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Neutrino Oscillations: From Discovery to Precision Measurements

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The neutrino is one of the elementary particles which make up the universe. Neutrinos are produced in the fusion reactions inside the sun and other stars, by natural radiation inside the earth, by supernovae, and by charged particles bombarding Earths atmosphere. Despite their abundance, they interact very rarely with matter, and sensitive detectors with large masses are required to observe their interactions. Neutrinos come in three types, called flavors, and experimental observations have established that neutrinos undergo flavor oscillations as they propagate due to quantum mechanical mixing between the mass states and flavor states. In this talk, I will discuss the experiments that discovered neutrino oscillations and describe what we hope to learn from current and future experiments.