

Twisted Quantum Double model as local topological order

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In this talk, we examine topological quantum codes based on lattice models and their protection against decoherence. We focus on the Twisted Kitaev quantum double model, a Hamiltonian realization of the Turaev-Viro TQFT associated to the representations of the twisted Drinfeld double over a finite group. We will present our recent proof that this model satisfies the Local Topological Order (LTO) axioms on arbitrary lattices, extending the results of Jones, Naaijken, Penneys, and Wallick (2023) who introduced these axioms and verified them for Kitaev's Toric Code and Levin-Wen models. Our work also builds upon recent research by Chuah, Hungar, Kawagoe, Penneys, Tomba, Wallick, and Wei (2024) on boundary algebras of the Kitaev quantum double model. We establish that the ground state space constitutes a quantum error-correcting code, while highlighting the open challenge of determining explicit error correction procedures. This talk is joint work with Shawn Cui (Purdue University) and César Galindo (Universidad de los Andes).

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