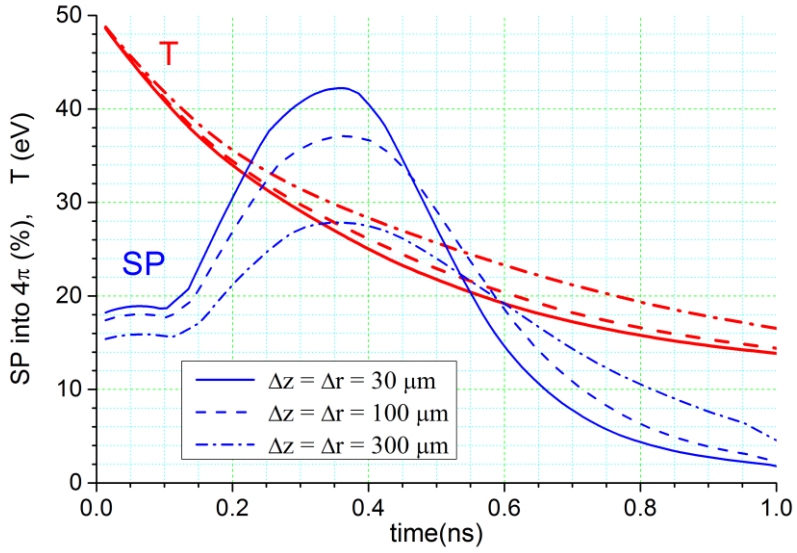
Proposal for a test problem: spectral purity of Sn plasma

by Mikhail Basko (KIAM, Moscow)

The purpose of this test is to give a general idea what values of the spectral purity (SP) – hence of CE – could be expected from the participating codes when simulating the emission from a finite-mass Sn plasma cloud under most favorable conditions, close to those encountered in realistic LPP sources.

The plasma configuration is defined as an Sn sphere of a fixed radius R at a constant density ρ (the two free parameters of the simulation). Hydrodynamics is turned off.

At time $t=0$ the considered Sn sphere is prescribed some initial temperature T_0 (another free parameter of the simulation) that is clearly above the optimum, say, T_0 = 50—100 eV, and then it is allowed to cool down by means of thermal emission only. The spectral radiation transport is fully accounted for, the thermal conduction is turned off (or let to be optional). As the temperature drops, the SP as a function of time will pass through a maximum. The plots to be compared should look approximately like



Suggested possible values of the free parameters:

- ρ = 0.0001 g/cc, R = 25 μm, 100 μm, 400μm;
- ρ = 0.01 g/cc, R = 0.5 μm, 2 μm, 8μm;

The mid value of R is supposed to be chosen such as to give the optical thickness of the considered sphere at 13.5 nm approximately equal to 1.