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Evolution of the Landau spectral peak produced by 50 GeV protons in Si detector with smoothly variable thickness

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The ionization loss of relativistic protons moving in the depleted layer of Si detector is measured for different thicknesses of the depleted layer. The thickness of Si crystal of the detector was 300 μm, the thickness of the depleted layer was driven with applied high voltage from the detector power supply and was in the region 160–300 μm. The position and the width of the Landau spectral peak were measured as a dependence on the applied high voltage under normal orientation of the crystal to the proton beam axis. Additional measurements were performed for the maximal thickness of the depleted layer and different orientation angles of the crystal relative to the proton beam axis. The corresponding thicknesses of the depleted layer along the protons trajectory were in the range 300–1440 μm respectively to the orientation angles 0–78°. In both cases the evolution of the Landau spectral peak was observed. The experimental data are compared to results of calculations.

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