

**Fokus Master Life Sciences – Methods in Life Sciences**  
**Learning Objectives Macromolecular Crystallography**

Properties and production of X-rays:

- Electromagnetic radiation
- Properties of electromagnetic waves
- Quantities describing an electromagnetic wave

Scattering:

- When do we observe scattering phenomena
- Interference: Destructive vs. constructive interference

The phase problem in crystallography:

- Why can the phases not be measured
- Difference to light or electron microscope

Protein crystals:

- Composition: Protein vs. solvent regions
- Unit cell vs. asymmetric unit

Bragg's law:

- Definition
- Maximal possible resolution

Resolution:

- General concept
- Typical resolution in macromolecular crystallography (MX)
- What can I see at low/medium/high resolution

Refinement:

- Restrained refinement
- R-factor: Definition, typical values in MX
- Free R-factor: Concept, definition, typical values in MX
- Model quality
- Model deposition