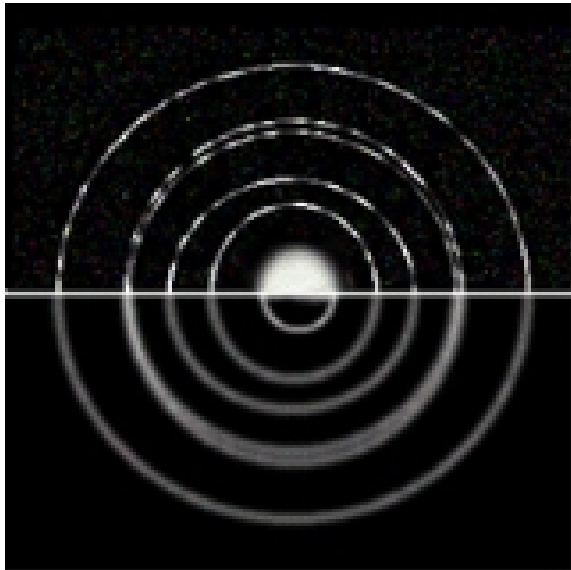




- **Particle – Wave Duality**
- **Photo-electric effect**
- **Uncertainty Principle**
- **Schrodinger's Equation**

- Particles can exhibit wave like features e.g. particles can produce interference patterns and can “tunnel” through potential barriers
- de Broglie hypothesis states:

$$\lambda = \frac{h}{p}$$



The top half is an example of X-ray diffraction, the bottom of electron diffraction, scales have adjusted for comparison

- Consider an electron traveling at a velocity of 10^7 cm/sec. Calculate its wavelength

The momentum is given by

$$p = mv = (9.11 \times 10^{-31}) (10^5) = 9.11 \times 10^{-6} \text{ kg m s}^{-1}$$

The de Broglie wavelength is given by

$$\lambda = \frac{h}{p} = \frac{6.625 \times 10^{-34}}{9.11 \times 10^{-6}} = 7.27 \times 10^{-9} \text{ m}$$

or $\lambda = 72.7 \text{ \AA}$