

Single-Crystal Time-of-Flight Neutron Diffraction: IPNS to SNS

Arthur Schultz¹

¹*X-Ray Science Division, Argonne National Lab*

ajschultz2@gmail.com

This talk will give an overview of single-crystal time-of-flight Laue neutron diffraction beginning with the Intense Pulsed Neutron Source Single Crystal Diffractometer (IPNS SCD) at Argonne National Laboratory and continuing with the small molecule (TOPAZ) and the macromolecule (MaNDi) instruments at the Spallation Neutron Source (SNS) at Oak Ridge National Laboratory. To put these developments in historical context, I will provide a brief history of the Chicago Pile reactors beginning with CP-1 at the University of Chicago in 1942, and of the demonstration of the feasibility of single crystal diffraction at a steady state reactor source by Peterson and Levy at Oak Ridge in 1951. More than twenty years later, Peterson would lead the initial design and fabrication of the prototype time-of-flight Laue SCD instrument at Argonne. Several research highlights using the IPNS and the SNS will be presented. These include examples of 2-electron 3-center X-H-metal bonding ($X = \text{H, B, C, Si}$) and the Jahn-Teller switch in the deuterated ammonium copper Tutton salt.