

MAS20-2020-000182

Abstract for an Invited Paper
for the MAS20 Meeting of
the American Physical Society

High-energy astrophysics enabled through high-resolution spectroscopy using nanofabricated gratings

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Many future astrophysics goals require high spectral resolving power achieved at high efficiency to meet the demanding observational requirements. Questions ranging from the cycling of hot baryons within galaxies to the kinematic output of supermassive black holes to the radiation environments around exoplanet host stars can be addressed with high performance diffraction gratings. This talk will cover the development efforts on reflection grating technologies currently being performed at Penn State University. High efficiency concurrent with high resolution require new fabrication methods. Nanofabrication tools and methodologies have been employed to successfully achieve many aspects of future gratings, but more work is required. The background and status of these development efforts will be discussed. In addition, an overview of space applications currently baselining these gratings will be given.