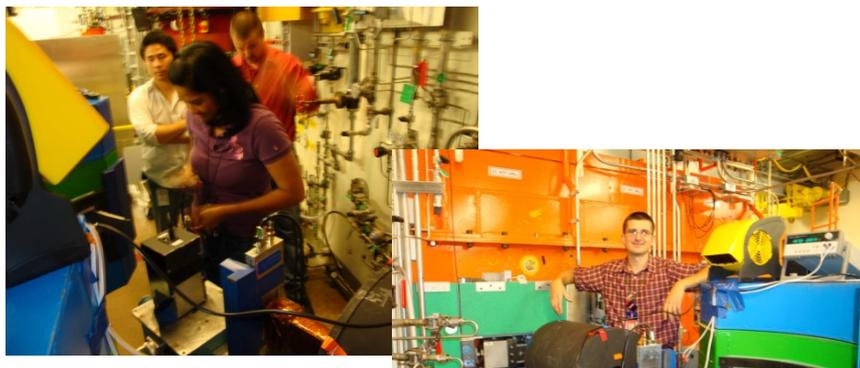


Polarized neutron diffraction experiments now possible at the HB2A Powder diffractometer

Polarized neutron diffraction is one of the most powerful technique in studying magnetism, since it allows to reach high precision in measuring weak magnetic moments.

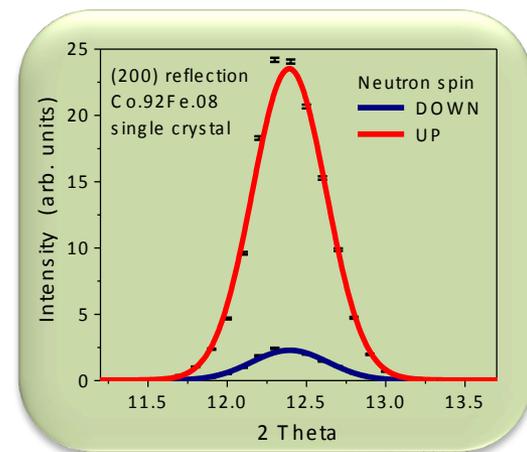
The HB2A instrument scientists in collaboration with NFDD instrument development team have successfully installed and tested a ^3He polarizer cell that provides a unique capability to the powder diffractometer. This makes **HB2A the first powder diffractometer in US capable of performing polarized studies** for high sensitivity to weak ferromagnetism.



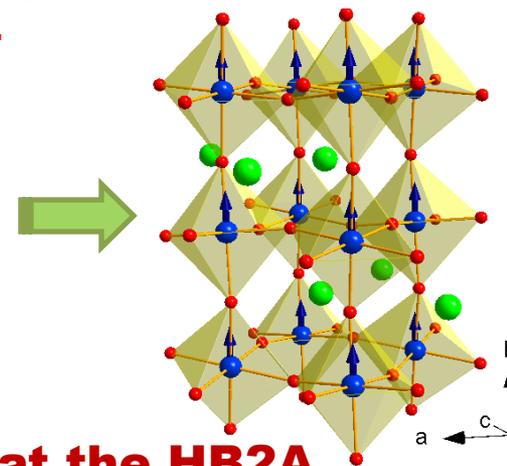
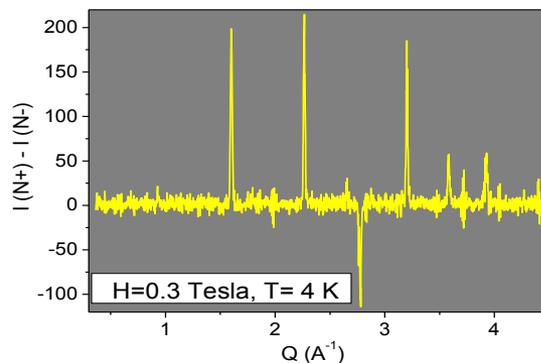
Pictures display Clarina de la Cruz, Ovi Garlea, Tony Tong and Daniel Brown performing the polarized neutron diffraction experiment at the HB2A instrument.



Polarization efficiency has first been evaluated using a $\text{Co}_{0.92}\text{Fe}_{0.8}$ single crystal. Figure below shows the intensity of (200) Bragg reflection measured with neutrons polarized UP or DOWN, perpendicular to the scattering plane.



Polarized neutrons were further used to precisely measure the magnitude of the ordered magnetic moment in an **itinerant ferromagnet**. The difference scattering from neutron beam polarized parallel and antiparallel to the applied magnetic field gives an **improvement of nearly one order of magnitude in detection sensitivity**.



Fist user experiment using polarized neutrons at the HB2A

A group led by Prof. Mark Meisel of Univ of Florida have used the polarization capability to explore the magnetization density distribution in a Co-Fe Prussian Blue analog.

Picture displays Daniel Pajerowski, Mark Meisel, Elisabeth Knowles conducting the polarized experiment at the Hb2A. The insert plot shows the diffraction intensity obtained from two neutron spin states.

