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Traceless character varieties, the pillowcase and Khovanov cohomology

This talk will describe recent joint work with Matthew Hedden, Matthew Hogancamp, and Paul Kirk.

For a diagram of a 2-stranded tangle in the 3-ball we define a twisted complex of compact Lagrangians in the triangulated envelope of the Fukaya category of the smooth locus of the pillowcase. We show that this twisted complex is a functorial invariant of the isotopy class of the tangle, and that it provides a factorization of Bar-Natan's functor from the tangle cobordism category to chain complexes. In particular, the hom set of our invariant with a particular non-compact Lagrangian associated to the trivial tangle is naturally isomorphic to the reduced Khovanov chain complex of the closure of the tangle. Our construction comes from the geometry of traceless $SU(2)$ character varieties associated to resolutions of the tangle diagram, and was inspired by Kronheimer and Mrowka's singular instanton link homology.