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Rotary echos for the preservation of quantum memories HERMANN UYS, LUDWIG DE CLERQ, Council for Scientific and Industrial Research, NLC, Pretoria, South Africa, TODD GREEN, MICHAEL BIERCUK, Department of Physics, University of Sydney, Sydney, Australia, JOHN BOLLINGER, National Institute of Standards and Technology, Boulder, Colorado, USA — Dynamical decoupling is a promising technique for fighting the unwanted effects of decoherence in the context of quantum information. Decoupling techniques span two extremes from pulsed spin-echo sequences to optimized, continuous amplitude and phase modulation allowing arbitrary rotations on the Bloch sphere. On the one hand spin-echo techniques have the advantage of simplicity, while on the other optimized continuous modulation is expected to achieve better performance results at the cost complexity. That complexity exists both in the implementation and the modulation design, which either requires intimate knowledge of the relevant noise environment for numerical optimization or experimental optimization through feedback. Rotary echos represent an intermediate approach which have the advantage of continuous averaging of dephasing noise and pulsed compensation of fluctuations in the control field amplitude. Here we consider a classical dephasing noise environment and compare the performance of rotary echos to both pulsed and optimized continuous control decoupling techniques.

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