SIMION STOILOW INSTITUTE OF MATHEMATICS OF THE ROMANIAN ACADEMY

IMAR Monthly Lecture

Khovanov homology and four-manifolds

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Abstract: Over the last forty years, most progress in four-dimensional topology came from gauge theory and related invariants. Khovanov homology is an invariant of knots of a different kind: its construction is combinatorial, and connected to ideas from representation theory. Nevertheless, it turns out that it can act as a substitute for gauge theory in some cases. I will survey some topological applications of Khovanov homology. In particular, Morrison, Walker and Wedrich used Khovanov homology to define a new invariant of four-manifolds, called the skein lasagna module. I will discuss joint work with Neithalath, and with Walker and Wedrich, in which we developed computational techniques for the skein lasagna module. These techniques were recently used by Ren and Willis to detect exotic smooth structures on four-manifolds with boundary.