Quantum Computing for Antineutrino Event Reconstruction AN-
DREA DELGADO, Oak Ridge National Laboratory, PROSPECT COLLABORA-
TION — PROSPECT is an antineutrino detector located above ground at the
High-Flux Isotope Reactor (HFIR) at Oak Ridge National Laboratory (ORNL).
The energy spectrum of antineutrinos emitted from the reactors is measured by
using a delayed coincidence technique through the inverse-beta-decay (IBD) inter-
action. The efficiency of current methods used to reconstruct antineutrino events
through the signatures of the positron annihilation and neutron capture in the liquid
scintillator is very low. A potential alternative to improve both reconstruction effi-
ciency and computing time is using quantum computing. In this way, the problem
of matching detector pulses consistent with the positron and neutron signals is cast
to an "earth movers distance" problem. The latter can then be encoded into an
Ising Hamiltonian, whose ground state can be computed in quantum annealers such
as the D-Wave quantum computer processor.

Andrea Delgado
Oak Ridge National Laboratory

Electronic form version 1.4