

Abstract Submitted
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Parafermion stabilizer codes¹ UTKAN GUNGORDU, RABINDRA NEPAL, ALEXEY KOVALEV, Univ of Nebraska - Lincoln — We define and study parafermion stabilizer codes [Phys. Rev. A 90, 042326 (2014)] which can be viewed as generalizations of Kitaev's one dimensional model of unpaired Majorana fermions. Parafermion stabilizer codes can protect against low-weight errors acting on a small subset of parafermion modes in analogy to qudit stabilizer codes. Examples of several smallest parafermion stabilizer codes are given. Our results show that parafermions can achieve a better encoding rate than Majorana fermions. A locality preserving embedding of qudit operators into parafermion operators is established which allows one to map known qudit stabilizer codes to parafermion codes. We also present a local 2D parafermion construction that combines topological protection of Kitaev's toric code with additional protection relying on parity conservation.

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