Minutes of RESULTS, PITZ Physics Seminar, 06.06.2019

Project: PITZ
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Agenda:
1) Discussion of new scaled emittance & camera gain for FASTSCAN – H. Qian
2) Non-scaled, scaled, scaled-2, core, fractional core, etc. – M. Krasilnikov
3) RC
4) FEL2019 participants selection
5) Summer student project collection
6) AOB

Results:
1) New formula for the scaling factor introduced.
2) Gaussian phase space simulation – proposed emittance scaling compensates charge cut well.
3) Realistic phase space simulation – charge cut is not compensated completely.
4) Experimental results – charge cut seems completely compensated (function of camera gain). Core remains constant. Possible beam jitter effects increased together with number of pulses. New scaling not sensitive to camera gain.
5) Analytical studies of charge cut in beamlets. Explanation for flattop and Gaussian laser pulse trends in scaling factor and charge cut.
6) Single pixel noise (background) statistics as function of gain: median becomes 0 at 20db and more gain, but average is higher than 0. Average decreases with gain, RMS increases with gain.
7) Proposed to use 10-13 db camera gain. Another solution: more efficient screen. Practical limit on number of pulses to be defined. Improved optics and image filtering is needed.
8) Peppepot mask and quadrupole scan as alternative – few pulses, better SNR, but uniform holes required, scattering signal focused and good quadrupole calibration.
9) Open questions – decisions must work on all cases, long term solution
   a. Camera gain
   b. YAG or LYSO
   c. Pulse number
   d. Scaling factor
   e. Optimum BSA and solenoid
   f. Core emittance.
10) Charge cut approximation – no tails versus no base method.
11) Core emittance and core fraction – as function of charge cut.
12) High scaling factor.
13) Charge cut of point with largest cut applied to whole series

14) New slit scan procedure idea – adaptive gain for each slit position. Normalized to EMSY.
15) Conclusion on flattop emittance advantage?

Protocol prepared by
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