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Michael H. Freedman*, Microsoft Research, 1 Microsoft Way, Redmond, WA 98052. *Quantum computation and modular functors.*

Quantum computing can be constructed on a novel mathematical/physical foundation: topological modular functors (the mathematics) and quantum media (the physics). This foundation is less intuitive than the current standard model: the fault tolerant quantum circuit based on “logical” and “physical” qubits. Its advantage is that it suggests a topological approach to physical implementation for which error will scale like $e^{\alpha \cdot length}$, where length is the scale at which the nontrivial topology of the physical system becomes manifest. This is the same error scaling that keeps a particle in a box and makes your PC function. (Received July 12, 1999)