

# Neutrino Physics - Experiment

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## Abstract

The lectures on experimental neutrino physics will focus on the recent breakthroughs in neutrino oscillation studies and on progress in the searches for the absolute mass scale of neutrinos. Experiments using solar and atmospheric neutrinos have provided clear evidences for massive neutrinos. This has been further strengthened by the recent result from the KamLAND reactor oscillation experiment. Future long-baseline accelerator oscillation experiments will allow precision measurements of the relevant oscillation parameter. Accelerator experiments at short baseline yield contradicting results. These efforts are complemented by experiments aiming at measuring the absolute mass scale: tritium  $\beta$ -decay searches and searches for neutrinoless double beta decay ( $0\nu\beta\beta$ ). The following topics will be covered:

- introduction to oscillation experiments
- solar neutrino experiments:
  - 'classical' radiochemical experiments
  - water Cherenkov detectors: Super-Kamiokande and SNO
  - the KamLAND reactor experiment
- atmospheric neutrino experiments:
  - flavour ratios
  - zenith angles
  - oscillation modes: sterile vs. tau  $\nu$ 's
- Long baseline oscillation projects at Japan, US and EU
- Short baseline accelerator results
- The absolute mass scale of neutrinos: status and perspectives
  - cosmological and astrophysical studies
  - tritium beta decay experiments
  - double beta decay searches