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Logical operator tradeoff for local quantum codes[1] JEONGWAN HAAH, JOHN PRESKILL, IQI, Caltech — We study the structure of logical operators in local D-dimensional quantum codes, considering both subsystem codes with geometrically local gauge generators and codes defined by geometrically local commuting projectors. We show that if the code distance is d, then any logical operator can be supported on a set of specified geometry containing $\tilde{d}$ qubits, where $\tilde{d}d^{1/(D-1)} = O(n)$ and n is the code length. Our results place limitations on partially self-correcting quantum memories, in which at least some logical operators are protected by energy barriers that grow with system size. We also show that two-dimensional codes defined by local commuting projectors admit logical "string" operators and are not self correcting.

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