FEL TEST PLAN WORKSHEET

PROGRAM DEPUTY APPROVAL	COMPLETION INFORMATION
FEL Exp Coordinator Signoff: _____ Date: _____	Completion Date: _____
PI Reviewer Signoff: _____ Date: _____	Crew Chief/PI Signoff: _____
Expiration Date (max. 90 days from approval): _____	Comments (partial completion, etc.):
Presentation Required? ❑ yes ❑ no	❑

NOTE: Information addressing the appropriate content of each of the following sections can be found in Section 2.0 of the Test Plan Instructions.

Test Plan Title: **Testing the optics for ε-measurement in the backleg.**

Author(s): P. Piot, D. Douglas

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Revision Number: Rev. 5, (*March 2nd, 1998*)

Brief Purpose of Test

This test is intended to verify that a "good" optics suitable for transverse emittance measurement in the 4F region can be achieved. Two optics setups are proposed: one is intended to measure the transverse-emittance in the backleg using the multi-monitor technique, and the other using quad-scan method

Anticipated Benefits

The setup herein will be use for transverse emittance measurements in the backleg line during the CSR experiment.

Beam Conditions Required

Complete all of the following tables, entering a value or an **X** in the appropriate spaces:

Beam Type/Current (enter value)

Beam Type	Beam Current
Beam Off	
Pulsed (std. current = 1 μA)[a]	OTR limited (135pC or 60pC)
CW	

a. The standard current for pulsed beam operation is 1 μA. If your test requires pulsed beam current >1 μA, then specify the required current and provide a brief explanation next to the specified current.

Beam Energy (select one)

Beam Off	350 keV	10 MeV	42 MeV	Energy Recovery dump
			X	

Beam Termination Point (select one)

Inj Dump	ER Dump	Straight Ahead Dump	Other (specify)
			IDC4F12 and IDCF06

Type of Test (select one)

Invasive (disrupts beam delivery)	Non-invasive (does not disrupt beam delivery)
X	

Time Required

1 Shift

Preferred Time of Test

None

Staff Required to Execute the Test (including contact info)

P. Piot (X/Pgr: 5032), or D. Douglas (X/Pgr: 7512) or R. Li (X/Pgr: 7069)

Controlled Access Requirements

None

Hardware and/or Software Changes Required

NOTE: If software changes are part of the test plan, include the name of the application, the old revision level, the new revision level, and if applicable, whether or not it is possible to roll back to the old revision level (are there hardware limitations, etc.).

None

Setup Procedure

1. Setup pulsed beam up to the last insertable dump in the backleg (IDC4F12)

Test Procedure

EMITTANCE MEASUREMENT 4F OPTICS A

This part is intended to setup the optics for transverse-emittance measurement using multi-monitor technique in the backleg line. The measurement use the six

OTR monitors (ITVF05 -> ITVF10)

1. Load the DIMAD-predicted quad settings file ******* for the backleg line. This setup provides an advance per cell of 60 deg and uses the 4 first and 4 last quad of the line to make the transfer matrix between the exit of arc1 and the entrance of arc2: **-I**
2. Insert the monitor ITV4F05, ITV4F06, ITV4F07, ITV4F08, ITV4F09 and ITVF10, each time record the rms beam size in Table 1..

Table 1: beam spot size on wiggler OTR's

	4F05	4F06	4F07	4F08	4F09	4F10
σx #1						
σy #1						
σx #2						
σy #2						

3. Start the script *beast.tcl* to perform an emittance measurement using the multi-monitor technique in the wiggler insertion (the code will guide you through the steps of the procedure)
4. Note the measured emittance and courant snyder parameters:
   ε=_____mm-mrad
   α=_____
   β=_____m

SAVE SETTINGS

1. Print a hardcopy of the "BPM absolute position" screen for regions 2F and 2G
2. Print a hardcopy of the beam spot on each of the OTR's of the wiggler line including ITV4F05, ITV4F06, ITV4F07, ITV4F08, ITV4F09
3. Save all corrector settings and quad settings in the region 4F in file:
   _____

EMITTANCE MEASUREMENT 4F OPTICS B

This part is intended to setup the optics for transverse emittance measurement using quad-scan technique in the backleg. The beam should be parked in the first backleg insertable dump (IDC2F06).

1. Insert dump IDC2F06 and withdraw IDC2F12
2. Load the file ********** that contains the DIMAD predicted quad settings for the quad MQG4F01->MQG4F06 to achieve good beam spot size on ITV4F06.
3. Insert ITV4F06 and measure beam spot size
   σx=_____

σy=_____

4. Vary quadrupole MQG4F05 (nominally it should not be excited) and make sure with sufficient high (negative and positive) gradient, you can achieve a beam spot size that is, at least, twice as large as the above recorded value (step 3). If not call the on-call PI
   Record the gradients for which beam spot is twice as large as above value:
   g+=_____
   g-=_____
5. Start *beast.tcl* and chose the quad-scan technique

SAVE SETTINGS

1. Print a hardcopy of the BPM absolute position screen for regions 4F
2. Print a hardcopy of the beam spot on each of the OTR's of the wiggler line including ITV2F01, 2F05, 2F09, 2G00
3. Save all corrector settings and quad settings in the region 2 in file:
   _____

Backout Procedure

1. Restore initial value for the quads and corrector that have been modified.

Test Results

Optics setup for emittance measurement, and hopefully some preliminary measurements of potential CSR-induced emittance growth through the arc 1.