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Applications of instanton Floer homology to knots

In the last decade, 3-manifold topology has seen the first major applications of the ideas developed 20 years ago by the late Andreas Floer, most notably through the use of the Heegaard–Floer homology defined by Ozsváth and Szabó. Through recent work of Kronheimer and Mrowka, many of these advances can be recovered through a version of instanton Floer homology. In this talk we aim to look at some consequences for $SU(2)$ -representation varieties of knots in S^3 . In particular we shall explain how $SU(2)$ -representation varieties of 2-fold branched covers detect the unknot and give a simple proof of a classical result of Scharlemann which asserts that unknotting number 1 knots are prime.