

Abstract Submitted  
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**Topological Quantum Computing with Only One Mobile Quasiparticle** STEVEN H. SIMON, Lucent Technologies, Bell Labs, NICK BONES-TEEL, Dept Physics and NHMFL, Florida State University, MICHAEL FREEDMAN, Microsoft Research, LAYLA HORMOZI, Dept Physics and NHMFL, Florida State University, NADA PETROVIC, UC Santa Barbara — In a topological quantum computer, universal quantum computation is performed by dragging quasiparticle excitations of certain two dimensional systems around each other to form braids of their world lines in 2+1 dimensional space-time. We show that any such quantum computation that can be done by braiding  $n$  identical quasiparticles can also be done by moving a single quasiparticle around  $n - 1$  other identical quasiparticles whose positions remain fixed. This result may greatly reduce the technological challenge of realizing topological quantum computation.

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