## Abstract Submitted for the 4CF13 Meeting of The American Physical Society

Non-Specular Reflectance to Determine Surface Roughness JONATHAN SCHULER, JOSHUA MARX, R. STEVE TURLEY<sup>1</sup>, BYU, BYU XUV TEAM — Extreme ultra-violet (XUV) optics have potential applications in nanoscale photolithography, imaging, astrophysics, and plasma diagnostics. Because the wavelengths can approach atomic dimensions the optics are particularly sensitive to surface roughness. For instance, multilayer mirrors often needs to have their thicknesses and roughnesses controlled to within one nanometer. We have developed a technique to use scattering of XUV light to from rough UOx thin films to determine their surface roughness. From the scattering data, we calculated the reflectance per unit angle of the different materials. We compared the calculated reflectance information to physical optics models of surface scattering to determine details of the surface roughness. We compared these calculations to AFM and SEM characterizations of the same surfaces. By correctly accounting for surface roughness, we improved our determination of the optical constants of these thin films and the predicted performance of XUV optical elements.

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