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Categorical diagonalization and Drinfeld centers

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What does it mean to diagonalize a functor? In linear algebra, given an operator f with a multiplicity-free minimal polynomial, Lagrange interpolation tells you how to construct idempotents projecting to eigenspaces as polynomials in f. We categorify this construction (only for invertible functors) with a healthy dose of homological algebra.

A very common tool in representation theory is to simultaneously diagonalize the center of an algebra A (or the centralizer of a subalgebra), or to simultaneously diagonalize large commutative subalgebras. The representation theory of the Hecke algebra in type A can be understood by examining the Young-Jucys-Murphy (YJM) operators, which form a large commutative subalgebra containing the center. One proves that these operators are (simultaneously) diagonalizable, and classifies their spectrum via standard tableaux. We categorify this story, though there are a few "twists."

What it means for a functor to be in the center (or to centralize a subcategory) is more complicated than its decategorified analogue (e.g. the Drinfeld center). We have recently defined a stronger notion of categorical center (the A_infinity Drinfeld center), and explain how the categorical YJM operators can be equipped with this additional structure.

Everything is joint work with Matt Hogancamp. Most of the talk will be based on work from 2017 and 2018 (but you're a new crowd for me), while the Drinfeld center work is from 2024.

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