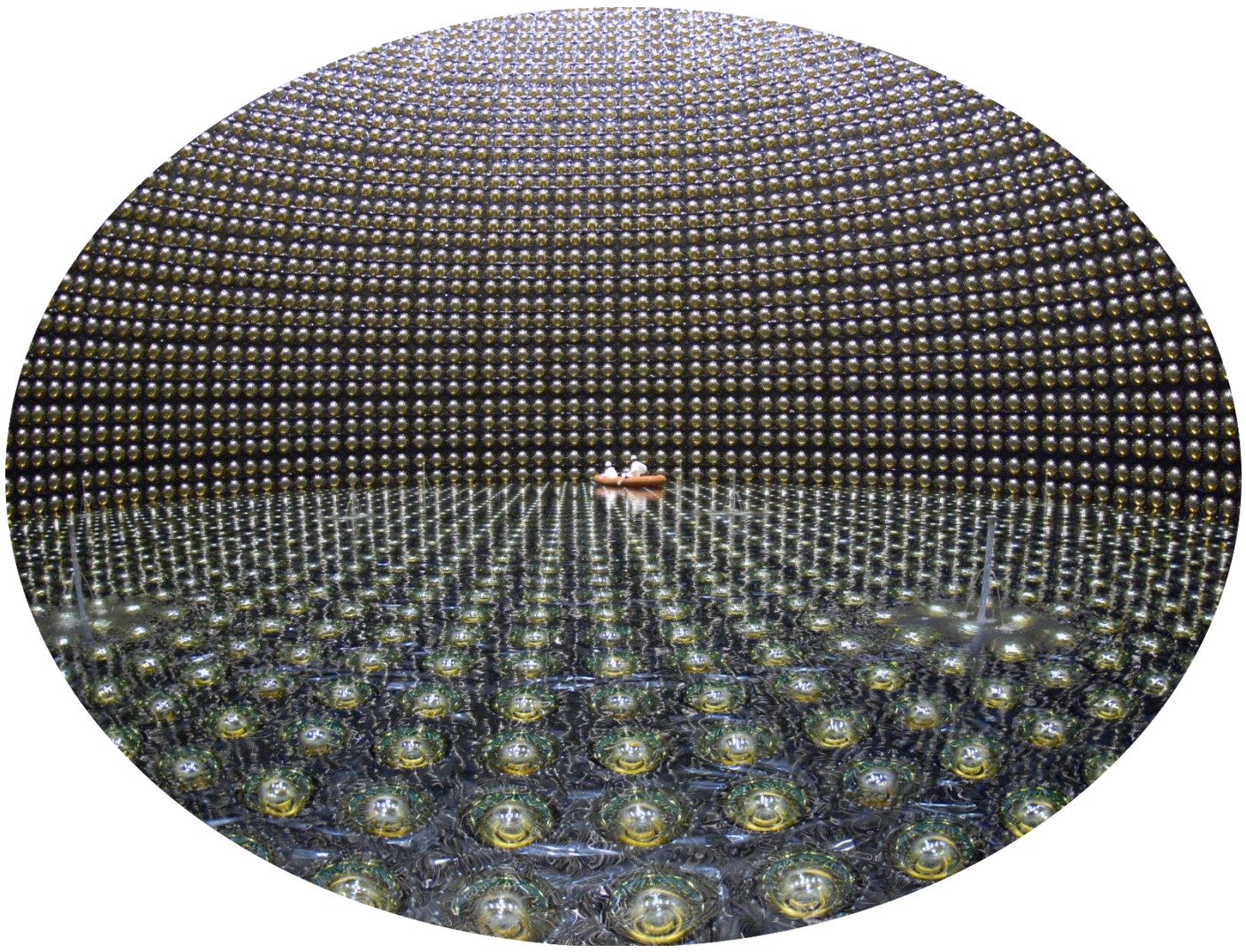
Neutrinos

The Best-Understood "Ghost Particle" in Nature



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Cardwell 102

Neutrinos are all around us and almost undetectable. They are created copiously in nuclear reactions inside stars, including our own star, the Sun. They interact so weakly with ordinary matter that a shell of lead six thousand miles thick would only stop one solar neutrino in a billion. Despite this difficulty, enough important discoveries have been made about neutrinos to merit 4 Nobel Prizes in Physics; one for the first detection of neutrinos, one for the first detection of neutrinos from space, one for the creation of artificial neutrino beams and the discovery that neutrinos come in different "flavors", and the latest in 2015 for the discovery that neutrinos oscillate between flavors. These discoveries have revealed ways we can use neutrinos in the study of processes in the sun, on earth, and in the cosmos. More fundamentally, they have helped establish the Standard Model of particle physics, which successfully accounts for all known interactions of matter in terms of just four kinds of forces.