

MAR16-2015-001690

Abstract for an Invited Paper
for the MAR16 Meeting of
the American Physical Society

Toward a new culture in verified quantum operations

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Measuring error rates of quantum operations has become an indispensable component in any aspiring platform for quantum computation. As the quality of controlled quantum operations increases, the demands on the accuracy and precision with which we measure these error rates also grows. However, well-meaning scientists that report these error measures are faced with a sea of non-standardized methodologies and are often asked during publication for only coarse information about how their estimates were obtained. Moreover, there are serious incentives to use methodologies and measures that will continually produce numbers that improve with time to show progress. These problems will only get exacerbated as our typical error rates go from 1 in 100 to 1 in 1000 or less. This talk will survey existing challenges presented by the current paradigm and offer some suggestions for solutions that can help us move toward fair and standardized methods for error metrology in quantum computing experiments, and towards a culture that values full disclosure of methodologies and higher standards for data analysis.