

Minutes of PITZ Physics Seminar, 16.12.2021

Project: PITZ

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Agenda:

- 1) Short RC
- 2) AOB
- 3) Talk by G. Shu: Updated physics design studies of a L-band RF gun for 2 ms operation

Results:

- 1) Short RC
 - a. HQ: Did the rf window conditions get better? MK: Done, but we lost 4 days due to the power outage, which caused it.
 - b. MK: Let's condition without solenoid until 6.5 MW, and then see if it is stable at long pulses
 - c. HQ: Detuning of Gun5 is not larger than the one of Gun4.2
 - d. FS: What is the dark current level? MK: We cannot measure the dark current with FC, it is too small. But we see some dark current in the dispersive arm. The dark current monitor is not well-calibrated.
 - e. DCM shows 2.5 uA of dark current → Very low!
 - f. HQ: I'm on shift on Monday, what next pulse length after 650 us? GV, MK, FS: 1ms.
 - g. FS: Talk to the rf people, so they check the high voltage for 1 ms operation on Monday!
 - h. MK: We have to be very careful with the high voltage regarding 1 ms operation.
 - i. MK: Cathode box is being installed. Should we try Cs2Te next week? HQ: Let's wait till next year.
 - j. MK: Should we increase the PMT HV back to before? HQ: Can we first keep it, and then decide after the Monday late shift?
 - k. HQ: 50 Ampere are still a problem for longer pulses. We have to condition it away.
 - l. MK: Worst we use some coils near the coupler during conditioning. We can also try using the gun quadrupoles.
- 2) AOB
 - a. FS: Reminder: Send around your abstracts! IPAC is Jan 7th, FLS is on Jan 14th!!
 - b. Who wants an invited talk at FEL should get back to Frank?
 - c. MK: We should check, how we can make sure, that we can have a slot for our PPS AND the data science seminar.
- 3) G. Shu: Updated physics design studies of a L-band RF gun for 2 ms operation

- a. GS: Why do you keep the emission gradient constant? GS: We want to have a comparison with our previous Guns, therefore we constraint the gradient.
- b. MK: You will probably overlap dark current with photoelectrons. GS: There will be later a slide.
- c. FS: By changing the emission
- d. MK: Solenoids already applied? GS: Not yet
- e. FS: Why is the slice emittance (slightly) smaller? MK: It's a numerical artefact.
- f. MK: How does the longitudinal emittance & phase space look like?
- g. FS: Can the longitudinal phase space be improved?
- h. HQ: Flattop is not used at XFEL, they gave up, because it messes up the longitudinal phase space. MK: They don't use flattop, because they have little experience with it, and a ripple on the top of the profile. HQ: Yes, that makes it even worse!
- i. FS: How much longer are the bunches compared to Gun4? GS: 15%
- j. FS: Do you have usage of this gun with 2 ms pulse length in mind? At Eu-XFEL they are limited by the SC cavity filling time, so it's not for Eu-XFEL. GS: I have no idea, 1% might be the maximum duty cycle. FS: No, up to 8 % with the Boeing gun. Perhaps in China?
- k. HQ: This is rather triggered at DESY, so currently it is NOT possible, but there is some interest by Vladimir Vogel (from DESY HH).
- l. MK: Small remark: Tuning might be fun? GS: Yes, this I haven't considered yet.
- m. MK: Have you analysed other modes of this cavity? GS: Pi-mode is closest to operation point, then half-pi-mode.
- n. FS: Good results, we should publish it.

Protocol prepared by
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 (Name, Date)