MAR17-2016-020327

Abstract for an Invited Paper
for the MAR17 Meeting of
the American Physical Society

Uniaxial pressure dependence of the magnetic ordered moment and transition temperatures in BaFe2-xNixAs2

PENGCHENG DAI, Rice University

We use neutron diffraction and muon spin relaxation to study the effect of in-plane uniaxial pressure on the antiferromagnetic phase in $BaFe_2As_2$ and superconducting $BaFe_{1.915}Ni_{0.085}As_2$. We find that the ordering temperature (TN) increases in both compounds, consistent with calculations of the static spin susceptibility within the random-phase approximation. At low temperature, where uniaxial pressure mechanically detwins the crystals, we find that the magnetic ordered moment in $BaFe_{1.915}Ni_{0.085}As_2$ increases by as much as 20% under 40 MPa of pressure, whereas no change was observed in $BaFe_2As_2$. The doping and uniaxial pressure dependence of the magnetic ordered moment is captured by DFT+DMFT calculations which suggests the pressure-induced increase near superconductivity is closely related to the diverging nematic susceptibility. We will also present new spin wave data on fully detwinned $BaFe_2As_2$.