## Abstract Submitted for the MAR17 Meeting of The American Physical Society

Thin film textured erbium for superconducting spintronics NATHAN SATCHELL, JOSHANIEL COOPER, CHRISTY KINANE, TIMOTHY CHARLTON, STFC Rutherford Appleton Lab, JAMES WITT, GAVIN BURNELL, University of Leeds, MACHIEL FLOKSTRA, St. Andrews University, PETER CURRAN, University of Bath, SEAN LANGRIDGE, STFC Rutherford Appleton Lab — Bulk erbium has an exceptionally rich magnetic phase diagram. It exhibits antiferromagnetic, spiral and conical phases, which could be technologically important if these phases can be reproduced in the thin film regime. In previous works it was found that with reduced dimensionality many of the bulk phases are suppressed (even in films as thick as 2000 nm). We have studied strongly textured, DC magnetron sputtered films of Er in a thickness range 6 - 200 nm. Using neutron diffraction and polarised reflectometry, the nature of the spin spiral and conical phases were directly probed. On the thickest samples it was found, using neutron diffraction, that all bulk magnetic phases were retained for the first time in a thin film. On reduction to the thinnest film of 6 nm we used polarised neutron reflectometry to extract a depth dependent magnetisation profile. Even at this thickness there is evidence that the spiral magnetisation is retained. Finally, we combine Er with superconducting Nb and find a proximity effect which is both large in magnitude and tuneable with a field history.

> Nathan Satchell STFC Rutherford Appleton Lab

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