Dear Hard Condensed Matter Users of the HFIR at ORNL:

As the deadline approaches for the next neutron scattering proposal call at ORNL, here are some quick updates about the user program for hard condensed matter science at the High Flux Isotope Reactor (HFIR):

1. Proposal deadline

IPTS is now open to accept proposals for cycle 2018-B, with a **Feb. 21 deadline at noon**: http://www.ornl.gov/sci/iums/ipts/

2. Transportation between HFIR and the ORNL guest house

Note that it takes 10 – 15 minutes to drive between the HFIR site and the ORNL guest house. ORNL offers a taxi service between the two locations, but the taxis only run on weekdays between 8 AM – 4 PM. Therefore, it is highly desirable for at least one member of your experimental team to arrive at ORNL with a car. If this is not possible, please let the instrument team know in advance so other transportation arrangements can be made.

3. Neutron alignment station

If you need to align a single crystal for an ORNL neutron scattering experiment, please email the instrument team well in advance of your experiment, so alignment time can be reserved for you on CG-1B. Note that we have a first come, first served scheduling system for this instrument. Also, let the instrument team know if you are experienced with sample alignments or if you will require significant assistance.

4. Sample environment

(i) **High Temperature Experiments** (> 400K): A high temperature checklist is required to perform a high temperature experiment at HFIR. It is ideal to fill out the checklist and return it as soon as it is received so that any issues can be addressed and mitigated quickly. Please consider the sample holder material in reference to the sample material for any reactions that may occur at the experimental temperatures. The high temperature equipment dimensions and temperature range information are available on the public sample environment webpage: https://neutrons.ornl.gov/sample/list/furnaces. For more information, please contact Bekki Mills (millsra@ornl.gov).

(ii) **Ultra-low Temperature and/or Magnetic Field Experiments:** (< 1.5K): Please ensure that a properly aligned and mounted single crystal or a loaded powder sample can is provided to the sample environment team at least 24 hours before the experiment is scheduled to begin to maximize data collection time on the instrument. Also, note that dilution fridge experiment changeovers will begin promptly at 8 AM. The ultra-low temperature equipment dimensions and temperature range information are available on the public sample environment webpage:

https://neutrons.ornl.gov/sample/list/ultra-low-temperature-devices. For more information, please contact Chris Redmon (redmoncm@ornl.gov).

(iii) **Applied pressure:** If you want to apply pressure during your experiment, it is critical to begin communication as early as possible to ensure success of your experiment. Please contact the instrument team and/or the Sample Environment's High Pressure Group (Mark Loguillo, loguillomj@ornl.gov) to help with the experiment planning. If possible, this communication should commence from the proposal writing stage and continue until the experiment begins. Furthermore, high pressure users are strongly advised to arrive to ORNL at least one full day before their experiment begins to ensure successful sample loading. Please discuss an appropriate arrival date and time with your instrument team.

(iv) **Block scheduling:** We now schedule experiments requiring the same sample environment equipment on a particular instrument in blocks. For this reason, the impossible dates that you provide when submitting the proposal are now more important than ever. Please enter these dates into the IPTS system with as much accuracy as possible when you submit your proposal. We will accept changes to impossible dates up to three business days after experimental approval notices are sent out to users. After this period, we will create the experiment schedule and therefore we may not be able to accommodate additional change requests.

5. Instrument Descriptions

(i) **HB-1A**: fixed incident energy thermal triple axis spectrometer. Excellent signal-to-noise ratio and large Q-coverage makes this instrument ideal for magnetic diffraction studies of small single crystals (mass > 5 mg) and thin films at a variety of different temperatures (0.03 K – 1800 K), magnetic fields (0 - 8 T), and applied pressures. For more information, please contact Wei Tian (tianwn@ornl.gov) or Adam Aczel (aczelaa@ornl.gov).

(ii) **HB-1**: polarized thermal triple axis spectrometer. This instrument is specifically designed for polarized beam measurements, but also highly efficient for general purpose unpolarized neutron scattering experiments. These measurements can be done at a variety of different temperatures (0.03 K – 1800 K) and magnetic fields (0 – 8 T). Starting this summer high-resolution neutron Larmor diffraction utilizing Wollaston prisms will be available to users at HB-1. This technique provides a Δd/d resolution on the order of 10^{-6}, which is ideal to measure small lattices distortions or Bragg peak shifts [see F. Li et al, *High resolution neutron Larmor diffraction using superconducting magnetic Wollaston prisms*, Scientific Reports 7, 865 (2017)]. For more information regarding the Larmor diffraction capabilities contact Fankang Li (frankli@ornl.gov). For all other information regarding HB-1 please contact Masaaki Matsuda (matsudam@ornl.gov), Jaime Fernandez-Baca (fernandezbja@ornl.gov), or Travis Williams (williamstj@ornl.gov).

