Abstract Submitted
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The status of the ultra-high resolution spectroscopy at the HFIR[1] FANKANG LI, Oak Ridge National Lab, JIAZHOU SHEN, Indiana University, LOWELL CROW, QIANG ZHANG, FENG YE, Oak Ridge National Lab, THOMAS KELLER, Forschungs-Neutronenquelle Heinz Maier-Leibnitz (FRM II), OLIVIER DELAIRE, Duke University, ROGER PYNN, Indiana University, JAIME FERNANDEZ-BACA, Oak Ridge National Lab — To measure the crystal lattice distortion or the lifetime of weak interactions among quasiparticles, such as phonons, electrons and magnons, with high resolution, the key is to break the inverse relationship between the resolution and useable flux. By using the Larmor precession of the neutron spin inside a given magnetic field, its momentum or energy change during the interactions with sample can be measured with ultra-high resolution. Therefore, this unique property of neutron provides us with another approach to overcome some of the limitations of conventional neutron scattering instruments. Also, it can make the best use of all the available neutrons by allowing the use of large divergent beams. The progress on upgrading the HB-1 polarized triple axis spectrometer at the High Flux Isotope Reactor of ORNL with superconducting magnetic Wollaston prisms will be presented. For neutron diffraction, the achievable resolution of the absolute peak splitting and relative lattice distortion (Δd/d) can be 2x10^{-4} and 1x10^{-6} relatively. While for inelastic scattering, for example phonon linewidth measurements, the resolution can be <10ueV.

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