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Vortex Core Size Measurements in YNi_2B_2C and $TmNi_2B_2C$ P. DAS, C. RASTOVSKI, K. SCHLESINGER, M.R. ESKILDSEN, University of Notre Dame, IN, USA, J.M. DENSMORE, Army Research Laboratory, Aberdeen, MD, USA, S.L. BUD'KO, P.C. CANFIELD, Ames Laboratory and Iowa State University, IA, USA — The vortex core size in type-II superconductors is typically determined from measurements of a related quantity combined with a theoretical model, with the best known example being the upper critical field and the GL-result: $\xi = \sqrt{\phi_0/2\pi H_{c2}}$. However, for many non-conventional superconductors such an approach is problematic, as for example in the case of $TmNi_2B_2C$ and $CeCoIn_5$ where H_{c2} is suppressed by coexistence with magnetism. In such instances a direct, model independent determination of the vortex core is desirable, and can be obtained by small-angle neutron scattering (SANS) measurements of the vortex lattice (VL) if a sufficient number of reflections are recorded [J. M. Densmore *et al.*, Phys. Rev. B **79**, 174522 (2009)]. Here we report on VL SANS studies on two members of the borocarbide superconductors, YNi_2B_2C and $TmNi_2B_2C$. Non-magnetic Y1221 measurements at 0.2 and 0.5 T show clear evidence of a vortex squeezing effect. In magnetic Tm1221 the vortex core size was found to be $\xi = 10.8$ nm, roughly a factor of two smaller than the value estimated by the measured H_{c2} (21 nm). Supported by NSF award no. DMR-0804887 (Notre Dame) and DOE BES contract No. DE-AC02-07CH11358 (Ames).

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