

Abstract Submitted  
for the MAR07 Meeting of  
The American Physical Society

**Magnetic Penetration Depth in Overdoped Tl-2201 Superconductors**<sup>1</sup> JESS H. BREWER, SCOTT STUBBS, DARREN PEETS, RUIXING LIANG, WALTER HARDY, DOUG BONN, Univ. of British Columbia, PETER RUSSO, TRIUMF, JEFF SONIER, Simon Fraser Univ. — Studies of the magnetic penetration depth  $\lambda_{ab}$  via the  $\mu^+$ SR lineshape in the vortex state has revealed a great deal about *underdoped* cuprate superconductors, including the original confirmation of *d*-wave superconductivity. However, *overdoped* cuprates have been neglected, partly due to the difficulty of doping sufficiently to decrease  $T_c$ , and partly because the overdoped materials are thought to be “ordinary Fermi liquid” superconductors, about which many presume we already know everything. In the belief that we may *not* know everything about these materials, the UBC group has set out to grow high quality crystals of  $\text{Tl}_2\text{Ba}_2\text{CuO}_{6+\delta}$  (Tl-2201), which can be made very overdoped, to the point of  $T_c \rightarrow 0$ . We have now used  $\mu^+$ SR lineshape studies to measure  $\lambda_{ab}$  as a function of  $T$  and  $H$  for crystal mosaics with  $T_c$ 's of 72, 60 and 46 K. As expected,  $\lambda_{ab}^{-2}(T = 0)$  continues to increase with doping beyond optimal doping, but then decreases again with higher doping. We also find a strong dependence on the applied field  $H$ . The low- $T$  behavior of  $\lambda_{ab}^{-2}(T)$  is again strongly linear, as expected for a *d*-wave superconductor.

<sup>1</sup>We gratefully acknowledge the support of NSERC and the CIAR.

Jess H. Brewer  
Univ. of British Columbia

Date submitted: 19 Nov 2006

Electronic form version 1.4