

CESR TA Machine Studies Task Overview

I. Experiment Description

Experimental Topic	Electron Cloud Instability Studies	
Classification*	EC	
Coordinator/ Experimenters	Billing/Dugan	Billing, Dugan, Sonnad, Ramirez, Palmer, Williams, Forster
Primary Goals	Measure beam instabilities with train of bunches and associated tune shifts of bunches within train of bunches, with and without a precursor bunch to observe the effect of the precursor bunch's timing and current	

Description[†]	<p>Setup</p> <ol style="list-style-type: none"> 1. <u>Take reference measurement</u> <ol style="list-style-type: none"> a. 30 bunch train 14 nsec spacing 0.75 mA/b <p>Instability/Damping Measurements (INST/DAMP)</p> <ol style="list-style-type: none"> 2. Study Head-tail instability (INST) <ol style="list-style-type: none"> a. Conditions <ol style="list-style-type: none"> i. 2 GeV lowest emittance (Big D) ii. 30 bunches iii. Current per bunch <ol style="list-style-type: none"> 1. 0.75 mA/b iv. Positrons/Electrons v. Different Tunes for bunch 1 <ol style="list-style-type: none"> 1. $f_h/f_v = 222.5/238.5$ kHz vi. Concurrent xBSM bunch-by-bunch data vii. Low Feedback viii. Vary Location of precursor bunch(es) <ol style="list-style-type: none"> 1. 160 ns 2. 80, 40, 320, 640 ns ix. Vary Current in precursor bunch(es) <ol style="list-style-type: none"> 1. 0.5, 0.75, 1.0, 1.5 mA 2. for approximately 3 timing locations b. Bunch spacings: 14 ns c. Bunch spacings: 4, 8, 20, 28 ns
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* Machine Studies Classifications:

- EC - Electron Cloud
- LET - Optics Correction and Low Emittance Tuning
- 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 time)

[†] Attach additional pages for experimental description if needed

	<p>d. Turn on EC Solenoids With & Without the Precursor – choose best case for study</p> <p>e. Above gives a total number of measurements of 5x5 + 2 – this is too many so we will choose the best 15 sets of measurements</p>	
Special Needs/Requests		
Prerequisites[‡]	Personnel	Description
	Billing, Forster,	Establish stored beams
	Ramirez, Billing, Sikora	Software testing of 1. Swept frequency shaking (TUNE) 2. Instability spectra (INST) 3. Damping measurements (DAMP)
	Billing	Test method for expelling precursor bunch (2 hours) – this could shorten the time between some experimental setups
Time Requested[§]	No. Shifts	Principal Tasks
1 hour/each shift		Measurement setup for train-head tail instabilities 1.a.
15 measurements at 1 hour per measurement = 15 hours	2	Measurement of train-head tail instabilities with a precursor bunch 2.b,c,d

II. Machine Studies Assignments

Reserved for Project Management Team Use	
Topic ID	
Priority^{**}	

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

[§] Indicate the principal shift topics and estimated number of shifts required

^{**} Priority Scale:

1. Critical – results are necessary for preparation for subsequent down/run periods

Shift Assignments	Date	Shift

Notes:

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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