

MIND: A Detector for Probing CP Violation at a Neutrino Factory.

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A neutrino factory provides a well defined neutrino beam with a wide range of oscillation channels for the direct detection of CP violation in the neutrino sector. To make use of this beam, a detector must have excellent charge discrimination capabilities because the un-oscillated background has the same flavour, but with the opposite charge to the signal. A magnetic field is required to achieve the required charge discrimination. The most reliable method for the generation of a magnetic field over a volume required for a neutrino factory experiment is using a Magnetized Iron Neutrino Detector (MIND). A detailed simulation of a MIND has been developed for the neutrino factory with advanced reconstruction and analysis software for the identification of muons resulting from the appearance of muon neutrinos from electron neutrino oscillations. The sensitivity of MIND at a neutrino factory to CP violating effects in this appearance oscillation is discussed, with consideration of systematic uncertainties. The combination of this detector concept at a neutrino factory provides the best sensitivity to CP violation of all possible future experiments and the best accuracy in the measurement of the CP violating phase delta.

Primary author: Dr BAYES, Ryan (University of Glasgow)

Presenter: Dr BAYES, Ryan (University of Glasgow)

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