. In this talk, I reformulate the invariants as invariants of knots using surgery presentations of the knots, motivated by the study of various equivariant invariants for infinite cyclic covers of knot complements such as the loop expansions of the Kontsevich invariant of knots. I show some values of the invariant of the trefoil knot and the figure-eight knot for the quantum U(1) invariant and the quantum SO(3) invariant at infinitely many roots of unity.

Colin Rourke
(University of Warwick)

Extending Markov's Theorem to classify links and 3-manifolds

This is joint work with Sofia Lambropoulou. Markov's theorem can be extended to classify links in arbitrary 3-manifolds and to classify the 3-manifolds themselves. The version for links is given in math.GT/0405498 (the geometry) and math.GT/0405493 (the algebra). These results have great power for constructing link invariants which to date have only been explored in simple special cases.

Vladimir Vershinin
(Universite Montpellier II)

Graphs, braids and Khovanov homology

We discuss certain relations between the notions given in the title. Namely, we give graph presentations of various types of braid groups. That is the presentations initiated by V.Sergiescu, where generators correspond to adges of graphs and relations arrise from the geometry of graphs. We also discuss connections between graphs and Khovanov homology.