Prepared by the scientific secretary: L. Hein

Bruce Carlsten – LANL "Space charge Effects in RF Photoinjectors"

Question: In case on electron guns you have to deal different regimes of relativity.
At the cathode the electrons are non-relativistic and already at 160MeV to 200 MeV they are highly relativistic. Do you change the code and if yes, when?

Answer: We are using codes like Michel, Egun and Track, which are solving the problematic differently. We use them from the cathode to e.g. to the FEL section and change there the code.

Comment: Can you also use the code IMPACT
Answer: Yes, but we don't take RF-loading into account.
Comment: We tested the simulations with Mafia and have seen no differences.

Question: Is there really a virtual image charge at the cathode and is that a cathode issue?
Answer: Yes, we think so. But our Codes are taken this effect into account.

Question: The 60nm emittance - is it the projected emittance?
Answer: Yes, the related beam parameters are 100pC with 2.1 ps rms length (page 25).

Question: MaRie - Is this project in realisation?
Answer: Yes, we are currently designing it and we are going to build it.

Question: In the radio density profile there is a Spike. Is this spike real?
In our simulations we also observed a spike, but it turned out to be a numerical artefact.
Answer: This spike is physical. I also tried several different numerical tests and it also remained.

C.Chen MIT – "Adiabatic thermal beams in a periodical focusing field"

Question: Where does the emittance growth come from?
Answer: In the adiabatic thermal theory the temperature is taken into account leading to a new equation of motion in which the thermal emittance is taken into account. (page 6)

Question: What is the thermal range of your theory?
In our simulations we obtained 5 orders of magnitude.
Answer: Based on this theory a dynamic range of approximately 6 orders is possible.

P.Nghiem Saclay – "Beam core-halo issues"

Question: How often does the definition of halo and core has to be renewed?
Answer: The renewing procedure is performed in the same manner as shown at every calculation every step.
{Comment: Let's talk about the implementation of noise in the approach later.}

Comment: There is another definition of halo, which is based on the assumption that the halo particles do not follow the motion patterns of the beam centre particles.

Question: How do take the phase advance and beam divergence into account.
At present your definition in only valid for the x-y-plane, or?
Answer: This definition is only the first step. Currently, I'm working on the implementation of beam divergence. So, I'll extend it, but maybe in the collaboration with a Phd. student?

Question: Can you apply this method to measurements?
Answer: In principle yes. It is just a question of the measurement accuracy and especially the dynamic range, which has to be high.

M. Ikegami KEK/J---PARC – "Resonance crossing in linacs - Recent measurements on space charge resonances in J---PARC Linac"

Comment: It is good if an experiment delivers a surprise. Your experiment delivered one, but unfortunately your experiment is even more pessimistic than the theory.

Question (to I. Hoffmann?): Is it good to use the rms emittances for the Hoffmann Resonance diagram? Do you have any suggestions?
Answer (I. Hoffmann?): I'll address this topic in my talk. It was good to see the emittance exchange as a result of an experiment.

Question: Where do you use the quadrupole scan method for emittance measurement?
In present of space charge effects the needed transfer matrix elements will be modified, which can lead to a mis-estimation of the transverse emittance.
Answer: For the determination of the emittance we are using an envelope-model.
Comment: In this approach your emittance will be strongly dependent on the assumed particle distribution.