

Abstract Submitted  
for the MAR05 Meeting of  
The American Physical Society

**Bose-Einstein Condensation and atomic kinetic energies in liquid  $^3\text{He}$ - $^4\text{He}$**  SOULEYMANE DIALLO, University of Delaware, JONATHAN PEARCE, Institut Laue-Langevin, RICHARD AZUAH, NIST Center for Neutron Research, HENRY GLYDE, University of Delaware — We present Deep Inelastic Neutron Scattering (DINS) measurements of mixtures of liquid  $^3\text{He}$ - $^4\text{He}$  in both the superfluid and normal phases. The measurements were performed on the MARI time-of-flight spectrometer at the ISIS pulsed spallation neutron source, at wavevectors  $26 \leq Q \leq 29 \text{ \AA}^{-1}$  for four different  $^3\text{He}$  concentrations  $x$ . From the data, we extract both the condensate fraction  $n_0$  and the single particle kinetic energies  $\langle K_3 \rangle$  and  $\langle K_4 \rangle$  of each isotope. We find a relative increase in  $n_0$  from 7.25% for the bulk data ( $x = 0\%$ ) to  $\sim 12\%$  for  $x = 20\%$ , in agreement with theoretical calculations but less than that found in the only other DINS measurement of  $n_0$ . The measured values of  $\langle K_3 \rangle$  ( $\sim 11 \text{ K}$  for  $x = 10\%$ ) fall in the range of previous DINS measurements. Surprisingly,  $\langle K_4 \rangle$  is found to be somewhat independent of  $x$ , in contrast to most calculations and measurements.

Souleymane Diallo  
University of Delaware

Date submitted: 21 Dec 2004

Electronic form version 1.4