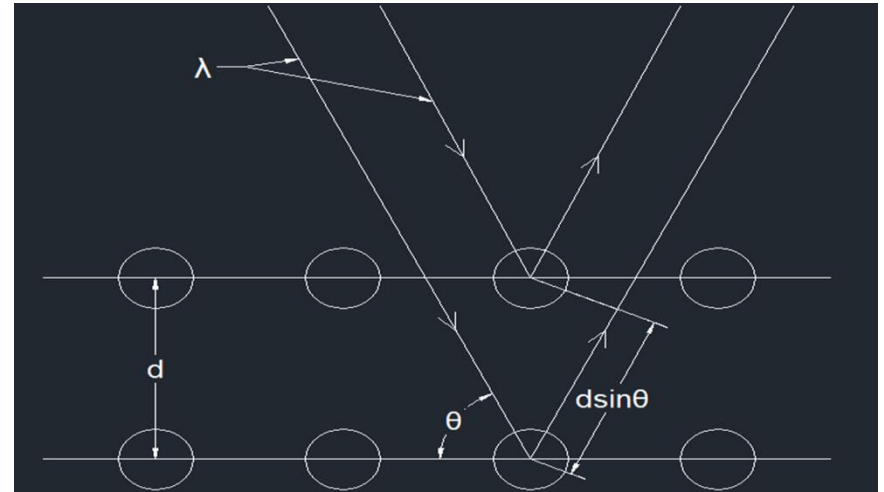


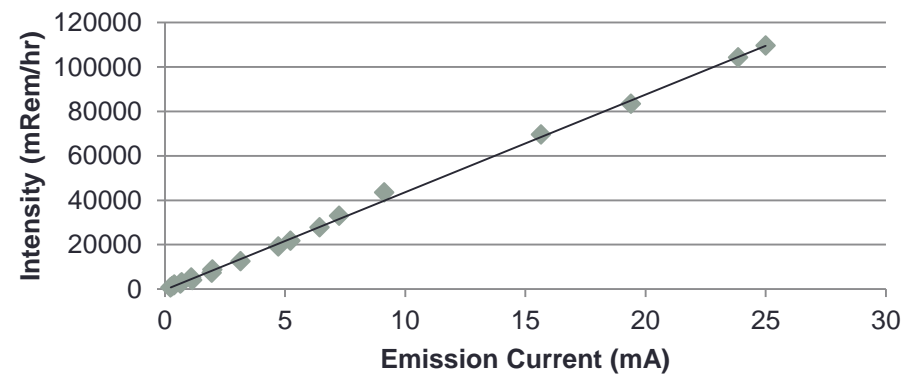
THE DESIGN AND CONSTRUCTION OF AN X-RAY DIFFRACTOMETER FOR THE STUDY OF THIN METAL FILMS

Jordan Cady, Brandon Hoffman,
The Houghton Physics Department

Outline



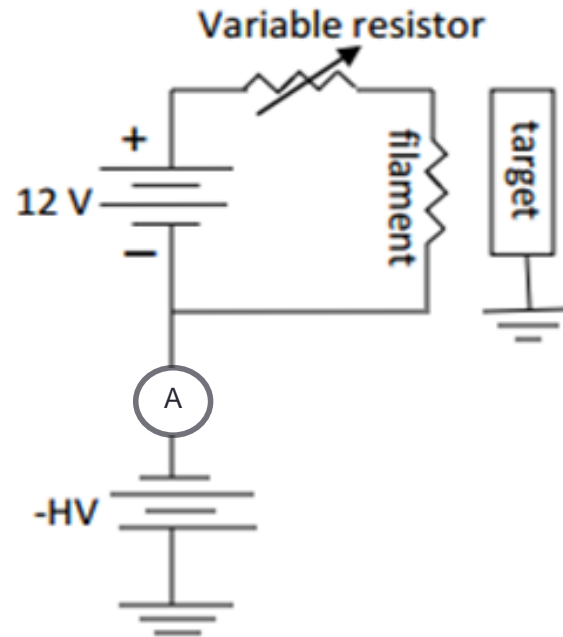
Intensity v. Emission Current



Thin Films – Why?

