

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

$\mu$SR study of real space magnetic phase separation in Mn$_3$O$_4$\textsuperscript{1}

ALEXANDER ZAKJEVSKII, ALEXANDER THALER, DALMAU REIG-IPLESSIS, ISAAC BRODSKY, YEWON GIM, University of Illinois - Urbana, ADAM ACZEL, Oak Ridge National Laboratory, S. LANCE COOPER, GREGORY MACDOUGALL, University of Illinois - Urbana — The material Mn$_3$O$_4$ is a magnetically frustrated spinel which exhibits three distinct magnetic transitions below 42 K. Recent work has shown that the lowest of these is accompanied by an orthorhombic structural distortion, implying strong magneto-elastic coupling. Magnetic force microscopy (MFM) measurements indicate a substantial region of phase coexistence below this transition, with domain walls that order on the mesoscale. It is further suggested that a tradeoff in ordered volume with field may play a role in the recent quantum phase transition reported in this material. To follow up on these ideas, we have performed a series of zero- and transverse-field muon spin rotation measurements on single-crystal Mn$_3$O$_4$. The zero-field data clearly show the co-existence of ordered and disorder volumes, consistent with MFM results. Here we report these data, and further attempts to vary the ordered volume with applied field. We will discuss both zero- and transverse-field results within the context of the current understanding of the material.

\textsuperscript{1}This material is based upon work supported by the U.S. Department of Energy, Office of Science, Office of Basic Energy Sciences, under award number DE-FG02-07ER46453.

Alexander Zakjevskii
University of Illinois - Urbana

Date submitted: 14 Nov 2014

Electronic form version 1.4