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Performances of the Double-Crystal Setup at CERN SPS Accelerator for Physics beyond Colliders Experiments

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Abstract : We are currently presenting the recent results from the CERN accelerator facilities obtained in the frame of the UA9 Collaboration. The UA9 experiment investigates how a tiny silicon bent crystal (few millimeters long) can be used for various high-energy physics applications. Due to the huge electrostatic field (tens of GV/cm) between crystalline planes, there is a probability for charged particles, impinging the crystal, to be trapped in the channeling regime. It gives a possibility to steer a high intensity and momentum beam by bending the crystal: channeled particles will follow the crystal curvature and deflect on the certain angle (from tens microradians for LHC to few milliradians for SPS energy ranges). The measurements at SPS, performed in 2017 and 2018, confirmed that the protons deflected by the first crystal, inserted in the primary beam halo, can be caught and channeled by the second crystal. In this configuration, we measure the single pass deflection efficiency of the second crystal and prove our opportunity to perform the fixed target experiment at SPS accelerator (LHC in the future).

Keywords : channeling, double-crystal setup, fixed target experiment, Timepix detector
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