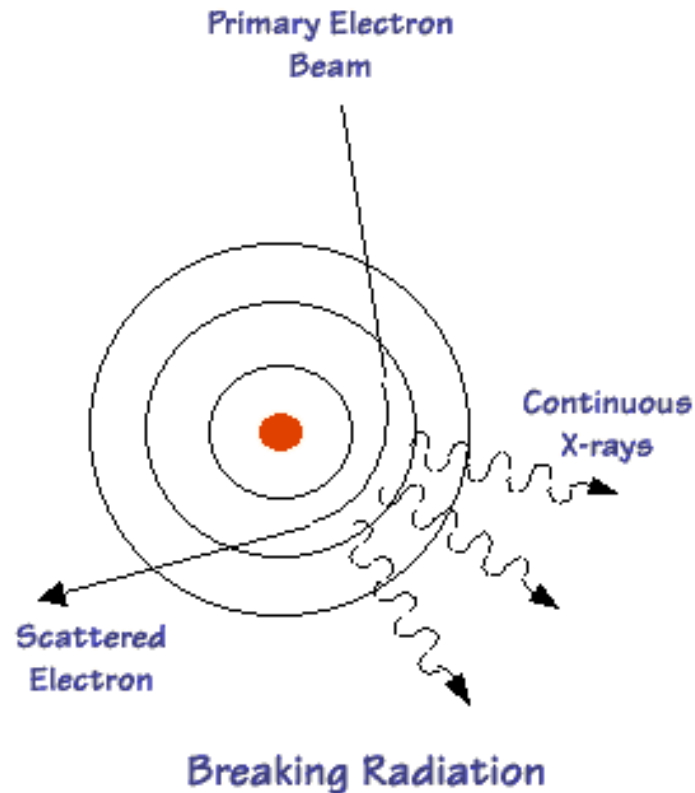


X-ray Production



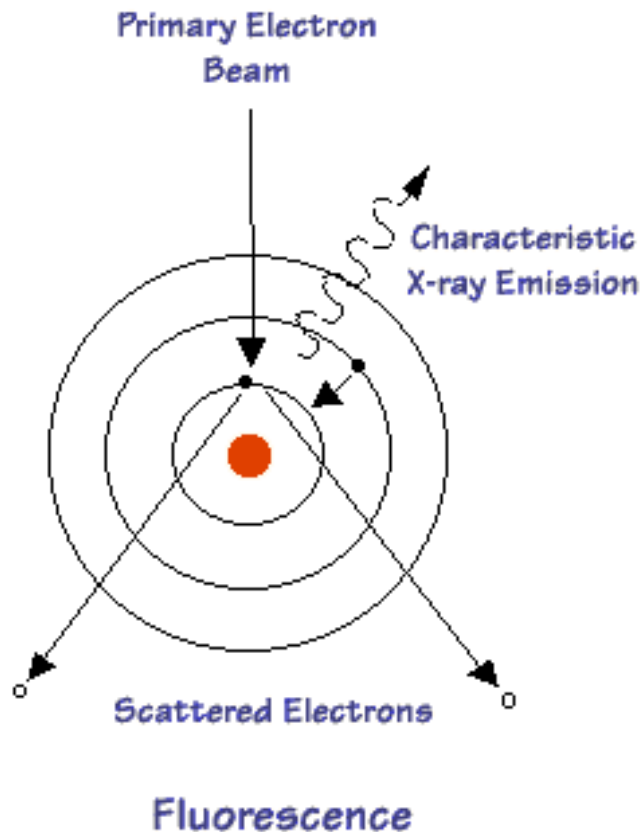
X-ray Production

- Bremsstrahlung X-rays



X-ray Production

