

# MASTER OF SCIENCE IN PHYSICS

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## DESIGN AND CONSTRUCTION OF MEDIUM RESOLVING, POWER SCANNING, GRATING SPECTROMETER

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A scanning Ebert-Fastie spectrometer was designed and built for the Optical Physics and Sensors Laboratory of the Naval Postgraduate School. Optical design was done with two commercially available optical design software packages, OSLO LT by Sinclair Optics, Inc., and Optica by Wolfram Research, Inc. Several components for the spectrometer were designed and built at the Naval Postgraduate School Physics Department machine shop to include grating mount, motor mount, entrance and exit slits, gearbox, and spacers. Electronic interfaces included the motor, motor controller, and personal computer to control the diffraction grating angle, and a detector, data logger, lock-in detection system, and personal computer to record data. Data was measured from a Fe hollow cathode source to demonstrate proper operation. The recorded spectral lines were graphed in Microsoft Excel and tentatively identified as those tabulated in the published literature. Future work includes optimization of the resolving power and of the fore optics. Upon completion, the spectrometer will prove to be a very useful instructional aid in the optics and optoelectronics classes taught at the school, and as a medium resolving power visible and near ultraviolet instrument for future student thesis research.

**DoD KEY TECHNOLOGY AREAS:** Chemical and Biological Defense, Sensors

**KEYWORDS:** Spectrometer, Ebert-Fastie, Optics, Detector

