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Super-fluid assisted quantum computation with group II atoms DAVID HAYES, SATYAN BHONGALE, IVAN DEUTSCH, University of New Mexico, UNIVERSITY OF NEW MEXICO TEAM — We investigate the possibility of using super-fluid immersion in order to suppress diabatic transitions in a system governed by a time-dependent Hamiltonian. A simple model has been used to study the question where quantum information is stored in the nuclear spin of a group II atom which is trapped in a harmonic oscillator that is traveling at a constant velocity inside of a stationary BEC. While the motion of the trap acts to heat the atom in the trap to higher vibrational levels, the motion of the trapped atom creates excitations in the BEC and carries the energy away in the form of phonons and decreases the effective heating.

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