

Arthur Bruce McDonald, (born August 29, 1943) is a Canadian astrophysicist. McDonald is the director of the Sudbury Neutrino Observatory Institute and holds the Gordon and Patricia Gray Chair in Particle Astrophysics at Queen's University in Kingston, Ontario. He was awarded the 2015 Nobel Prize in Physics jointly with Japanese physicist Takaaki Kajita.

He graduated with a B.Sc. in physics in 1964 and M.Sc. in physics in 1965 from Dalhousie University in Nova Scotia. He then obtained his Ph.D. in physics in 1969 from the California Institute of Technology.

McDonald worked as a research officer at the Chalk River Nuclear Laboratories northwest of Ottawa from 1970 to 1982. He became professor of physics at Princeton University from 1982 to 1989, leaving Princeton to join Queen's University. He is currently the University Research Chair at Queen's University and a board member at Perimeter Institute for Theoretical Physics.

Research:

Physicists have been investigating whether or not neutrinos have mass. Since the late 1960s, experiments have hinted that neutrinos may have mass. Theoretical models of the Sun predict that neutrinos should be made in staggering numbers. Neutrino detectors on the Earth have repeatedly seen fewer than the expected number of neutrinos. Because neutrinos come in three varieties (electron, muon, and tau neutrinos), and because solar neutrino detectors have been primarily sensitive only to electron neutrinos, the preferred explanation over the years is that those "missing" neutrinos had changed, or oscillated, into a variety for which the detectors had little or no sensitivity. If a neutrino oscillates, according to the laws of quantum mechanics, then it must have a mass.

In August 2001, a collaboration at the Sudbury Neutrino Observatory (SNO), a detector facility located 6,800 feet (2,100 m) underground in a mine outside Sudbury, Ontario, led by McDonald, checked in with a direct observation suggesting that electron neutrinos from the Sun really were oscillating into muon and tau neutrinos. SNO published its report in the August 13, 2001, issue of *Physical Review Letters*, and it is widely considered as a very important result. McDonald is a co-recipient of the 2007 Benjamin Franklin Medal in Physics, the 2015 Nobel Prize in Physics, and the 2015 Fundamental Physics Prize for the discovery of neutrino oscillations and demonstrating that neutrinos have mass.

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