



# Floating Machine Development Week 40 -

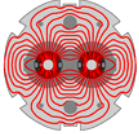
R. Assmann

for the LHC MD coordination team

**(R. Assmann, Frank Zimmermann, Giulia Papotti)**

LPC, 03.10.2011

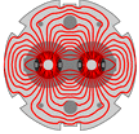




# Schedule

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- 4.10.: Discussion in LSWG with input/clarifications/requests from MD teams (round-table)
- 5.10.: Discussion of draft list in LMC
- Week 2.10.-8.10.: Large pile-up MD. Floating MD #1: 25ns setup
- Week 9.10.-15.10.: Floating MD #2: 25ns setup
- 18.10.: Discussion in LSWG with detailed presentations from MD teams. Start MP procedure.
- 19.10.: Discussion in LMC. Approval of plan for MD#4.
- **MD#4: Oct 30, 6am - Nov 4, 6am.**



# Introduction

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- Scheduled 168h of more MD time in 2011:
  - 120h in MD block #4.
  - 48h in floating MD's (scheduled during physics run).
- We could have scheduled another 230h (see list) and more (in your requests that we already reduced)...
- Not everything can be done!
- We will also have MD time in 2012! Will ask for new requests for next year, which should take into account results achieved in 2011.
- All this depends on your input to us!



# Present Draft List *(to be discussed this week)*

Short MD description	Time	Time from MD#4	Time from floating MD
	[h]	[h]	[h]
<b>Theme: Running with 25ns or 50ns?</b>			
<b>Large Pile-Up (from MD3, on physics time) (3.5TeV)</b>	9	0	0
<b>25ns: injection + ADT set-up (450GeV)</b>	12	0	12
<b>25ns: setup up to ≥48b, quality check, ramp 24b, squeeze, collision, SB (3.5TeV)</b>	12	0	12
25ns: 450GeV, observation, e-cloud (450GeV)	4	4	0
25ns: ramp 48b, squeeze, collide, LR beam-beam test, scraping test for beam shape (3.5TeV)	8	8	0
<b>Theme: Operational efficiency, new working points, preparation for ions</b>			
Ions: p-Pb test, rephasing, radial loop (450GeV)	16	16	0
Combined ramp and squeeze (3.5TeV)	8	8	0
Beam instrumentation (3.5TeV)	8	8	0
Tune working points: integer to half-integer (450GeV)	8	8	0
TDI vacuum issues (450GeV)	8	8	0
<b>Theme: Machine analysis, future upgrades</b>			
<b>Injection stability and losses for HW upgrades (LIU) (450GeV)</b>	8	0	8
<b>ATS optics dry run (HL-LHC) (3.5TeV)</b>	3	0	3
ATS pre-squeeze to 0.4m and tight collimation settings (LHC) (3.5TeV)	10	10	0
ATS squeeze to 0.1m in IR1 and IR5 (HL-LHC) (3.5TeV)	6	6	0
Quench margin at injection (LHC) (450 GeV)	4	4	0
Quench margin at 3.5 TeV (HL-LHC) (3.5TeV)	8	8	0
Longitudinal RF stability (LHC) (3.5TeV)	8	8	0
<b>Large Piwinsky Angle (HL-LHC) (450GeV)</b>	8	0	8
Non-linear dynamics (LHC) (450GeV)	8	8	0
<b>Overhead/Reserve</b>	21	16	5
<b>Total</b>	177	120	48
<b>Available</b>		120	48

} This week

To be moved to regular MD?



# Present Draft List

Short MD description	Time	Time from MD#4	Time from floating MD
	[h]	[h]	[h]
<b><i>Theme: Running with 25ns or 50ns?</i></b>			
<b>Large Pile-Up (from MD3, on physics time) (3.5TeV)</b>	9	0	0
<b>25ns: injection + ADT set-up (450GeV)</b>	12	0	12
<b>25ns: setup up to <math>\geq 48b</math>, quality check, ramp 24b, squeeze, collision, SB (3.5TeV)</b>	12	0	12
25ns: 450GeV, observation, e-cloud (450GeV)	4	4	0
25ns: ramp 48b, squeeze, collide, LR beam-beam test, scraping test for beam shape (3.5TeV)	8	8	0
<b><i>Theme: Operational efficiency, new working points, preparation for ions</i></b>			
Ions: p-Pb test, rephasing, radial loop (450GeV)	16	16	0
Combined ramp and squeeze (3.5TeV)	8	8	0
Beam instrumentation (3.5TeV)	8	8	0
Tune working points: integer to half-integer (450GeV)	8	8	0
TDI vacuum issues (450GeV)	8	8	0