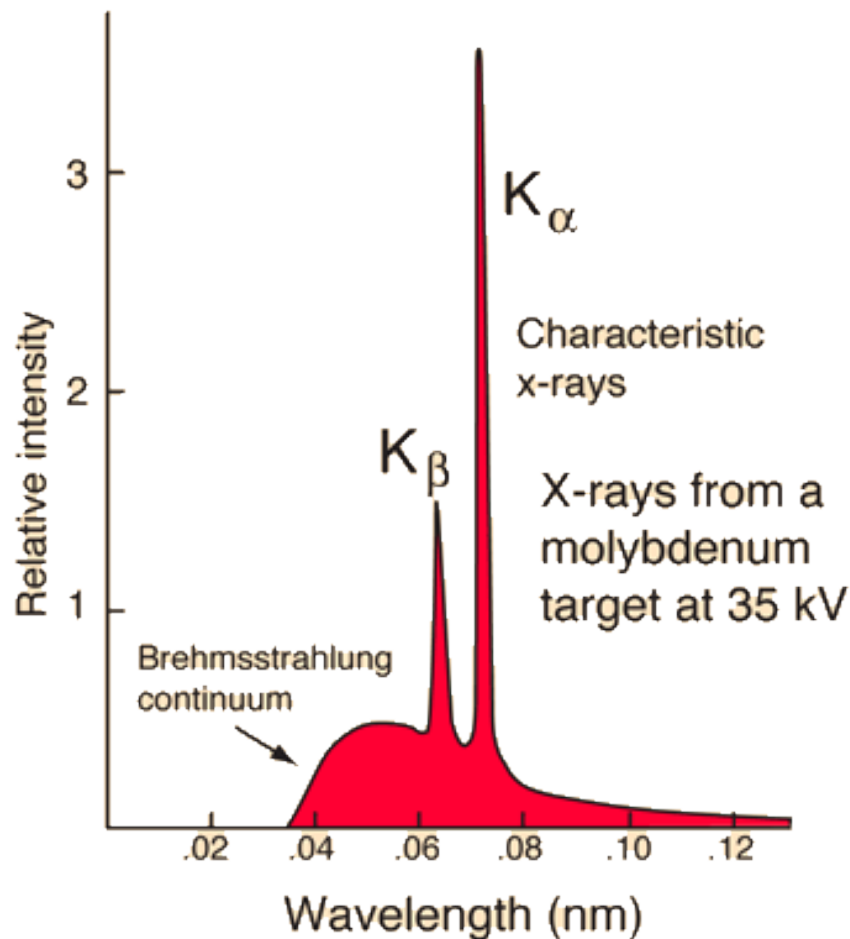
- Characteristic X-rays



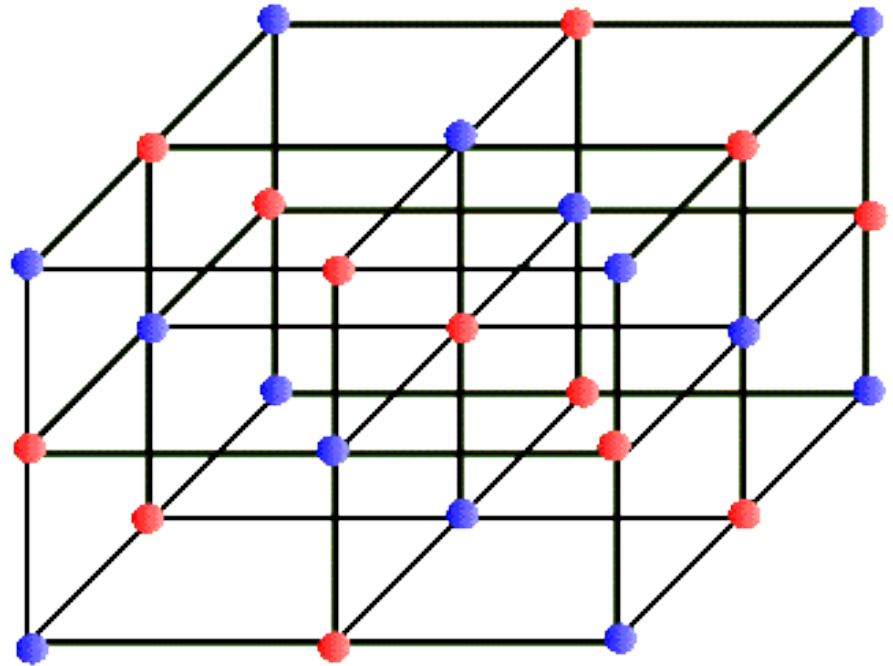
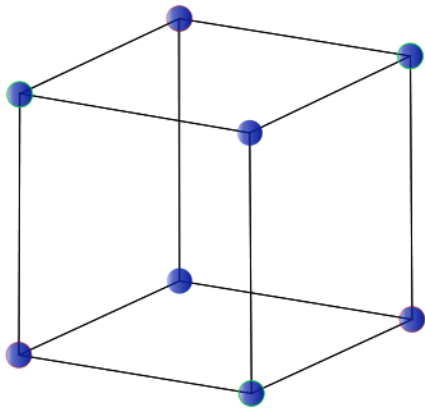
$$\Delta E = \frac{hc}{\lambda}$$

