



Contribution ID: 14

Type: **not specified**

Fractional, Dynamic X-ray OAM from Coherent Magnetic Scattering

Wednesday 15 April 2026 17:00 (30 minutes)

Square artificial spin-ices (ASI) with topological defects are known to generate orbital angular momentum (OAM) in diffracted X-ray beams. A previous investigation of ASI with even-charge topological defects showed both charge and magnetic X-ray scattering yield photon OAM confined to integer OAM values. Here we show that square ASI's with an antiferromagnetic ground state yield fractional OAM from magnetic scattering when the topological defect has odd-charge. Fractional OAM beams produced from magnetic scattering can be manipulated by a magnetic field and temperature while the integer OAM from charge scattering remains unaffected. We also show that magnetic fluctuations in the ASI lead to dynamic, fractional OAM. Fractional OAM has potential applications including particle guiding and sorting, high-dimensional photon entanglement, quantum communications, and materials characterization. These findings could open new paths for these applications in the X-ray region.

Presenter: HASTINGS, Todd (University of Kentucky)

Session Classification: Applications