

On the Significant Enhancement of the Stern-Gerlach Effect for Neutron, Diffracting in a Crystal at Bragg Angles Close to the Right One

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The essential magnification of any external force, acting on a neutron under diffraction at the Bragg angles close to the $\pi/2$ for Laue diffraction case is discussed. Such enhancement is due, on the one hand, to the smallness of the Darwin width compared to the Bragg angle, and, on the other, to the significant slowing down of the neutron in the crystal at diffraction angles close to the right one. As well a neutron trajectory "curvature" in crystal is discussed. With taking into account of the Bormann effect of abnormal absorption it is shown that the Stern-Gerlach effect will be sharply displayed for diffracting neutron in a weak gradient of magnetic field. The enhancement factor for neutron in the crystal can reach magnitudes of about 7 orders in comparison with a "free" neutron in the same field gradient. The experimental results are demonstrated.