

Channeling 2018



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High-Energy e^-/e^+ Spectrometer via Coherent Interaction in a Bent Crystal

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The atomic order of a crystalline structure generates an electrostatic field capable of confining charged particle trajectories. Depending on the charge sign, points of equilibrium of the oscillatory motion under channeling lie between or on atomic planes for positive and negative particles, respectively. This forces positive particles to stably oscillate far from the planes, while negative ones repeatedly cross them, causing a tremendous discrepancy between the deflection efficiency of positive and negative particles under channeling. We suggest the use of charged-particles interactions in oriented bent crystals as a novel non-cryogenic passive charge spectrometer for the measurement of the positron to electron ratio to aid the search for dark matter in the Universe in satellite-borne experiment. The limited angular acceptance makes this technique particularly suited for directional local sources of energetic charged particles.

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