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A Search for nEDM and New Constraints on Short-range "Pseudo-magnetic" Interaction Using Neutron Optics of Noncentrosymmetric Crystals

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Here we discuss new effects resulting from the recently predicted and discovered strong electric fields (up to 109 V/cm), which affect the neutrons moving through noncentrosymmetric crystals.

That opens, for example, a new way for searching the electric dipole moment of a neutron (nEDM) with the sensitivity comparable or exceeding that for the most sensitive now magnetic resonance method.

A series of experiments on neutron diffraction and optics was carried out in Gatchina at the PNPI reactor WWR-M to study the polarization phenomena in the noncentrosymmetric quartz crystals, as well as the test experiment at ILL reactor confirmed this conclusion.

Also the direct constraint on the parameters of short range pseudomagnetic interaction of free neutron with matter is obtained from that test experiment.

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