

Abstract Submitted
for the 4CS19 Meeting of
The American Physical Society

Creating a Probabilistic Quantum Superposition using Nuclear Magnetic Resonance. ETHAN ROBINSON, JEAN-FRANCOIS VAN HUELE, Brigham Young University — The no-superposition theorem states that given two arbitrary quantum states and two complex coefficients, an appropriate superposition of these two states cannot be created. By including a third quantum state as an ancilla however, a probabilistic procedure has been proposed that creates an un-normalized superposition [M. Oszmaniec *et al.* Phys. Rev. Lett. **116** 110403 (2016)]. We will review the challenges of creating a quantum superposition. We develop an automated program to output superpositions, we explore the possibility of applying this process to physical molecules. We introduce the concept of pseudo-pure states, and elaborate on the difficulty of procuring and detecting molecules in these states.

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Date submitted: 09 Sep 2019

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