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Search for the Neutrino Mixing Angle θ_{13}

KARSTEN HEEGER, University of Wisconsin-Madison

The discovery of neutrino flavor change and mixing in atmospheric, solar, and reactor experiments has provided compelling evidence for neutrino mass and oscillation. Two of the three neutrino mixing angles have been measured but the coupling of the electron neutrino flavor to the third mass eigenstate is yet unknown. Its corresponding mixing angle θ_{13} is a fundamental parameter of the new Standard Model and critical for future CP violation searches in the lepton sector. A non-zero θ_{13} is necessary for observing leptonic CP violation which plays an important role in leptogenesis. Past experiments provide limits on θ_{13} and have shown that it is much smaller than the other neutrino mixing angles. This talk will review our current knowledge of neutrino mixing from non-accelerator experiments and describe the prospects for future precision measurements of θ_{13}. Several next-generation oscillation experiments using reactor antineutrinos have been proposed and aim to reach a sensitivity of $\sin^2\theta_{13} < 0.01$ in the measurement of $\overline{\nu}_e$ disappearance. The search for θ_{13} with reactor antineutrinos will be complementary to the measurements with upcoming accelerator experiments and an important element in the program to understand the neutrino mixing matrix. The implications of an observation of non-zero θ_{13} will be discussed.