

The Sudbury Neutrino Observatory: A Nobel Use for Heavy Water

Arthur B. McDonald
Nobel Laureate

The loan of 1000 tonnes of heavy water provided a unique opportunity to perform a measurement of the basic properties of neutrinos by observing flavour change of electron neutrinos produced in the core of the sun, implying that neutrinos have finite mass. This measurement also provided a very accurate test of the calculations of the nuclear fusion process in the core of the sun, confined by gravity. This adds confidence to similar calculations applied to fusion confined magnetically for power applications on earth. To accomplish these Nobel-prize-winning measurements, a detector the size of a ten-storey building was built under ultra-clean conditions 2 km underground in an active nickel mine near Sudbury, Ontario. The science and engineering of this work will be discussed, including the substantial contributions from Chalk River Laboratories and innovative technology.

