

Heisenberg's Uncertainty principle, Illustration - Gamma ray microscope

QB:

1. Using Heisenberg's uncertainty principle (HUP) arrive at the expression for spectral linewidth ($\Delta\lambda$). If the excited state lifetime is $\Delta t = 10\text{ns}$, find the spectral width $\Delta\lambda$.
2. Explain the non-existence of electron inside the nucleus using HUP.
3. Compare the energy-time uncertainty relation for a gamma photon. Given: wavelength of gamma photon is $\lambda = 1\text{pm}$.
4. Explain the role of Heisenberg's uncertainty principle in magnetic field wave.