

Abstract Submitted  
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**Measurement of the Penetration Depth and Coherence Length of MgB<sub>2</sub> in All Directions Using Transmission Electron Microscopy** JAMES LOUDON, University of Cambridge, S. YAZDI, T. KASAMA, Technical University of Denmark, N.D. ZHIGADLO, J. KARPINSKI, ETH Zurich — We demonstrate that images of flux vortices in a superconductor taken with a transmission electron microscope can be used to measure simultaneously the penetration depth and coherence length in all directions at the same temperature and magnetic field. This is particularly useful for MgB<sub>2</sub> where these quantities vary with the applied magnetic field and values are difficult to obtain at low field or in the *c* direction. We obtained images of flux vortices from a sample cut in the *ac* plane by focussed ion beam milling and compared these with simulations which accounted for flux vortices with a non-zero core in a thin, anisotropic superconductor. This gave penetration depths  $\Lambda_{ab} = 100 \pm 35$  nm,  $\Lambda_c = 120 \pm 15$  nm and coherence lengths  $\xi_{ab} = 41 \pm 13$  nm and  $\xi_c = 34 \pm 10$  nm at 10.8 K in a field of 4.8 mT. The implications of these values for type-1.5 superconductivity will be discussed.

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