



Contribution ID: 186

Type: Poster

7-order enhancement of the Stern-Gerlach effect of neutrons diffracting in a crystal

Tuesday, 18 October 2022 17:18 (1 minute)

We spatially split a non-polarized neutron beam passing through a 21.6 cm thick silicon crystal into two polarized beams with opposite spin orientations using a small magnetic field gradient of 3.1 G/cm (analogy to the Stern-Gerlach effect). To do this we used a two-crystal Laue diffraction scheme and Bragg angles close to the orthogonality. At the maximum achieved diffracting angle $\theta_B = 82^\circ$, we got the splitting of 4.1 ± 0.1 cm. The amplification factor compared to that in the absence of the crystal was 1.1×10^7 in good agreement with the theory [1].

References

1. V.V. Voronin, S.Yu. Semenikhin, D.D. Shapiro et al, Physics Letters B **809** (2020) 135739

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Session Classification: BBQ - Drinks & Posters