

CesrTA Machine Studies Task Overview

I. Experiment Description

Experimental Topic	Intra-Beam Scattering (IBS)	
Classification*	LET	
Coordinator/ Experimenters	MPE	DLR, JSh, MPE, WH, SW
Primary Goals	Measure beam size vs. current using the xBSM(vertical), VBSM(horizontal), streak camera(Longitudinal)	
Description†	<p>Positrons – 2.085GeV [2 * 10 hrs]</p> <ul style="list-style-type: none"> • NOTE: Optics type is PH unless otherwise specified. • Based on results of tune scans over two regions, one being in the traditional part of the tune plane, the other being in the vicinity of (0.62,0.59), pick one of the regions for IBS studies. <ol style="list-style-type: none"> 1. Operating point will be based on examination of experimental tune plane, simulation tune plane, and analytical tune plane. • Decision on fixed vs. free will be based on current dependent coupling/phase. • Run 0) Create qtune vs current schedule for use during runs where tunes held constant with feedback on • Run 1A) Hold tunes fixed, high tune @ high current. LET. Achieve lowest possible emittance. Charge ring to highest current and take data as beam decays. <ul style="list-style-type: none"> • Observe checklists contained below • Run 1*) If good conditions found in 1A, 1B, or 1C immediately repeat with CA. • Run **) On day two, rerun Run 1A to verify conditions. • Run 1B) Let tunes float, low tune @ high current. LET. Achieve lowest possible emittance. Charge ring to highest current and take data as beam decays. • Run 1C) (option) Based on high current behavior, adjust tunes and repeat 1A & 1B. <ul style="list-style-type: none"> • Poor man's tune scan at low or mid (3 mA) current • Run 2a,b) Same conditions with sqrt(2) longer bunch, repeat with CA <ul style="list-style-type: none"> • Run poor man's tune scan if no tune scan data from ts machine studies. • Run 2c,d) Same conditions with sqrt(2)/2 longer bunch, repeat with CA • Run 3) Use C8 to blow up beam to ~35 um. (nominal bunch length) • Run 4) Use C8 to blow up beam to ~75 um. (nominal bunch length) • Steps for each IBS run <ol style="list-style-type: none"> 1. Set conditions 	

* Machine Studies Classifications:

- EC – Electron Cloud
- LET – Optics Correction and Low Emittance Tuning
- IBS – Intra-beam scattering studies
- xBSM – x-ray Beam Size Monitor
- INST – Instrumentation (BPM development, RFA development, other)
- MDEV – Machine Development (includes injection configuration, injection tuning, custom orbit setup, instrumentation preparation, etc.)
- MREC – Machine Startup (recovering conditions after down period or access)

† Attach additional pages for experimental description if needed

	<ul style="list-style-type: none"> ▪ Define hysteresis loop for qtune ▪ spectrum analyzer sources off ▪ set tunes ▪ check chrom ▪ feedback ▪ C8 ▪ bunch length <ol style="list-style-type: none"> 2. Check that xBSM, vBSM, and streak camera ready 3. C8 scan (ph and ca) to validate conditions and produce data to help instrumentation group 4. Fill single bunch to ~8 mA 5. Take tune measurement (high current) 6. Start xBSM trigger tool 7. Start data logger 8. Complete webdb template (below) 9. At about 1 mA, begin scraping in 0.25 mA increments 10. Take tune-tracker measurement (low current) 11. Take data at lowest reasonable current (~0.10 mA) <ul style="list-style-type: none"> • Webdb template (make a webdb entry for each run. Record the following.) <ol style="list-style-type: none"> 1. IBS Run number 2. Run number of first and last xBSM data file 3. Goal of run 4. High current tune 5. Low current tune 6. Start current 7. Optics type and aperture 8. Number of turns taken by xBSM 9. Feedback settings 10. Currents where scraping done 11. First observations <p>Not requesting electrons because line condition uncertain and limited time.</p> <p>Not requesting alternative energies because not that interesting without 3 energies and instrumentation not characterized for 1.8 GeV.</p>
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Special Needs/Requests		
Prerequisites[‡]	Personnel	Description
xBSM characterization	NTR, JSh, DPP	Characterize xBSM
Tune scans	DLR, JSh, et al	Characterize tune plane in both regions
Phase/Coupling vs I	JSh, DLR	Characterize phase and coupling vs current
L3 instrumentation	SW, JSh	Characterize vBSM, Streak camera
Time Requested[§]	No. Shifts	Principal Tasks

[‡] Indicate other machine work that is required in preparation for this machine studies experiment.

20hr (2x10hr)	2	See above.

^s Indicate the principal shift topics and estimated number of shifts required

II. Machine Studies Assignments

Reserved for Project Management Team Use		
Topic ID		
Priority**		
Shift Assignments	Date	Shift

** Priority Scale:

1. Critical – results are necessary for preparation for subsequent down/run periods
2. Very high – results are strongly desired for achieving program milestones or in preparation for subsequent down/run periods
3. High – results are of immediate interest but not require
4. Moderate – results should be pursued at the first convenient opportunity
5. Low – results are not presently a high priority for either project milestones or planning