X-ray Production

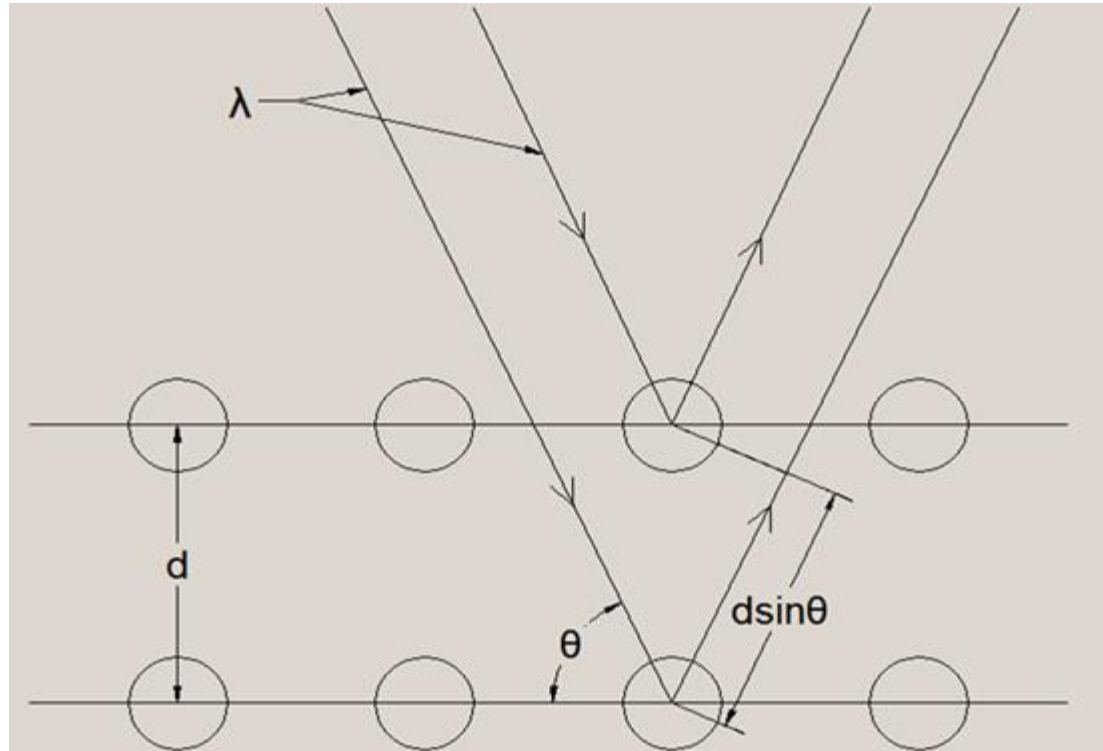
- Comparison



Crystal Structure

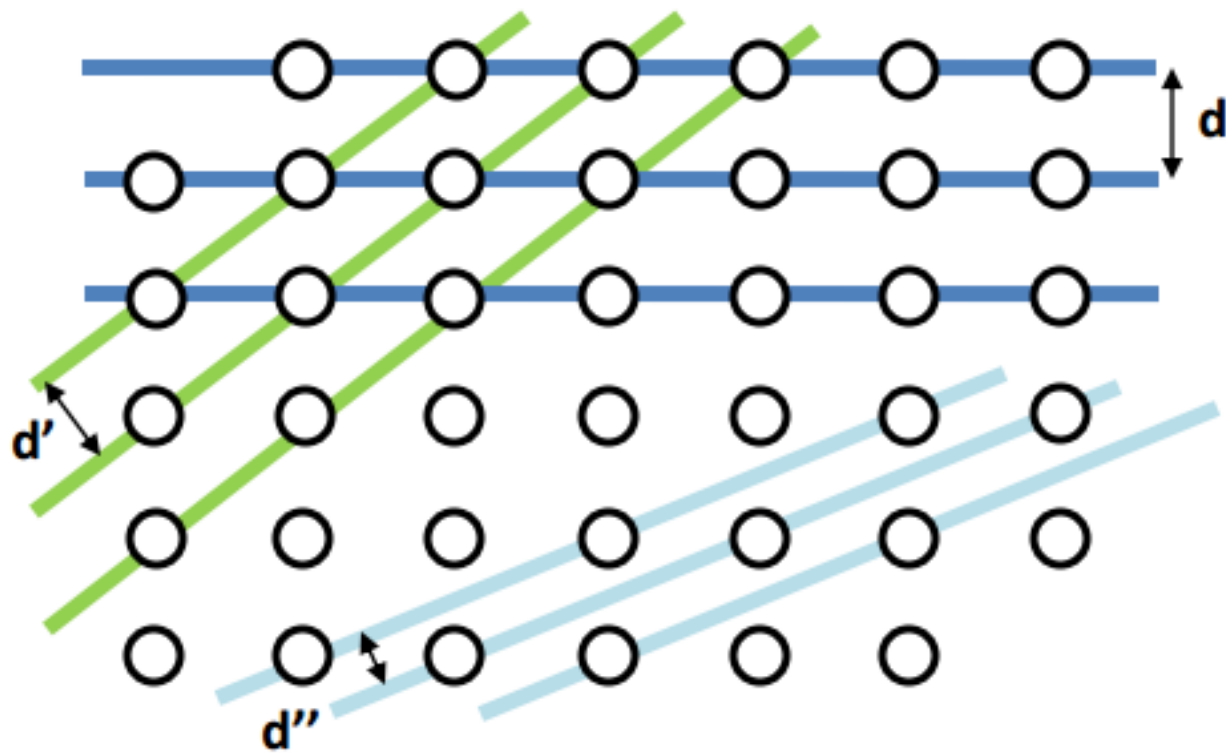


