

Some Questions of Units and Connections to the Electromagnetic Spectrum

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Two fundamental constants:

- 1 $c = 3 \times 10^{10}$ cm/sec: relates length to time. Natural to set $c = 1$ and use same units for both. Similarly energy and momentum.
- 2 $\hbar = 6.58211899 \pm 10^{-22}$ MeV s. Related energy to time. Natural to set $\hbar = 1$. Then energy, mass, momentum have same units. Similarly time, length have (inverse) units.

Examples:

- 1 Visible light: $\text{eV}^{-1} \sim 10^{-15}$ sec.
- 2 X-rays: $\text{KeV}^{-1} \sim 10^{-18}$ sec.
- 3 γ -rays: $\text{MeV} - \text{GeV}^{-1} \sim 10^{-21} - 10^{-24}$ sec.
- 4 1 fm = size of nucleus = 3×10^{-24} sec.

