



MERIT beam request

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http://cern.ch/proj-hiptarget

Collaboration meeting, October 2005





- Summary of previous actions
 - Pulse list
 - Beam request to the APC
- Pulse list
- Response of APC
- Next steps



Available Information



APC: Accelerator Performance Committee

- Platform to discuss all issues relevant to CERN accelerators
- http://ab-div.web.cern.ch/ab-div/Meetings/APC/Welcome.html

Following the approval of MERIT:

- Presentation of beam request to APC (June 2005)
 - http://proj-hiptarget.web.cern.ch/projhiptarget/default/Documents/subsystems/ProtonBeam/APC_Jun0 5_AFabich.ppt
 - APC asked for a pulse list as follow-up action:
- MERIT pulse list: hiptarget/redir.asp?short=pulselist (July 2005)
- APC responded on feasibility of configurations





Version in June was a suggestion for discussion:

- 80 different configurations
 - Each two pulses
 - Total: 160 pulses = 4.4*10¹⁵ protons on TARGET
 - Remember: limited to 3*10¹⁵ p.o.t. by RP safety
 - varying intensity, time structure, displacement, spot size and solenoid field
 - Solenoid field not in the responsibility of PS
 - → About 25 different proton beam configurations



MERIT pulse list (ff)



#	B-field	momentum	protons/bunch	Ърр	buckets	dx	dy	spot r mus	s an
	[T]	[GeV/c]	[*10^12 p+]			[mm]	[mm]	[mm]	
1	0	24	1	4	1-2-3-4	0	0	1.2	
2	0	24	2	4	1-2-3-4	0	0	1.2	
3	0	24	3	4	1-2-3-4	0	0	1.2	
4	0	24	4	4	1-2-3-4	0	0	1.2	intensity
5	0	24	5	4	1-2-3-4	0	0	1.2	Ē
6	0	24	6	4	1-2-3-4	0	0	1.2	
7	0	24	7	4	1-2-3-4	0	0	1.2	
8	3	24	7	4	1-2-3-4	0	0	1.2	
9	6	24	7	4	1-2-3-4	0	0	1.2	73
10	9	24	7	4	1-2-3-4	0	0	1.2	B-field
11	12	24	7	4	1-2-3-4	0	0	1.2	ı e
12	15	24	7	4	1-2-3-4	0	0	1.2	
13	-5	24	7	4	1-2-3-4	0	0	1.2	8 2
14	-10	24	7	4	1-2-3-4	0	0	1.2	inverse B-fald
15	-15	24	7	4	1-2-3-4	0	0	1.2	. E 🖆
16	3	24	4	4	1-2-3-4	0	0	1.2	
17	6	24	4	4	1-2-3-4	0	0	1.2	73
18	9	24	4	4	1-2-3-4	0	0	1.2	B-field
19	12	24	4	4	1-2-3-4	0	0	1.2	, mi
20	15	24	4	4	1-2-3-4	0	0	1.2	1
21	15	24	7	4	1-2-3-4	-7	0	1.2	Ħ
22	15	24	7	4	1-2-3-4	-5	0	1.2	horizontal scan
23	15	24	7	4	1-2-3-4	-3	0	1.2	귤
24	15	24	7	4	1-2-3-4	3	0	1.2	ğ
25	15	24	7	4	1-2-3-4	5	0	1.2] ·[]
26	15	24	7	4	1-2-3-4	7	0	1.2	ᅽ
27	15	24	7	4	1-2-3-4	0	-7	1.2	
28	15	24	7	4	1-2-3-4	0	-5	1.2	vertical scan
29	15	24	7	4	1-2-3-4	0	-3	1.2	1 2
30	15	24	7	4	1-2-3-4	0	3	1.2	Ę
31	15	24	7	4	1-2-3-4	0	5	1.2	7e I
32	15	24	7	4	1-2-3-4	0	7	1.2	
33	0	24	7	4	1-2-3-6	0	0	1.2	
34	15	24	7	4	1-2-3-6	0	0	1.2	1

