

## DISCOVER: ORNL's TOTAL SCATTERING DIFFRACTOMETER FOR MATERIALS DISCOVERY

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For several years the Materials Chemistry and Quantum Condensed Matter communities have advocated clearly for a rapid acquisition but medium-resolution quiet and stable diffractometer for the First Target Station (FTS) at the Spallation Neutron Source (SNS). That instrument has become a priority in building out the FTS suite at Oak Ridge National Laboratory (ORNL). DISCOVER, ORNL's Total Scattering Beamline for Materials Discovery, will be optimized for studying real materials in their operating environments from day one, and is intended to supply the scientific community with a platform for ground-breaking investigations of the delicate interplay of spin, lattice, and orbital degrees of freedom in disordered crystalline solids and nanostructured materials, as well as kinetic studies of crystalline solids. It will be the world's highest resolution dedicated *total scattering* instrument; the *total scattering* holds the key to determining the crystallographic average structure as well as the local structure, often responsible for the physical properties of complex materials. In this contribution we will present the science mission, early experiment opportunities, and key design criteria for DISCOVER, demonstrating preliminary engineering and neutronics calculations, and inviting feedback from the community.