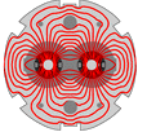
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Short MD description	Time	Time from MD#4	Time from floating MD
	[h]	[h]	[h]
<b><i>Theme: Machine analysis, future upgrades</i></b>			
Injection stability and losses for HW upgrades (LIU) (450GeV)	8	0	8
ATS optics dry run (HL-LHC) (3.5TeV)	3	0	3
ATS pre-squeeze to 0.4m and tight collimation settings (LHC) (3.5TeV)	10	10	0
ATS squeeze to 0.1m in IR1 and IR5 (HL-LHC) (3.5TeV)	6	6	0
Quench margin at injection (LHC) (450 GeV)	4	4	0
Quench margin at 3.5 TeV (HL-LHC) (3.5TeV)	8	8	0
Longitudinal RF stability (LHC) (3.5TeV)	8	8	0
Large Piwinsky Angle (HL-LHC) (450GeV)	8	0	8
Non-linear dynamics (LHC) (450GeV)	8	8	0
<b><i>Overhead/Reserve</i></b>	21	16	5
<b>Total</b>	177	120	48
<b>Available</b>		120	48



# Received Requests: Not Scheduled I

Short MD description	Time
	[h]
Beam-Based Measurement of the Waveform of the LHC Injection Kickers	6
Improving Collimator Setup Speed at 3.5 TeV	8
Measurement combined cleaning efficiency	8
Crossing schemes	24
Instability and transverse impedance	24
Quench test at 1.38 TeV	5
Wire breakage with ion beams	2
Q' decay vs powering history	17



# Received Requests: Not Scheduled II

Short MD description	Time
	[h]
UFO's at MKI's	8
Quench test with wire scanner	8
Collimation scraping	8
Tight collimator settings: orbit control	12
Commissioning 1T feedback	8
Rephasing tests (RF)	4
Movements of the inner triplet with beam at injection	8
TCDQ alignment and TCT transmission during asynchronous dump	8





# Received Requests: Not Scheduled III

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Short MD description	Time
	[h]
Transverse noise	8
Tune scan WP	8
Beam loss measurements with different collimator settings	16
Alignment and protection of long absorbers (can be done 2012)	8
45 degree crossing at LHCb (25ns)	16
Transfer and injection of Q20 beam into LHC (first part can be done in shadow if LHC down)	8
25ns studies	8

Total 230



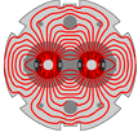
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<b>25ns: setup up to <math>\geq 48b</math>, quality check, ramp 24b, squeeze, collision, SB (3.5TeV)</b>	12	0	12
25ns: 450GeV, observation, e-cloud (450GeV)	4	4	0
25ns: ramp 48b, squeeze, collide, LR beam-beam test, scraping test for beam shape (3.5TeV)	8	8	0
<b><i>Theme: Operational efficiency, new working points, preparation for ions</i></b>			
Ions: p-Pb test, rephasing, radial loop (450GeV)	16	16	0
Combined ramp and squeeze (3.5TeV)	8	8	0
Beam instrumentation (3.5TeV)	8	8	0
Tune working points: integer to half-integer (450GeV)	8	8	0
TDI vacuum issues (450GeV)	8	8	0



# Present Draft List

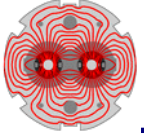
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<b><i>Theme: Machine analysis, future upgrades</i></b>			
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Quench margin at injection (LHC) (450 GeV)	4	4	0
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Longitudinal RF stability (LHC) (3.5TeV)	8	8	0
Large Piwinsky Angle (HL-LHC) (450GeV)	8	0	8
Non-linear dynamics (LHC) (450GeV)	8	8	0
<b><i>Overhead/Reserve</i></b>	21	16	5
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<b>Available</b>		120	48



# Discussion

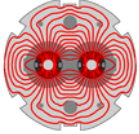
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- What should NOT be done and what MUST still be done in 2011?
  - Scheduled 168h of more MD time in 2011.
  - We could have scheduled another 230h (see list) and more (in your requests that we already reduced)...



