By the 1920s, physicists were struggling with two different definitions of light: wave vs. particle. How could light be both? Niels Bohr solved the problem with his “principle of complementarity”: In order to understand a given phenomenon, one must use either the wave or the particle theory, but not both.

Wave Theory Support

- Interference
- Diffraction
- Electron Diffraction

Particle Theory Support

- Photoelectric Effect
- Compton Scattering
- Pair Production

We must accept both models and admit that the nature of light is not describable in terms of a single, classical picture.
Radio Waves: Low frequency  
Long wavelength  
Low photon energy  
→ Takes many low-energy photons to create a signal → Radio frequencies appear as a continuous wave.

Visible Light: Higher frequency  
Short wavelength  
→ Sometimes behaves like a wave (Young's Experiment)  
   Sometimes behaves like a particle (Photoelectric Effect)

X-Rays: Very high frequency  
Extremely short wavelengths  
High energy  
→ Fewer photons are needed for a signal → Photons tend to act more like particles (Compton Scattering)  
→ It is possible, but much more difficult to detect interference of x-rays.