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dE/dx Measurements in a Drift Chamber Filled with a CO_2(90%)/Isobutane (10%) Mixture

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Abstract

We have studied particle identification performance of a mini-jet-cell-type drift chamber filled with a CO_2(90%)-Isobutane (10%) gas mixture. The chamber, having only 10 sampling layers but with the same cell structure as with the central tracking detector we proposed for a future linear e^+e^- collider JLC, has been exposed to e, π, and p beams with momenta of 0.6-1.5 GeV/c at the KEK-PS. The beam test results show good particle separation capability under practical operating conditions of the chamber. For the JLC central tracker with 80 sampling layers of 10 mm thickness, the r.m.s. resolution of the dE/dx measurement will be 5.2 % for minimum-ionizing particles at atmospheric pressure.

Keywords: Drift chamber, particle identification, dE/dx measurement