# Thank you...

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# Appendix 1 – MD List (Status Aug. 2011)

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Scheduled & not yet scheduled  
MD Requests  
status August 2011

times in hours  
(incl. possible ramp down)  
allocated in:  
**1<sup>st</sup> MD block**  
**2<sup>nd</sup> MD block**  
**3<sup>rd</sup> MD block**



# beam-beam MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
45 degree crossing at LHCb (25ns)	W. Herr and T. Pieloni	2	0	16	3500	physics	LHC nominal	RA, GP
Beam-Beam Limits	W. Herr and T. Pieloni	5	40	0	450, 3500	5e12	LHC nominal	RA, GP <b>8+17+16</b>
Crossing Scheme	F. Zimmermann, R. Calaga, W. Herr and T. Pieloni	2	0	24	450, 3500	1.7e13	HL-LHC	SR, RA, GP
Large Piwinski Angle (LPA)	S. Fartoukh, F. Zimmermann	2	8	8	450	3e11	HL-LHC	SR <b>8</b>
Transverse noise, coherent beam-beam instability and beam-beam emittance growth	W. Herr and T. Pieloni	1	8	0	3500	5e12	LHC nominal	RA, GP
Operation tune close to half-Integer	R. Calaga, W. Herr, T. Pieloni, R. Steinhausen	2	0	16	450, 3500	1e12	HL-LHC	RA, GP <b>1</b>
Tune scan for beam-beam optimization, lifetime and losses	W. Herr, T. Pieloni, R. Assmann, R. Steinhausen	2	8	8	450, 3500	6e12	LHC nominal + HL-LHC	RA, GP <b>6 (EOF)</b>

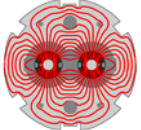
total: 134 h



MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
ATS	S. Fartoukh	6	24	24	450, 3500	1e10	HL-LHC	SR <b>14+14</b>
Un-squeeze to 90 m	Helmut Burkhardt	1	8	0	3500	1e10	Commissioning leftover	SR <b>10</b>
Emittance growth. Life-time and emittance dependence on chromaticity at 450 and 3.5 TeV	R. Steinhagen, F. Roncarolo, V. Kain, B. Goddard	2	8	0	450, 3500	2e13	LHC nominal	VK
Non-linear dynamics studies: various studies. Measurement of single-particle dynamic aperture	F. Schmidt, M. Giovannozzi	3	8	16	450, 3500	1e10	LHC nominal	SR <b>12</b>
Collision tunes at injection and ramp	R. Tomas	1	6	0	450	1e10	LHC nominal	SR <b>8</b>
Single beam parameter evolution	G. Papotti	1	4	0	3500	1.15e11	LHC nominal	GP

total: 98 h





# e-cloud MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Intensity limitations from electron cloud in the LHC	G. Arduini	1	36	36	450	3e14	Commissioning leftover	x

***mC priority***

7

total: 36 h



# operational MD's

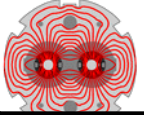
MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Combined ramp and squeeze	S. Redaelli	2	6	6	450,3500	1e10	Commissioning leftover	SR

total: 12 h



MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link	
Movements of the inner triplet with beam at injection	S. Redaelli	1	0	8	450	1e10	Commissioning leftover	SR	
BPM offset determination for triplet BPMs	J. Wenninger	2	16	0	450	1.2e11	LHC nominal	x	8
Triplet aperture measurements at 3.5 TeV	S. Redaelli	1	0	8	3500	1e10	Commissioning leftover	SR	10

