Homework 2 - Tuesday

Task 1

What laser intensity (in W/cm^2) would correspond to normalized vector potential a_0=10, and what are the maximum values of the electric and magnetic field in the laser wave, for a CO_2 laser.

Task 2

Assume that plasma density is 1E17 cm-3. Laser light of which wavelength will still penetrate such plasma? Also, estimate the corresponding plasma frequency.

Task 3

~~Analyse if the example shown on slide 30 of Lecture 7 indeed corresponded to radiation in wiggler regime. How one would need to change some of the parameters (such as r_b) to get into the undulator regime of radiation?~~

Task 4

Assume that we get 1 GeV electron bunch from laser plasma accelerator, and would like to create an undulator from plasma, using focusing force of ions of plasma. Suggest the plasma parameters and the amplitude of oscillation of the beam when the radiation will be at the boundary of undulator regime, i.e. with the undulator parameter K=1.

Task 5 (Collective work in the team)

Contribute to writing draft report in Word, describing the compact source (Project 3), creating and filling the tables of parameters, describing assumptions, etc. Follow the parameter set agreed for your group (e.g. 1 GeV beam for one group, and 3 GeV beam for another group). The parameter table can thus be describing four cases: 1 or 3 GeV, normal conducting or superconducting bends.