

X-ray FEL lecture

Problem

An FEL, driven by a 15GeV electron bunch with 10 fs pulse duration and 100pC charge, generates a diffraction limited 1\AA photon beam.

1. If the photon beam radius at the undulator exit is $10\text{ }\mu\text{m}$ what is its angular divergence?
2. If the FEL parameter is 5×10^{-4} , what is the number of photons in the pulse?
3. If the electron beam emittance is negligible respect to the photon emittance, what is the X-ray peak brightness?