total: 32 h



# injection & injection protection MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Beam based alignment issues with long protection devices, injection losses & mitigation in other beam	Wolfgang Bartmann and Chiara Bracco	2	8	8	450	1.2e11 and 1.5e13	Commissioning leftover	VK
TCDQ alignment and TCT transmission during asynchronous dump	Wolfgang Bartmann and Chiara Bracco	1	8	0	450	pilot beam (beam 2)	Commissioning leftover	VK
Injection studies for different SPS beam parameters	Brennan GODDARD	2	16	0	450	1.2e13, 144 bunches at 25 ns	LIU	VK
Injecting nominal emittance	Lene Drosdal	1	9	0	450	12, 36 bunches	LHC nominal	VK
Transverse blow-up, longitudinal blow-up and SPS scraping and injection losses	Verena Kain	1	8	0	450	1.3e11	LIU	VK
Detailed injection matching studies	Malika Meddahi	2	6	6	450	1.3e11	LHC nominal	VK
Beam-Based Measurement of the Waveform of the LHC Injection Kickers	Mike BARNES	1	6	0	450	1e10	Commissioning leftover	x
MKI UFOs at injection	T. Baeer, J. Uythoven	1	8	0	450	up to 1.5e14	LHC nominal	x
sensitivity of injection quality & injection protection to TL steering	Verena Kain, Lene Drosdal,	1	12	0	450	1-12 b at 50 ns, at ~1.2e11	LHC nominal	x
transfer and injection with SPS Q20 optics	Wolfgang Baartmann,	2	16	0	450	1e10-3e11, single to 36, 1-4 batches	LIU	x

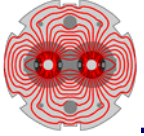
8

6+7

9

(4+)10

total: 111 h  
8/22/2011



# collimation MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link	
Scraping scans for beam shape	Daniel Wollmann, Daniel Deboy, Florian Burkart	1	8	0	450, 3500	3e11	LHC nominal + HL-LHC	SR	4
Improving Collimator Setup Speed at 3.5 TeV	Gianluca Valentino	2	8	8	3500	1.2e11	LHC nominal	SR	5
Nominal and tighter collimation settings, single bunch tune shift	R. Assmann, B. Salvant, N. Mounet, E. Metral	2	16	0	3500	3e11	LHC nominal + HL-LHC	SR	10
Feasibility test beta* = 1 m	R. Bruce, R. Assmann	1	8	0	3500	pilot	LHC nominal	SR	10
Beta* reach from collimation	Roderik Bruce	2	8	8	3500	1e12	LHC nominal	SR	
combined cleanup		1	5				LHC nominal	SR	5
BLM quench threshold test at 3.5 TeV in the DS of IR7	S. Redaelli, R. Assmann	2	16	0	3500	1e13	LHC nominal	SR	10+10

**mC priority**

total: 72 h



# MD's on passive protection for stored beam

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Beam loss measurements with different collimator settings (TCTs, TCLAs, ...), TCDQ/TCSG/TCT protection levels and tolerance	Adriana Rossi, Chiara Bracco	2	8	8	450	1.5e11	LHC nominal	VK, SR

total: 16 h



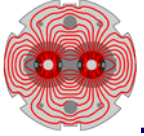
# impedance MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Coupled-bunch instability rise times at injection & flat top and stabilization by Landau octupoles, with collimators	N. Mounet, E. Metral, collimation team	3	16	8	3500	6e13	LHC nominal + HL-LHC	SR
Multi-bunch tune shift at 450 GeV and 3.5 TeV, with collimators	N. Mounet, E. Metral, collimation team	3	16	8	450, 3500	6e13	LHC nominal + HL-LHC	SR

10

(5?)

total: 48 h



MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Slow controlled losses for RadMon application benchmark	M. Calviani (EN/STI)	1	8	0	450	1e10	LHC nominal	MP

8

total: 8 h





# instrumentation MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Optimization of BGI parameters	Mariusz Sapinski	4	4	0	450	1e11	Commissioning leftover	x
BSR studies at 1.38 TeV	F. Roncarolo	2	2	0	1380	2e13	Commissioning leftover	MP
Continuous beta-beat measurement at injection and squeezed optic	Ralph Steinhagen	1	0	8	450, 3500	7e12	LHC nominal	x
Quench Test at 1.38 TeV	Agnieszka Priebe	1	5	0	1380	1.2e11	LHC nominal	x
Quench test with wire scanner	Mariusz Sapinski	1	2	0	3500	1e14	LHC nominal	x
Cross calibration of BSRT/WS/BGI	F. Roncarolo	2	2	0	450, 3500	>1e10 & <2e13	LHC nominal	MP
High bunch intensity	F. Roncarolo	1	8		450, 3500		LHC nominal	
direct-dump BLM calibration, new BPM firmware, stripline crosstalk, BCT/FBCT, BSRT. BSRA, Schottky, emittance vs Q'	F. Roncarolo	1	8		4,503,500	1-24 bunches, 0.5e10 to 1.3e11	LHC nominal	x

