



Contribution ID: 21

Type: **not specified**

The NIST Wolter optic neutron microscope

Friday, 3 March 2023 09:30 (30 minutes)

Wolter optics - axisymmetric, nested mirrors comprised of two conic sections - hold great promise for use in neutron imaging and other neutron transport and scattering applications. M. Gubarev at NASA introduced the idea of using Wolter optics for neutron scattering in 2007 [1]. It took a couple years, and the added enthusiasm of B. Khaykovich [2] for the the first tests as a microscope objective lens at NIST in 2011 [3]. Including a condensing optic was demonstrated by measuring the semi-metal to ferromagnet transition temperature in HgCr_2Se_4 [4]. This lead to a final optical system design composed of a Wolter type-I telescope as the condenser and a hyperbola-elliptical objective with magnification 10. The ray tracing results suggest this optical system will yield a 10^4 gain over a conventional pinhole imaging setup. Or, a single projection image with $3 \mu\text{m}$ resolution in about 1 s with a maximum field of view of 10 mm [5]. The design and sources of inspiration for this optical system will be reviewed as will thoughts on how to create a user instrument.

References

1. <https://doi.org/10.1016/j.nimb.2007.09.041>
2. <https://doi.org/10.1016/j.nima.2010.11.110>
3. <https://doi.org/10.1063/1.4804178>
4. <https://doi.org/10.1016/j.jmmm.2018.11.086>
5. <https://doi.org/10.1016/j.nima.2020.164813>

Primary author: HUSSEY, Daniel (NIST)

Co-author: Dr KHAYKOVICH, Boris (MIT)

Presenter: HUSSEY, Daniel (NIST)