Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Soft decoding of a qubit readout apparatus[1] BENJAMIN D'ANJOU, WILLIAM A. COISH, McGill University — Qubit readout is commonly performed by thresholding a collection of analog detector signals to obtain a sequence of single-shot bit values. The intrinsic irreversibility of the mapping from analog to digital signals discards soft information associated with an *a posteriori* confidence that can be assigned to each bit value when a detector is well-characterized. Accounting for soft information, we show significant improvements in enhanced state detection with the quantum repetition code as well as quantum state/parameter estimation. These advantages persist in spite of non-Gaussian features of realistic readout models, experimentally relevant small numbers of qubits, and finite encoding errors. These results show useful and achievable advantages for a wide range of current experiments on quantum state tomography, parameter estimation, and qubit readout.

[1]We acknowledge support from NSERC, CIFAR, FRQNT and INTRIQ.

Benjamin D'Anjou
McGill Univ

Date submitted: 13 Nov 2014 Electronic form version 1.4