10

10

total: 31 h



# RF MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link	
RF noise induced beam diffusion	E. Shaposhnikova	4	8	8	450, 3500	1e12	LHC nominal + Commissioning leftover	GP	
Synchronous phase shift	E. Shaposhnikova	4	8	8	450	1e13	Commissioning leftover	GP	
Longitudinal beam stability	E. Shaposhnikova	3	8	4	450, 3500	1e12	LHC nominal	GP	8+10
long bunch length	E. Shaposhnikova	1	8	0	450, 3500	1e12	LHC nominal	GP	10
RF feedback optimization with circulating beam	P. Baudrenghien	4	8	8	450, 3500	1e12	Commissioning leftover	x	
Longitudinal damper commissioning	P. Baudrenghien	2	8	0	450	5e12	Commissioning leftover	x	
Voltage (capture/ramp/Physics) and Blow-Up Optimization	P. Baudrenghien	3	12	6	450, 3500	1.3e13	Commissioning leftover	GP	
1-T feedback commissioning	P. Baudrenghien	3	8	4	450, 3500	6e13	Commissioning leftover	x	
Rephasing	P. Baudrenghien	3	8	4	3500	5e12	Commissioning leftover	GP	8
Controlled transverse blowup	R. Schmidt, W. Hoefle, S. Redaellie	1	6	0	450	safe beam	Commissioning leftover	SR	6

*as operational development*

total: 124 h



MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Feasibility of p-Pb operation	John Jowett	<i>not ready?</i>	0	0	450	p, ion	LHC ions	x
Wire Breakage with ion beam	Mariusz Sapinski	1	2	0	450, 3500	50 nom ion b	LHC ions	x

total: 26 h



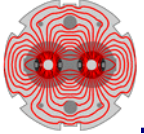
# experiment MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
maximum pile up in single bunches	Physics coordinators	1	6	0	3500	2 bunches with $\sim 2e11$	LHC nominal	x
25-ns test run with physics	Physics coordinators	1	8	0	3500	a few trains with 25-ns spacing	LHC nominal	x

6

total: 12 h

8/22/2011



# magnet MD's

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Investigation on CODs	Nuria	1	8	0	450	1e11	LHC nominal	6
RQ6.L8 quench limit investigation	Chiara Bracco, Rudiger Schmidt, Matteo Solfaroli	1	8	0	450	1e10, 2e10, 3e10	LHC nominal	
quench margin at injection	Rudieger Schmidt, Brennan Goddard, Mariusz Sapinski	2	8	0	450	3e9-1.2e11	LHC nominal	6+4
Q' decay vs powering history	Ezio Todesco	1	<b>not in MD</b>	0	450, 3500	probe bunch, 1e10	LHC nominal	

total: 41 h

8/22/2011



# EOF studies

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
Transverse noise, coherent beam-beam instability and beam-beam emittance growth	W. Herr and T. Pieloni	4 EOF	4		3500	5e12	LHC nominal	RA, GP
TCP alignment test for different orbit settings	S. Redaelli	3 EOF	6		3500	4e13	LHC nominal	SR
Halo scraping	Daniel Wollmann, Daniel Deboy, Florian Burkart	16 EOF	8		450, 3500	physics	LHC nominal	SR
Debunched beam following klystron trip	P. Baudrenghien	4 EOF	8		3500	physics	LHC nominal + Commissioning leftover	GP
Emittance from lumi scan (eof, many)	G. Papotti	0	0		3500	physics	LHC nominal	GP
Tight collimator settings for beta*=1 m at high intensity	S. Redaelli	1	2		3500	physics	LHC nominal	



# operational development studies

MD title	Requester	# MD's	Total time 2010 [h]	Total time 2011 [h]	Energy	Max Intensity	Theme	OP link
beta*= 1 m w/o beam	M. Lamont?	1	4		3500	no beam	LHC nominal	SR
beta*=1 m with beam	M. Lamont?, R. Tomas?	1	8		3500	pilot	LHC nominal	SR
SPS Q20 extraction to downstream TED (w/o LHC)	W. Bartmann, H. Bartosik	1	8		450		LIU	VK?