Chapter 4

The Short Baseline Near Detector and The Booster Neutrino Beam

Chapter 4 Opening

4.1 The Short-Baseline Near Detector Physics Program

4.2 The Short-Baseline Near Detector

The SBND detector is a 112 tons LArTPC located 110 m from the BNB target. It is 5 m in length, 4 m in height and 4 m in width. The detector is made of 2 TPCs sharing the same Cathode Plane Assembly (CPA) at the centre, each with a drift length of 2 m. A complex Photon Detection System (PDS) is located behind each of the Anode Plane Assemblies (APAs) on the dege of the detection. The PDS also includes a passive component made up of TPB-coated reflective foils installed at the CPA. The TPC is placed inside a membrane cryostat, of which is surrounded by seven planes of Cosmic Ray Tagger (CRT) to provide a full coverage of cosmic rejection.

4.2.1 Time Projection Chamber

The APA of SBND is made up of 3 wire planes: two induction planes, referred to as U and V, oriented at an angle ±60° to the vertical collection plane, referred to as Y, shown as green, blue and red in Fig. **??**. Each wire plane consists of 150 μm diameter copper-beryllium wires with a spacing of 3 mm. The wires are tensioned to 7 N to prevent sagging when being cooled down at liquid argon temperature at 87 K[]

4.2.2 Photon Detection System

Photomultiplier Tubes

is coated on foils placed on the cathode , which reflect the incident photon back towards the PDS located behind the anode. This also shifts the wavelength of the photon which

X-ARAPUCAs

4.2.3 Cosmic Ray Taggers

4.2.4 Data Acquisition

4.2.5 Trigger

4.3 The Booster Neutrino Beam

4.4 Concluding Remarks