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*Fermionic Modular Categories*

A fermion in a braided fusion category is an invertible object such that its generated braided fusion subcategory is equivalent to  $\text{Svec}$ , the category of super vector spaces. A fermionic modular category (or spin modular category) is a modular category with a fermion. The study of fermionic modular categories has been inspired by fermionic topological phases of matter and spin TQFT's.

The Mueger's centralizer of a fermion in a fermionic modular category is a super-modular category (a braided fusion category with Mueger's center equivalent to  $\text{Svec}$ ). Thus, a fermionic modular category is a braided  $\mathbb{Z}/2\mathbb{Z}$ -extension of the associated super-modular. We conjecture that every super-modular is included in a fermionic modular category in exactly 16-ways. We refer to this conjecture as the 16-fold way conjecture. The difficulty in resolving the 16-fold way conjecture lies in the existence of at least one minimal extension. We describe fermion in some families of braided fusion categories and analyze explicitly the minimal modular extensions of the super-modular categories using a construction called zesting.

The talk is based on joint work with Paul Bruillard, Tobias Hagge, Siu-Hung Ng, Julia Plavnik, Eric Rowell and Zhenghan Wang.