



FEL TEST PLAN WORKSHEET

PROGRAM DEPUTY APPROVAL

FEL Exp Coordinator Signoff: _____ Date: _____
 PI Reviewer Signoff: _____ Date: _____
 Expiration Date (max. 90 days from approval): _____
 Presentation Required? yes no

COMPLETION INFORMATION

Completion Date: _____
 Crew Chief/PI Signoff: _____
 Comments (partial completion, etc.): _____

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: **Transverse Emittance Measurements after the Bunch Compressor and Bunch Decompressor Chicanes versus longitudinal tilt (σ_{56}) (DRAFT)**

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

Date Submitted: September 12th, 1997

Revision Number: Rev. 4 (November 1st, 1997)

Brief Purpose of Test

Measure emittance after the bunch compressor and bunch decompressor chicane for different incoming phase space tilt ($\sigma_{5,6}$).

Anticipated Benefits

- Compared emittance with PARMELA simulation at the compressor exit
- Study potential emittance degradation versus $\sigma_{5,6}$ in the decompressor chicane
- Side product: find incoming tilt for optimum compression

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 μ A) ^a	OTR limited (60pC)
CW	

a. The standard current for pulsed beam operation is 1 μ A. If your test requires pulsed beam current >1 μ A, 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)
		X	

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: 5032/9467), or D.Douglas (X/Pgr:7512), or R. Li (X/Pgr: 7069)

Controlled Access Requirements

None planed

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. Download optics setup for emittance measurement in the wiggler insertion line (file *****)
2. Setup injector and cryomodule to their nominal settings
3. Setup pulsed (OTR limited 60 pC) beam up to straight ahead dump

Test Procedure

1. Measure bunch length at the injector exit, using the Happek-interferometer IHI1F01 (this gives the bunch length at the decompressor entrance since, according to parmela simulations, the bunch length should be constant from the injection point up to the compressor chicane entrance).
Note the bunch length: _____ mm
2. Measure bunch length after the bunch compressor, using the Happek-interferometer IHI2F05.
3. Record beam size σ_x and σ_y on ITV2F05 using *maxvideo.tcl*
4. Measure emittance at the wiggler insertion line
 - a. Start up the tcl script *beast.tcl*
 - b. After initializing the measurement (click on Initialize), select the “Wiggler-Multi_Monitor” method
 - c. Enter in the comment widget “Info” the beam size on ITV2F05, the measured bunch length, and the phase/gradient of the cryomodule
 - d. Go through the steps indicated and note in the table, at the end below, the measured parameters
5. Measure emittance downstream the decompressor
 - a. start up the tcl script *beast.tcl*
 - b. Enter in the comment widget the beam size on ITV2F05, the measured bunch length, and the phase of the cryomodule
 - c. go through the steps indicated, and choose the quad-scan method, using quadrupole MQG2F09 and the profile monitor ITV2G00
6. Change the incoming longitudinal phase space tilt dephasing the cryomodule to nominal phase -5 up to +5 by step of 1 degree
 - a. For each value of the phase, change the overall gradient of the module to get the same energy as previously
 - b. Redo steps to 1 to 5

Table 1: Beam Parameters after the compressor versus cryomodule phase(60pC)

cryomod. $\Delta\phi$	ϵ_x/ϵ_y comp +	ϵ_x/ϵ_y decomp +	σ_x/σ_y (ITV2F05)	σ_z (IHI2F05)
-5				
-4				
-3				

Table 1: Beam Parameters after the compressor versus cryomodule phase(60pC)

cryomod. $\Delta\phi$	ϵ_x/ϵ_y comp +	ϵ_x/ϵ_y decomp +	σ_x/σ_y (ITV2F05)	σ_z (IH12F05)
-2				
-1				
0				
1				
2				
3				
4				
5				

Backout Procedure

1. Restore the Nominal Optics

Test Results