Collaborat Ocotober

1-2-3-8

1-2-3-8

1.2



врр	buckets	dx	dy	spot r rms	sc m	
		[mm]	[mm]	[mm]	/ \	
4	1-2-3-4	0	0	minimum		
4	1-2-3-4	0	0	minimum		
4	1-2-3-7	0	0	minimum		
4	1-2-3-7	0	0	minimum		١
4	1-2-3-10	0	0	minimum		
4	1-2-3-10	0	0	minimum		
4	1-2-3-12	0	0	minimum	-ਦੁ	
4	1-2-3-12	0	0	minimum	pamp-probe method	
4	1-2-3-14	0	0	minimim	Ě	
4	1-2-3-14	0	0	minimum	ھ ا	
4	1-2-3-16	0	0	minimum] <u></u>	
4	1-2-3-16	0	0	minimun	<u></u>	
4	1-2-3-20	0	0	minimun	별	
4	1-2-3-20	0	0	minimun	P4 [
4	1-2-3-28	0	0	minimun		
4	1-2-3-28	0	0	minimur		
4	1-2-3-40	0	0	minimur		
4	1-2-3-40	0	0	minimur		
4	1-2-3-400	0	0	minimur		
4	1-2-3-400	0	0	minimur		
8	2 bunches every 20 ms	0	0	1.2		
8	2 bunches every 20 ms	0	0	1.2] a [
4	2 bunches every 20 ms	0	0	1.2	Tage [
8	4 bunches every 20 ms	0	0	1.2	rep rate	
8	4 bunches every 20 ms	0	0	1.2] " [
4	4 bunches every 20 ms	0	0	1.2		
4	1-2-5-6	0	0	1.2		
4	1-2-5-6	0	0	1.2		
4	1-2-7-8	0	0	1.2	2	
4	1-2-7-8	0	0	1.2] 2	
4	1-2-9-10	0	0	minimun	물	
4	1-2-9-10	0	0	minimun	a H	
4	1-2-11-12	0	0	minimum	្ដ	
4	1-2-11-12	0	0	minimim	pump-probe method 2	
4	1-2-13-14	0	0	minimum		
4	1-2-13-14	0	0	minimum	ă,	
4	1-2-15-16	0	0	minimim		
4	1-2-15-16	0	0	minimum		
4	1-2-3-4	0	0	1.4		I
4	1-2-3-4	0	0	1.6	ايو	
4	1-2-3-4	0	0	1.8	ξĬ	
4	1-2-3-4	0	0	2	spot size	l
4	1-2-3-4	0	0	2.3	\ \frac{1}{2}	
	1-2-3-4		0			





Summary of pulse list



- Counting only PS beam parameter changes
 - About 30 different beam configurations: varying
 - Intensity
 - Beam displacement on target (hor./ vert.)
 - Pump-probe method
 - 50-Hz operation
 - Spot size
- APC statement: two "surprises"
 - Intensity limited to 4*10¹²/bunch (harmonic 8)
 - 50 Hz operation not possible
 - Kicker can do it, but not the septum

Comments to the configuration list

- # The majority of the bunch configurations can be made using correct PS Booster synchronisation and by timing the PS extraction kicker precisely.
- The double batch extraction separated by 20 ms cannot be done (6 cases).
 - # This means that 10 out of 80 cases cannot be done.
- The intensity that can be guaranteed is 4E12 protons per bunch.
 - ** The beam spot is based on optics calculations made by the collaboration. The collaboration is responsible for the result. We will provide the initial beam parameters.
 - # Some MD time, in order to increase the intensity per bunch, can be allocated end 2006.

Appendix 1

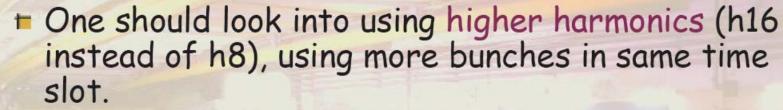
- # Complete pulse list as provided by A. Fabich.
- # In all cases bunch length should be around 50 ns and constant.

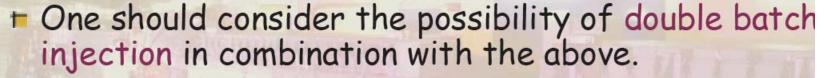
Cases that cannot be produced

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7 0	24 14 14 14 14 14 14 14 14 14 24 24	7 7 7 7		1-2-3-4	0	0	1.8	28	2 55
8 0	24 14 14 14 14 14 14 14 14 14 24 24 24	7 7 7 7 7	4	1-2-3-4	0	0	2	28	2 55
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Proposals and Conclusion:

For obtaining higher intensities:





To One should try not to do the experiment within the two months after the machine start-up.

We will make another iteration on the configuration list with A. Fabich, taking some of the previously mentioned proposals into account in order to decide the MD subject(s).







How to overcome restrictions?



Intensity?

- Consider running PS in harmonic 16
 - increases intensity to 5*10¹² p⁺ per 1/8 of PS
 - Beam structure changes to double number of bunches in same time interval

50 Hz operation

- Operate at 14 GeV/c only (pulse #57-62)
- Like pump-probe method, but extend bunch-tobunch distance extensively (milliseconds)





MERIT pulse list:

- Next iteration of proposal process
- Incorporate suggestions of APC
- Finalize list of requested beam configurations
- Estimate MD time needed
- PS-SPS coordinator was present at APC
 - Re-discuss with him possible dates of beam time