

Abstract Submitted  
for the MAR10 Meeting of  
The American Physical Society

**Unification of Universal and Non-Universal Topological Quantum Computation**<sup>1</sup> HAITAN XU, JACOB TAYLOR, University of Maryland-College Park — 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 talk we show a unified scheme of encoding and computing for both universal and non-universal topological quantum computation with  $SU(2)_k$  anyon models. And we give explicit construction of quantum gates, especially the controlled-controlled-phase gate, for universal topological quantum computation. The unified scheme can also be used to generalize the non-universal topological quantum computation to arbitrarily-many-qubit system. Besides, we will discuss error detection and correction in topological quantum computation.

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Date submitted: 20 Nov 2009

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