Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Superconducting Proximity Effects in Epitaxial Cr/Nb Bi-Layers: A Novel Approach Using a Three-Terminal Device Architecture[1] PAUL B. WELANDER, MICHAEL R. VISSERS, JAMES N. ECKSTEIN, Department of Physics and Frederick Seitz Materials Research Laboratory, University of Illinois at Urbana-Champaign, Urbana, IL 61801 — We have studied the proximity effects between a superconductor (Nb) and a SDW antiferromagnet (Cr) using epitaxial thin films and a novel three-terminal device structure. Single-crystal Cr/Nb bi-layers are grown on sapphire by means of molecular beam epitaxy. Interface quality is crucial – oxidation of the Cr surface before Nb deposition can render the proximity effects unseen. Our three-terminal device architecture allows independent measurement of the bi-layer sheet-resistance and the Nb-Cr contact resistance. We find that the contact resistance goes to zero a few tenths of a degree below the Nb critical temperature. Over this temperature range the junction conductance increases at a rate well beyond that predicted by Andreev reflection alone. The bi-layer sheet resistance also shows a slight increase with decreasing temperature. As the devices are cooled further we find both linear and non-linear current-voltage regimes.

[1]This work was supported by NSF.

Paul B. Welander
Department of Physics and Frederick Seitz Materials Research
Laboratory, University of Illinois at Urbana-Champaign, Urbana, IL 61801

Date submitted: 30 Nov 2006 Electronic form version 1.4