'Big crunch' or another 'Big Bang?'

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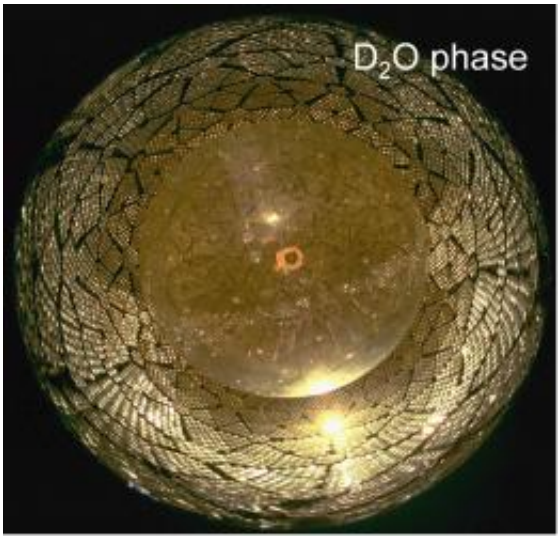

Located two kilometers underground in a nickel mine in Ontario, the Sudbury Neutrino Observatory consists of a 12-meter-diameter acrylic vessel filled with 1,000 tons of ultrapure heavy water. It is surrounded by almost 10,000 light -sensitive photomultiplier tubes. Credit: Minfang Yeh, Ph.D.

Will the universe expand outward for all of eternity and end in a vast, dark, cold, sterile, diffuse nothingness? Or will the “Big Bang” — the gargantuan explosion that formed the universe 14 billion years ago — end in the “Big Crunch?” Planets, stars and galaxies all hurtle inward and collapse into an incredibly hot, dense mass a billion times smaller than the period at the end of this sentence. And then … KA-BOOOOM!!! Another Big Bang and another universe forms and hurtles outward, eventually leading to new iterations of the Sun, the Earth, and you?

A special three-day symposium focusing on the weird subatomic particles that could help answer those compelling questions begins here today through August 18 at the 238th National Meeting of the American Chemical Society.

Titled “The Chemistry and Physics of Neutrino Experiments,” it will include almost two dozen reports on experiments to understand what Nobel Laureate Frederick Reines once termed “the most tiny quantity of reality ever imagined by a human being.” Neutrinos ("small neutral ones") are among the subatomic, or elementary, particles that make up all matter. They have no electric charge, virtually no mass, and pass through ordinary matter without causing any disruption.

Most neutrinos traveling through Earth come from the Sun, and trillions of solar electron neutrinos pass through every person each second. Although those properties make neutrinos difficult to detect, detecting and understanding them are key scientific pursuits, partly because of the implications for cosmology.

“The neutrino has the smallest observed mass for any elementary particle, but they appear in such astonishing numbers in the universe that they are a large portion of its mass,” said Steven Elliott, Ph.D. He is a physicist at Los Alamos National Laboratory in New Mexico. “At the moment, neutrinos may be massive enough to account for more mass in the universe than all stars combined.”

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