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Penetration Depth Anisotropy in MgB_2 measured by Small-Angle Neutron Scattering D. PAL, L. DEBEER-SCHMITT, T. BERA, M.R. ESKILDSEN, Department of Physics, University of Notre Dame, Notre Dame, IN 46556, C.D. DEWHURST, R. CUBITT, Institut Laue-Langevin, 6 Rue Jules Horowitz, F-38042 Grenoble, France, J. JUN, N.D. ZHIGADLO, J. KARPINSKI, Laboratory for Solid State Physics, ETH, CH-8093 Zurich, Switzerland, V.G. KOGAN, Ames Laboratory and Department of Physics and Astronomy, Iowa State University, Ames, Iowa 50011 — Traditionally the anisotropy of a type-II superconductor is described either by $\gamma_\lambda = \lambda_c/\lambda_{ab}$ or $\gamma_H = H_{ab}/H_c = \xi_{ab}/\xi_c$. with the two considered to be identical. However, in materials with anisotropic gaps this is generally not the case. MgB_2 represents an extreme case in which $\gamma_\lambda \neq \gamma_H$. While there is consensus on the value of $\gamma_H(T)$, measurements of γ_λ are still contradictory. Here we demonstrate a novel use of small-angle neutron scattering to determine γ_λ in MgB_2, by measuring the misalignment between the applied field and the direction of the flux-line lattice as the field is rotated between the c axis and the basal plane. Using a two-band/two-gap model we can fit the angular dependence of the misalignment, yielding $\gamma_\lambda = 1.1 \pm 0.2$ at 4.9 K and 0.4 T.

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