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New Developments in Beam Focusing and Polarization Tools for Neutron Single-Crystal Diffraction.
Christina Hoffmann, Robert Bau, Thomas Koetzle, Paula Piccoli, Arthur Schultz, Spallation Neutron Source, Oak Ridge Naitonal Lab, Oak Ridge, TN 37831.

A single-crystal diffractometer (SCD), named Topaz, is under development at the Spallation Neutron Source (SNS). The instrument design is optimized for the rapid measurement of Bragg intensities on materials with moderate-sized unit cells (up to ~50 Å) and provides the capability to study small 0.1 mm3 samples, approaching the size that is routinely used in laboratory single-crystal X-ray investigations. To maximize the scientific impact, Topaz will include functionality for magnetic scattering experiments, using polarized neutron beams, and for diffuse scattering measurements. By greatly expanding the range of materials that can be explored, Topaz will revolutionize single-crystal neutron diffraction, particularly from the viewpoint of the practicing synthetic chemist. Great advances are also expected in the study of critical structural problems in earth science, materials science and engineering, solid-state physics, and biology.

Recently, significant design enhancements have been realized by incorporating a tapered, segmented guide system that will provide the flexibility of high-resolution and high-intensity options for the Topaz beam line. Experiments are continuing on the SCD beam line at IPNS to optimize the performance of 3He devices in polarizing the incident neutron beam.