

Antarctic IceCube observatory to hunt dark matter

December 23 2010



A handout picture taken on December 18 released by the US National Science Foundation (NSF) shows the final Digital Optical Module (DOM) which was to be deployed in the IceCube array, the world's largest neutrino observatory, built under the Antarctic tundra near the US Amundsen-Scott South Pole Station.

An extraordinary underground observatory for subatomic particles has been completed in a huge cube of ice one kilometre on each side deep under the South Pole, researchers said.

Building the [IceCube](#), the world's largest neutrino observatory, has taken a gruelling decade of work in the Antarctic tundra and will help scientists study space particles in the search for [dark matter](#), invisible material that makes up most of the Universe's mass.

The observatory, located 1,400 metres underground near the US

Amundsen-Scott South Pole Station, cost more than 270 million dollars, according to the US National Science Foundation (NSF).

The cube is a network of 5,160 [optical sensors](#), each about the size of a basketball, which have been suspended on cables in 86 holes bored into the ice with a specially-designed hot-water drill.

NSF said the final sensor was installed in the cube, which is one kilometre (0.62 miles) long in each direction, on December 18. Once in place they will be forever embedded in the [permafrost](#) as the drill holes fill with ice.

The point of the exercise is to study neutrinos, [subatomic particles](#) that travel at close to the speed of light but are so small they can pass through solid matter without colliding with any molecules.

Scientists believe neutrinos were first created during the Big Bang and are still generated by nuclear reactions in suns and when a [dying star](#) explodes, creating a supernova.



A handout picture taken on December 18, released by the US National Science Foundation (NSF) on December 23, shows the final Digital Optical Module (DOM) IceCube project members. An extraordinary underground observatory for subatomic particles has been completed in a huge cube of ice one kilometre

on each side deep under the South Pole, researchers said.

Trillions of them pass through the entire planet all the time without leaving a trace, but the IceCube seeks to detect the blue light emitted when an occasional neutrino crashes into an atom in the ice.

"Antarctic [polar ice](#) has turned out to be an ideal medium for detecting neutrinos," the NSF said in a statement announcing the project's completion.

"It is exceptionally pure, transparent and free of radioactivity."

Scientists have hailed the IceCube as a milestone for international research and say studying neutrinos will help them understand the origins of the Universe.

"From its vantage point at the end of the world, IceCube provides an innovative means to investigate the properties of fundamental particles that originate in some of the most spectacular phenomena in the Universe," NSF said.

Most of the IceCube's funding came from the NSF, with contributions from Germany, Belgium and Sweden.

Researchers from Canada, Japan, New Zealand, Switzerland, Britain and Barbados also worked on the project.

It is operated by the University of Wisconsin-Madison.

(c) 2010 AFP

Citation: Antarctic IceCube observatory to hunt dark matter (2010, December 23) retrieved 19 June 2024 from <https://phys.org/news/2010-12-antarctic-icecube-observatory-dark.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.