Bragg's Law

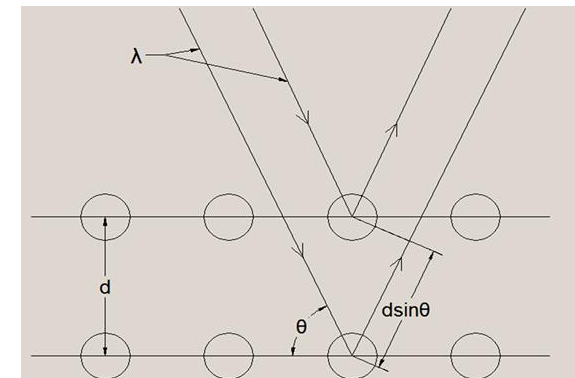
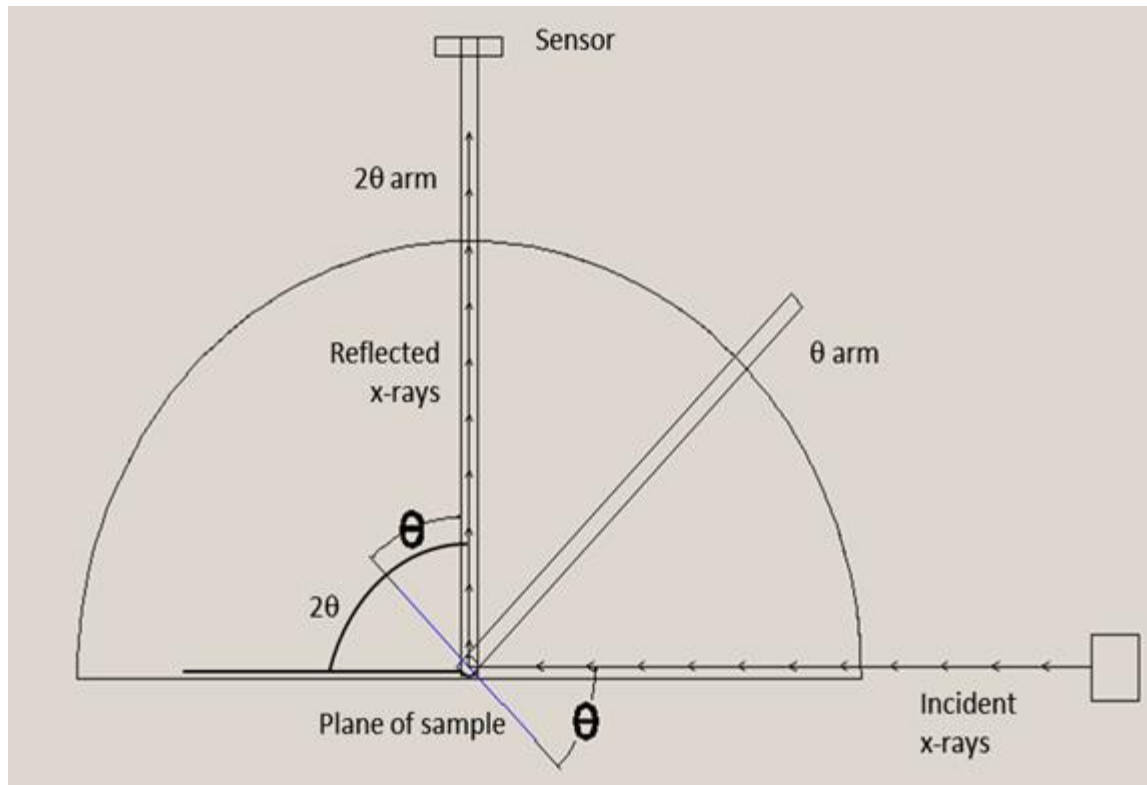


