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Beam Test and Simulation of Prototypes for the ALICE Silicon Pixel Detector

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The silicon pixel detector (SPD) of the ALICE experiment in preparation at the Large Hadron Collider (LHC) at CERN is designed to provide the excellent vertex resolution needed for measuring heavy ion production in heavy ion collisions at very high energies and high multiplicity. The detector consists of 1200 read out ASICs, each consisting of 8192 pixels, bump-bonded to 200 μ m thick silicon sensors. The SPD forms the innermost part of the Inner Tracking System (ITS), which also includes silicon drift and silicon strip detectors. Single assembly prototypes of the ALICE SPD have been tested at the CERN SPS using high energy proton/pion beams in 2002 and 2003. We report on the experimental determination of spatial precision and detector efficiency obtained from these tests. We also report on the first combined beam test of the pixel prototypes, together with prototypes of the other ITS silicon technologies, at the CERN SPS in November 2004. The issue of SPD simulation using GEANT and FLUKA is briefly discussed.

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