

The \mathfrak{sl}_n foam 2-category via skew Howe duality

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We'll discuss recent work of the speaker, *joint with H. Queffelec*, in which we use categorified quantum \mathfrak{sl}_m to construct the 2-category of (enhanced) \mathfrak{sl}_n foams, via categorical skew Howe duality. This 2-category, in which 2-morphisms are given by certain singular surfaces, admits a simple presentation via generators and relations, and is the natural setting for a completely combinatorial description of Khovanov—Rozansky link homology, as well as its colored variant. Moreover, any “skew Howe 2-functor” from categorified quantum \mathfrak{sl}_m necessarily factors through the 2-category of foams, so one can view this as a combinatorial model for the homotopy category of \mathfrak{sl}_n matrix factorizations and (conjecturally) for a certain 2-category arising from derived categories of coherent sheaves on iterated Grassmannian bundles. Time permitting, we'll also see how this construction gives a topological interpretation of (direct limits of) categorified q -Schur algebras.

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