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Baby MIND: A magnetised spectrometer for the WAGASCI experiment

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Abstract content

The WAGASCI experiment being built at the J-PARC neutrino beam line will measure the difference in cross sections from neutrinos interacting with a water and scintillator targets, in order to constrain neutrino cross sections, essential for the T2K neutrino oscillation measurements. A prototype Magnetised Iron Neutrino Detector (MIND), called Baby MIND, has been constructed at CERN and will act as a magnetic spectrometer behind the main WAGASCI target. Baby MIND will be installed inside the WAGASCI cavern at J-PARC in the Autumn of 2017. Baby MIND will be able to measure the charge and momentum of the outgoing muon from neutrino charged current interactions, to enable full neutrino event reconstruction in WAGASCI.

During the summer of 2017 Baby MIND was operated and characterised at the T9 test beam at CERN. Results from this test beam will be presented, including charge identification performance and momentum resolution for charged tracks. These results will be compared to the Monte Carlo simulations. Finally, simulations of charge-current quasi-elastic (CCQE) neutrino interactions in an active scintillator neutrino target, followed by the Baby MIND spectrometer, will be shown to demonstrate the capability of this detector set-up to perform cross-section measurements under different assumptions.

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