$$n\lambda = 2d \sin \theta$$

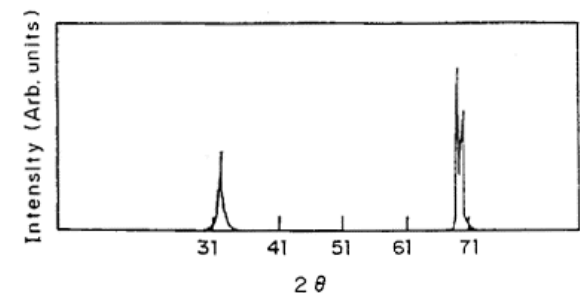
Different Plane Spacings



Bragg-Brentano θ - 2θ Diffractometer

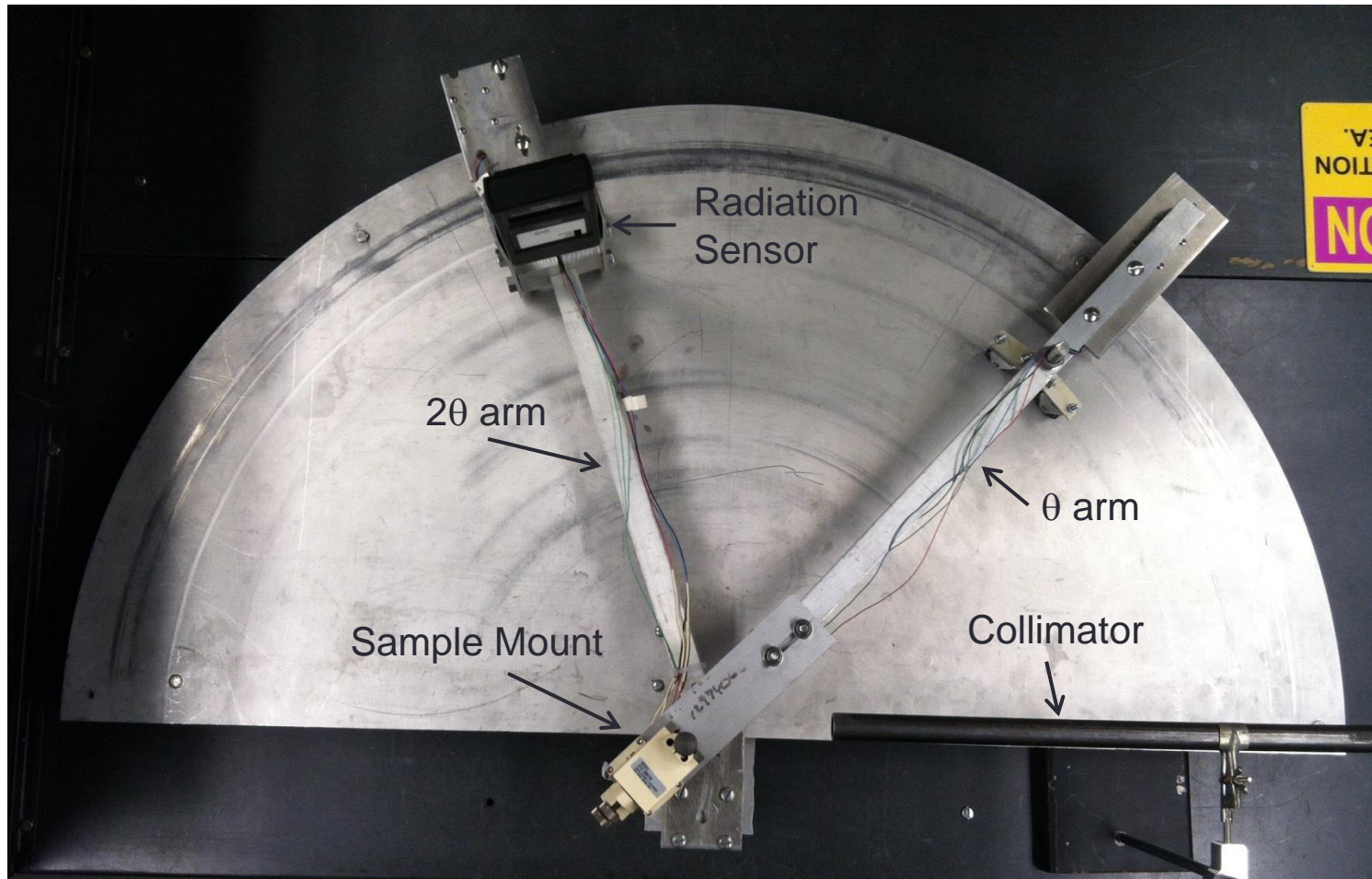


$$n\lambda = 2d\sin\theta$$



