

Minutes of RESULTS, PITZ Physics Seminar, 22.11.2012

Project: PITZ

Participants: Frank Stephan, Mikhail Krasilnikov, Anne Oppelt, Matthias Gross, Barbara Marchetti, Marek Otevrel, Galina Asova, Dmitriy Malyutin, Grygorii Vashchenko, Georgios Kourkafas, Roman Martin, Gaurav Patak; Guest: Lazar Staykov

Agenda:

- 1) L.Staykov: Measurement of longitudinal charge distribution of sub-ps relativistic beams
- 2) G.Kourkafas: Improvements of the tomographic reconstruction of PITZ (update)
- 3) G.Asova: Chromatic effects in quad scan emittance measurements (paper review)

Results:

- 1) – a 2 MeV probe beam is generated by RF gun + laser, deviated to the relativistic beam path by a 90 deg magnet
 - probe beam travels together with the relativistic beam and gets ‚modulated’
 - it is deflected from the relativistic beam path by another 90 deg magnet and analysed with a deflecting cavity
 - de-convolution of the measured probe bunch shape reveals shape of relativistic bunch
 - resolution of the method is ~25% (FWHM) deviation, absolute resolution about 30 fs
 - grants for building the setup is under discussion
- 2) – phase advance mismatch along the FODO lattice is studied in simulations (VCODE); this describes the status we had for the data already taken
 - including real quadrupole fields shows a certain mismatch (6.4 deg for x, similar value for y) that needs to be corrected by adjusting quadrupole fields
 - including linear space charge, the mismatch increases by 12.9 (34.5) deg, depending on the emittance (3 (1) mm mrad) -> quad adjustment even more important
 - combined effect sums up to 19 (40) deg and thus introduces a big effect on the reconstruction
- 3) The paper discusses emittance degradation due to chromatic effects in quadrupole scans at SPARC (numerical vs. analytical results). Results are:
 - the influence of energy spread on the emittance overestimation increases with the spot size at the quad entrance
 - chromatic terms in a single quad increase dramatically with the spot size at the quad entrance
 - doublet quad scans deliver always higher emittance values than a single quad scan; in the doublet scan, the emittance is heavily overestimating the emittance in the plane with a defocussing first quadSome simulations for PITZ were shown. It seems that chromaticity in the PITZ beam can introduce an emittance overestimation of a factor of 2 (non-optimized setup).

Next steps:

What is to be done?	By whom?	Until when?	Done on
Tune quad currents with V-code to correct phase advance mismatch to a flat line	G.Kourkafas	next week (collaboration meeting)	
Apply new transport (corrected phase advance) in data analysis of existing data	G.Kourkafas		
Do further simulations for PITZ to get an idea on the effect on the measured emittance for optimized setup (small beam size and energy spread)	G.Asova		

Protocol prepared by
A.Oppelt, 22.11.2012