Abstract Submitted
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Optimization of Dynamical Decoupling Using Measurement Feedback[1] HERMANN UYS[2], MICHAEL BIERCUK[3], AARON VANDEVENDER, NOBUYASU SHIGA[4], WAYNE ITANO, JOHN BOLLINGER, NIST — We study the optimization of dynamical decoupling sequences using $^{9}Be^{+}$ ions in a Penning ion trap. We artificially synthesize the noise environment the ions see to emulate a variety of physical systems. By incorporating measurement feedback with a Nelder-Mead search algorithm, our locally optimized dynamical decoupling sequences (LODD) attain an order of magnitude improved error suppression compared to known sequences in noise environments with power spectra that have sharp, high-frequency cutoffs. The technique requires no prior knowledge of the noise spectrum. This work shows that optimized dynamical decoupling will be a useful tool in suppressing qubit errors below the fault-tolerant threshold for quantum computation.

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