Minutes of PITZ Physics Seminar, 28.05.2020

Project: PITZ
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Agenda:

1) AoB
2) Talk by Guan Shu – Dark current tracking simulations of PITZ guns
3) Talk by Raffael Niemczyk – Impact of Intensity Cuts to Slice Emittance Calculations

Results:

1) AoB
    a. Are RF people working on FSM problem? No one knows
    b. FS: @Christian: Can we make a VBG experiment?
    c. @Grygorii: Is the students experiment on photo emission operational? @Georgi: Get it touch with Georgi and settle things
    d. Fire alarm: Anne will meet with technicians to settle things
2) Talk by Guan
    a. Frank: Neglecting secondary emission could be critical. There might be some in cathode vicinity
    b. Mikhail: Multipacting not observed in gun itself, only at windows
    c. Frank: Secondary emission should be included in simulations for publications
    d. Collimator position? Collimator means FC opening radius, i.e. 10 mm. MK: Please double check the numbers, this seems strange.
    e. Page 11: How are circles defined? GS: By measurement. Same size in simulation as in experiment
    f. Planned experiment: Rotation of plug by 180 deg, to see whether dark current source is cathode or cavity backplane
    g. Page 12: Larmor angle for 480 Ampere is almost 90 deg from cathode to FC1. Starting point of dark current is at y = 0 and x = 2.5 cm
    h. Space charge forces are neglected in simulations
    i. Temporal dark current profile is Gaussian, rms length is 17 deg
    j. How does the dark current collection efficiency look like for emission phases larger 90 deg? GS: Depends on the emission position. Outer positions are being lost at the coupler. See slide 6.
    k. Slide 15: How do dark current trajectories change with different main solenoid currents?
    l. Page 17, 2nd subitem of first item: This is not proven and is being discussed. Perhaps it is worth to simulate with two different surface

roughness's. GS: Very hard in simulation, perhaps impossible due to finite mesh side.

m. MK: You could use different weighting of the macro particles to fit the simulation results to the experimental data
n. Polishing of soft copper is questionable, as high-gradient experts think, polishing of soft copper could generate new dark current emission sources
o. Slide 18: Why does the red line stop so abruptly? It is supressed due to the gun pipe? HQ: Apex gun cathode gives smaller dark current emission area than PITZ cathode designs.
p. Does APEX gun have 60 MV/m at cathode? FS: No 20 MV/m.
q. GS: I don't understand the design of PITZ cathode it does not seem to be best solution.

Next steps:

What is to be done?	By whom?	Until when?	Done on
Check of FC1 size	Guan and Sebastian		

Protocol prepared by
R. Niemczyk, 28th May 2020
(Name, Date)