

Title of the Abstract: Rebuilding POWGEN: World's only third generation TOF powder diffractometer

AUTHORS : Ashfia Huq¹, Melanie Kirkham¹, ³Pamela Whitfield, Simon Kimber¹, Andre Parizzi¹, Peter Peterson¹, Jason Hodges² & George Rennich²

INSTITUTIONS: ¹Neutron Scattering Division, ²Neutron Technology Division, Oak Ridge National Laboratory, Oak Ridge, TN, United States.

Oak Ridge National Laboratory, Oak Ridge, TN, United States.

³Excelsus Structural Solutions, Park Innovaare, 5234 Villigen, Switzerland

E-mail: huqa@ornl.gov

POWGEN is a fundamental departure from previous designs for a time-of-flight powder diffractometer at a spallation neutron source and may be considered a third-generation design. The instrument is optimized for both parametric studies of materials under a wide range of conditions (T, P, H, flowing gases, etc) and ab-initio crystal structure determinations of complex solid-state materials with asymmetric unit-cells of the order $\sim 1500 \text{ \AA}^3$. The geometric design of the instrument allows for all detected scattered neutrons to be focused onto a single diffraction profile yielding high count rate while preserving good resolution $\Delta d/d = 0.0015$ at $d = 1 \text{ \AA}$. This instrument was recently rebuilt to increase detector coverage and extend the coverage in q , while keeping the original 3rd generation design philosophy in place. In this presentation I will discuss the design and its effects on the standard operation of this instrument and show a few examples of science case how it can be used effectively.

Keywords: neutron diffraction, powder diffraction, Spallation Neutron Source