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THE TOPAZ TIME PROJECTION CHAMBER

T.Kamae, H.Aihara, R.Enomoto, H.Fujii, T.Fujii, R.Itoh, N.Kusuki, T.Miki, A.Shirahashi, T.Takahashi, M.Tanaka, Univ. of Tokyo; A.DuBois, R.C.Jared, F.Kirsten, P.Salz, LBL; H.Ikeda, H.Iwasaki, S.Iwata, T.Matsuda, K.Nakamura, A.Yamamoto, M.Yamauchi, KEK

A *Time Projection* Chamber(*TPC*) has been built as a central-tracking and particle-identification device for the TOPAZ e^+e^- experiment at TRISTAN. The design was optimized to obtain high momentum and dE/dx resolutions, and to make the system easy to maintain. Highlights of the basic design and some test results are presented. Dimension of the TOPAZ-TPC is 260 cm in diameter and 260 cm in axial length. New features of this TPC include operation in 4 atm Argon 90% + Methane 10% gas, use of glass-fiber reinforced epoxy cylinders as a pressure vessel and a high voltage insulator, and a fin-type field cage. Many improvements are made in the sector design; extensive use of multilayer printed circuit boards, improvements on electrical grounding and heat shielding, implementation of gated grid and field-shaping strips, and use of zigzag-shaped cathode pads. The preamplifier has an equivalent input noise of ~300 electrons (RMS). Also described are FASTBUS based CCD-digitizer and test pulse system. LASER beacons and Fe^{55} are used to calibrate the entire system.

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PERFORMANCE OF THE TOPAZ-TPC SECTOR

H.Aihara, R.Enomoto, H.Fujii, T.Fujii, R.Itoh, T.Kamae, N.Kusuki, T.Miki, A.Shirahashi, T.Takahashi, M.Tanaka, Department of Physics, University of Tokyo, Tokyo 113, JAPAN; A.DuBois, R.C.Jared, F.Kirsten, P.Salz, Lawrence Berkeley Laboratory, University of California, Berkeley, CA94720, USA

Performance of the TOPAZ-TPC(Time Projection Chamber) sector is presented based on studies using prototype and production models with Fe^{55} X-ray source and Nitrogen LASER. Various parameters needed for operation at 4 atm Argon 90% + Methane 10% gas were studied. The Fe^{55} pulse height spectrum from a single sense wire had typically the width of 9% (RMS). The gain uniformity, which is essential to obtain the high resolution dE/dx measurement, was found to be 1.9±1.0% over the entire sector. This shows that the water-cooling system with a large heat shielding plane is effective to keep the gas temperature around sense wires uniform within 0.3°C and that the field-shaping strips installed at the end of wires hold the gain up to the sector boundary. These field-shaping strips also reduce the distortion in the electron drift path near the end of wires. The pick-up noise from the gated grid was found to be sufficiently small. Also studied was the zigzag-shaped cathode pad response. First few production models are now being tested. These results will also be reported.