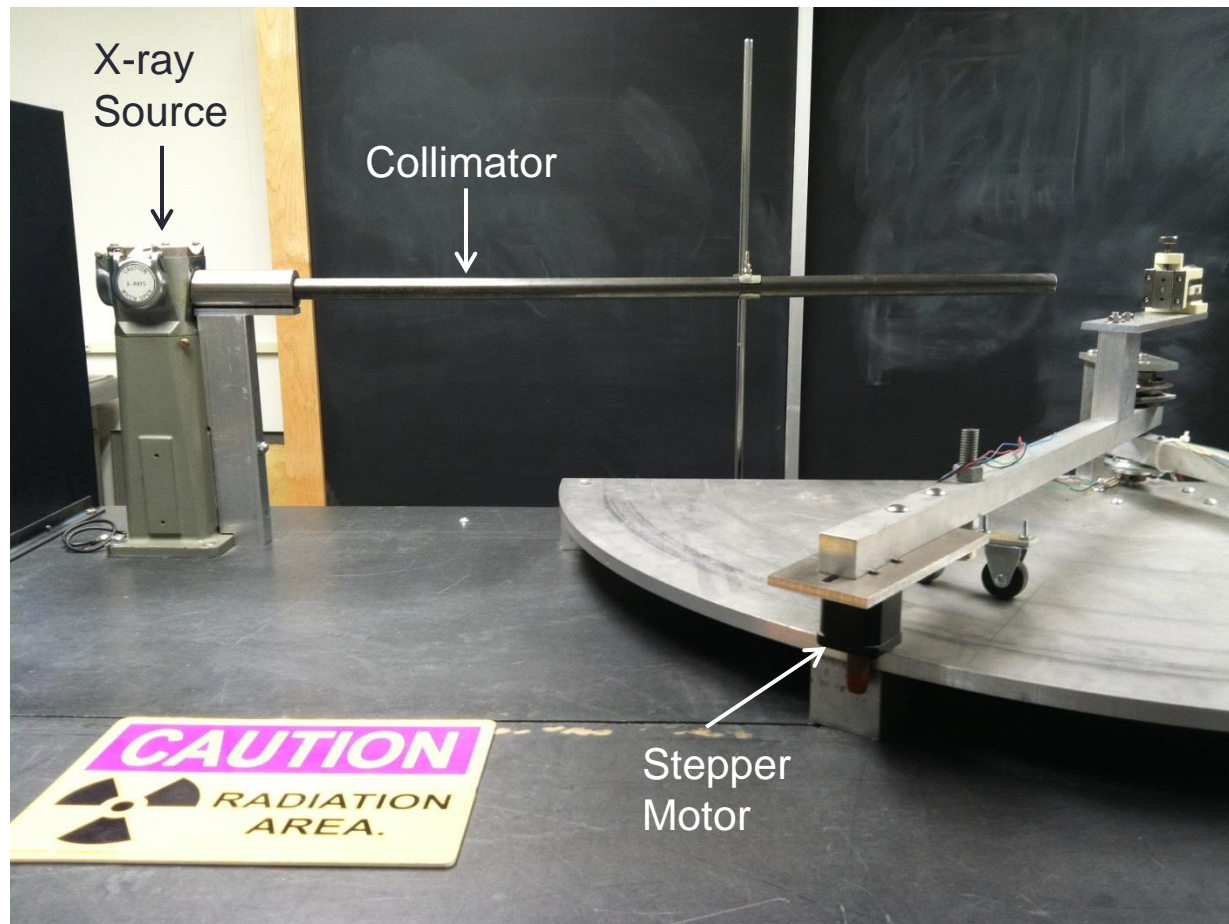
Houghton College Diffractometer

- Mechanical Design



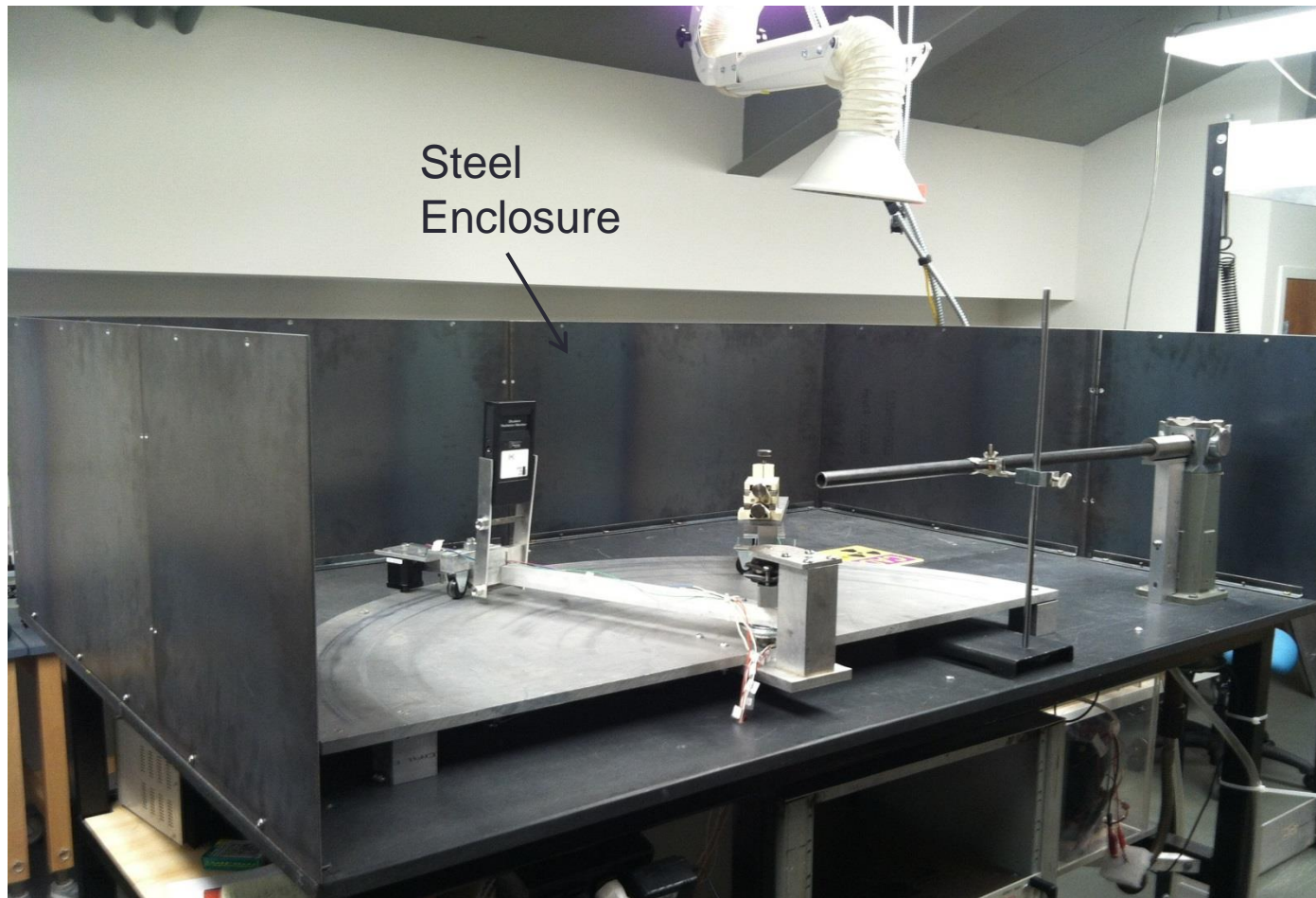
Houghton College Diffractometer

- Source, collimator, stepper motors



