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A diffractive-optic based nonlinear optical generation spectrometer for measurement of crystallographic and magnetic point group symmetries[1] DAVID HSIEH, DARIUS TORCHINSKY, California Institute of Technology, DEPARTMENT OF PHYSICS, CALIFORNIA INSTITUTE OT TECHNOLOGY TEAM — Nonlinear optical generation from a crystalline material can provide information about both its crystallographic and magnetic point group symmetries and may therefore be exploited as a complementary technique to diffraction based scattering probes. However, this is challenging to put into practice because the experiment should ideally be sensitive to all elements of the nonlinear optical susceptibility tensor. This involves being able to measure the intensity of nonlinear optical generation either transmitted or reflected from a crystal as a function of oblique light incidence direction, polarization and frequency. These requirements are even more difficult to achieve under extreme sample environments such as ultrahigh vacuum, low temperatures, high magnetic fields or high pressures. Here we present a novel experimental setup using a diffractive optic to realize such measurements. We demonstrate the efficacy of our scheme by showing results for low temperature lattice and magnetic symmetries of selected samples using optical second harmonic generation.

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