

Electromagnetic Radiation

transversal waves, velocity $c_0 \approx 3 \cdot 10^8 \text{ m s}^{-1}$

Characteristics

1. Energy (eV, kJ mol⁻¹)

-frequency ν ($\nu = c_0 / \lambda$; s⁻¹, Hz)

-wavelength λ ($\lambda = c_0 / \nu$; Å, nm, ..., m, ...)

-wavenumber $\tilde{\nu}$ ($\tilde{\nu} = 1/\lambda = \nu/c_0$; cm⁻¹, Kaiser)

energy \sim frequency $(E = h \cdot \nu)$

\sim wavenumber $(E = h \cdot \tilde{\nu} \cdot c_0)$

\sim wavelength⁻¹ $(E = h \cdot c_0 / \lambda)$

2. Intensity cross-section $I \sim |\vec{S}|^2 = |\vec{E} \times \vec{H}|$

3. Direction wavevector \vec{s}_0

4. Phase phase φ

Range of frequencies for structural analysis: 10⁶-10²⁰ Hz i.e. 10⁻¹² – 10² m
γ-ray, x-ray, ultraviolet (UV), visible (VIS), infrared (IR), micro-, radiowaves