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The NIST BT-1 Neutron Powder Diffractometer: Versatile, High Resolution and Available to Outside Researchers. Judith K. Stalick, Qingzhen Huang, Camille Y. Jones, David Mildner, Edward Prince, Brian H. Toby, NIST Center for Neutron Research, National Inst. of Standards and Technology, Gaithersburg MD 20854.

The high-resolution powder diffractometer at the NIST Center for Neutron Research, BT-1, has 32 detectors with 5 degree spacing. The instrument offers two in-pile collimation settings (7' and 15') and three monochromator take-off angles (75, 90 and 120 degrees). This allows the instrument configuration to be tailored to suit the desired measurement. BT-1 routinely operates with a resolution ($\Delta d/d$) of $\geq 0.15\%$, a performance matched by only one other instrument in the U.S. However, this resolution can be improved considerably, to $\geq 0.08\%$, when needed. Alternately, throughput can be improved through use of a longer wavelength, with slightly relaxed resolution. We have recently completed alignment and characterization of a new Fankuchen-cut combined Ge(533)/Ge(733) monochromator. This monochromator allows for high resolution operation at 1.5 and 1.2 Å. The Ge(733) mode, at 1.2 Å, nearly doubles the accessible range of reflections. The optimal resolution range for this monochromator is comprised of data that was previously inaccessible on the instrument. Depending on sample size, diffracting power, structural complexity and desired resolution, measurements on BT-1 typically require between 2 to 18 hours per scan. BT-1 operates approximately 250 days each year, with 63 days reserved for external (user) research. Proposals are accepted every two months and time is frequently scheduled within six weeks of the proposal deadline. Proprietary measurements are also possible. See <http://www.ncnr.nist.gov/xtal> for more details.