(iii) **HB-2A**: neutron powder diffractometer. This instrument is used for crystal and magnetic structure studies of powder and ceramic samples at a variety of different temperatures (0.03 K – 1800 K), magnetic fields (0 – 6 T), and applied pressures up to 2 GPa. For more information, please contact

Clarina de la Cruz (delacruzcr@ornl.gov), Stuart Calder (caldersa@ornl.gov), or Simon Kimber (kimbersa@ornl.gov).

(iv) **HB-2C:** Wide-angle Neutron Diffractometer Squared (WAND²). For 2018, this instrument has been upgraded with a curved, two-dimensional 3He position-sensitive detector covering 120° of the scattering angle with the focal distance of 71 cm and +/- 7.5° vertical coverage. This enables measurements of single-crystal diffraction patterns in a short time over a wide range of the reciprocal space, making WAND² useful to search for fundamental magnetic propagation vectors or measurements of diffuse scattering in single crystals.

WAND² is also a medium resolution powder diffractometer where the high flux allows fast data sampling for studies of kinetics in phase transitions. Additionally, it can be used for time-resolved experiments for structural transformations having short time constants or in stroboscopic mode for reversible processes.

These measurements can be done at a variety of different temperatures (0.03 K - 1800 K), magnetic fields (0 - 5 T) and pressures up to 2 GPa. For more information, please contact Matthias Frontzek (frontzekmd@ornl.gov) or Simon Kimber (kimbersa@ornl.gov).

(v) **HB-3:** general purpose thermal triple axis spectrometer. This instrument is our most intense triple axis spectrometer and is designed for inelastic measurements on single crystals over a wide range of energy and momentum transfers. These measurements can be done at a variety of different temperatures (0.03 K – 1800 K) and magnetic fields (0 – 8 T). For more information, please contact Songxue Chi (chis@ornl.gov), Jaime Fernandez-Baca (fernandezbja@ornl.gov), or Travis Williams (williamstj@ornl.gov).

(vi) **HB-3A:** four-circle single crystal diffractometer. This instrument is equipped with a two-dimensional area detector. It is used for single crystal diffraction measurements (both structural and magnetic) over a temperature range 4 – 800 K. Additional sample environment options include high pressures up to 2 GPa, electric fields (voltages up to 1100 V), and magnetic fields up to 1 T. For more information, please contact Huibo Cao (caoh@ornl.gov) or Bryan Chakoumakos (chakoumakobc@ornl.gov).

(vii) **CG-4C:** cold triple axis spectrometer. This instrument is designed for inelastic measurements on single crystals, where low energy transfers between -2 to 5 meV are necessary. These measurements can be done at a variety of different temperatures (0.03 K – 1800 K), vertical magnetic fields (0 – 9 T), and horizontal magnetic fields (0 – 6 T). The Q-range of the horizontal field magnet is very limited, so please contact the instrument team in advance of submitting your proposal to properly assess feasibility. For more information, please contact Tao Hong (hongt@ornl.gov), Jaime Fernandez-Baca (fernandezbja@ornl.gov), or Travis Williams (williamstj@ornl.gov).

(viii) **GP-SANS**: general-purpose small angle neutron scattering diffractometer. This instrument is used to probe magnetic structures on the order of 0.5 nm to 200 nm length scales (q = 0.0007 $Å^{-1}$ to about 1 $Å^{-1}$). These measurements can be done at a variety of different temperatures (0.03 K – 1300 K), and vertical or horizontal fields up to 8 and 11 T respectively can be applied. For more information, please contact Lisa DeBeer-Schmitt (debeerschmlm@ornl.gov).

More details for all of these instruments can be found at the following link:

http://neutrons.ornl.gov/instruments/

We look forward to receiving your neutron proposals this winter, before the **Feb. 21 deadline**.

Regards,

Your instrument team at the HFIR for hard condensed matter science