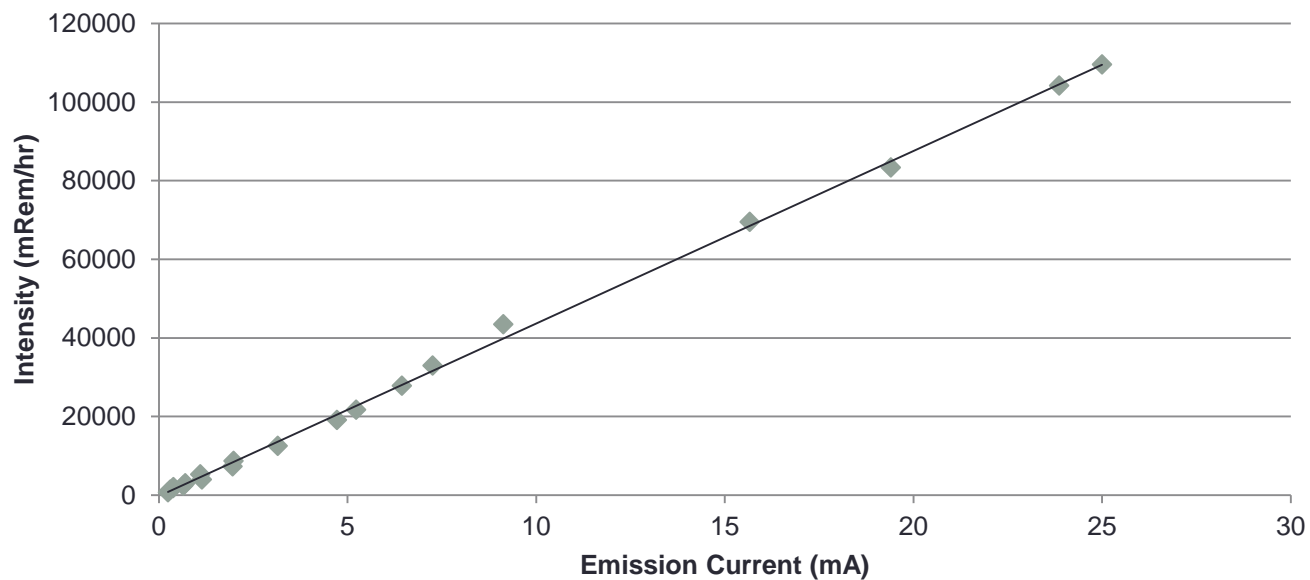
Houghton College Diffractometer

- Steel Enclosure



Results

Intensity of Source w/ 40kV Supply



Future Plans

- Finished steel enclosure
- Interlocking system
- Webcam
- Cooling system for source