Title: Accelerator-Based Neutrino Physics: Past, Present and Future

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Date: Monday 8 December, 2014, at 14:00

Place: CERN Council Chamber

Abstract

The study of the neutrino is the study of physics beyond the Standard Model. We now know that the neutrinos have mass and that neutrino mixing occurs causing neutrino flavour to oscillate as neutrinos propagate through space and time. Further, some measurements can be interpreted as hints for new particles known as sterile neutrinos. The measured values of the mixing parameters make it possible that the matter-antimatter (CP) symmetry may be violated through the mixing process. The consequences of observing CP-invariance violation in neutrinos would be profound. To discover CP-invariance violation will require measurements of exquisite precision. Accelerator-based neutrino sources are central to the future programme and advances in technique are required to deliver the “headline” long- and short-baseline experiments and the programmes required to minimise systematic uncertainties. I will explain how measurements made at CERN using the first ever neutrino beams shaped the Standard Model, how the exciting neutrino-physics programme of the next decades will depend on advances in accelerator capability and how CERN will continue to play leading and seminal roles in the programme.