$^{77}$Se NMR Study of K$_x$Fe$_{2-y}$Se$_2$-zSz

DAVID TORCHETTI, MINGXUAN FU, TAKASHI IMAI, Department of Physics and Astronomy, McMaster University, H.C. LEI, C. PETROVIC, Condensed Matter Physics and Materials Science Department, Brookhaven National Laboratory — We will present a $^{77}$Se NMR study of the superconducting properties of the recently discovered K$_x$Fe$_{2-y}$Se$_2$ ($T_c \sim 33$ K), in a temperature range of 4 to 250 K [1]. Our Knight shift data reflect the progressive decrease in uniform spin susceptibility with temperature, in analogy with FeSe and iron-arsenide systems. Nuclear spin-lattice relaxation rate data shows no Hebel-Slichter coherence peak, nor any enhancement of antiferromagnetic spin fluctuations (AFSF) toward $T_c$. We have also conducted $^{77}$Se NMR measurements on K$_x$Fe$_{2-y}$Se$_{0.4}$S$_{1.6}$ (non-superconducting) and K$_x$Fe$_{2-y}$Se$_{1.2}$S$_{0.8}$ (T$_c \sim 21$ K) to study the effect of sulphur substitution in this superconductor [2]. Sulphur applies a chemical pressure on the lattice, because it has the same valence as Selenium but less than half the ionic radius. We again measure NMR Knight shift and nuclear spin-lattice relaxation rate $1/T_1$, and find that both are suppressed with S substitution. We will discuss these results in comparison with K$_x$Fe$_{2-y}$Se$_2$.