Abstract Submitted
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**Efficient Approaches to Universal and Non-Universal Topological Quantum Computation**[1] HAITAN XU, Joint Quantum Institute/University of Maryland-College Park, College Park, MD, JACOB TAYLOR, Joint Quantum Institute/National Institute of Standards and Technology, Gaithersburg, MD — In topological quantum computation, information is encoded non-locally in exotic quasiparticles called anyons, and quantum gates are carried out by braiding the anyons in (2+1)-dimensional space-time. Universal topological quantum computation can be carried out by a universal set of quantum gates composed of single-qubit gates and controlled-phase gate and more efficiently together with controlled-controlled-phase gate. In this poster we show a unified scheme of encoding and computing for both universal and non-universal topological quantum computation with $SU(2)_k$ anyon models. We further give explicit construction of quantum gates, especially the controlled-controlled-phase gate, for universal topological quantum computation. Consequences of these ideas for the detection and correction of errors in topological quantum computation will be explored.

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