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Enhanced qubit readout via engineering of subpoissonian qubit relaxation[1] BENJAMIN D'ANJOU, WILLIAM A. COISH, Department of Physics, McGill University, Montreal, Quebec, H3A 2T8 Canada — Qubit readout is often performed by mapping the microscopic qubit state to a macroscopic signal using available experimental tools. In many cases, however, the physical dynamics of the readout apparatus may be engineered to further optimize the measurement procedure [1,2]. In recent years, several works have shown that qubit readout fidelity can be enhanced by forcing the qubit to relax through auxiliary intermediate states. The usual rationale for the use of these intermediate states is that 1) they couple more strongly to the readout device and/or that 2) they are longer-lived than the original qubit excited state. Here we theoretically show that the use of intermediate states can enhance readout even when neither of these effects is present. More precisely, we show that the addition of intermediate states leads to subpoissonian relaxation statistics which strongly reduce the randomness of the relaxation process and thereby significantly increase readout fidelity. Our work highlights a previously unappreciated aspect of qubit readout engineering and paves the way for further optimization of existing qubit readout schemes. REFERENCES: [1] D'Anjou & Coish, Phys. Rev. A 89 012313 (2014); [2] D'Anjou, Kuret, Childress & Coish, Phys. Rev. X 6 011017 (2016).

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