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Kapustin-Saulina-Rozansky Topological quantum field theories (TQF) and knot homology

Abstract

In 2009 Kapustin-Saulina-Rozansky (KRS) outlined TQFT that introduces defects in earlier constructed Rozansky-Witten 3D topological sigma model. Jointly with the speaker, Rozansky provided a rigorous mathematical set up for the KRS theory when the targets are quiver varieties and the source is $S^2 \times \mathbb{R}$ with the surface defects. In my talk, I will explain how the triply graded homology (HOMFLY-PT homology) emerges as a partition function of the mentioned theory. In particular, physics guided the speaker and Rozansky to construction that ties together coherent sheaves on the Hilbert scheme of points on the plane and Soergel bimodules.