MD2889+2935: 16L2-events UFO-dynamics and solenoid studies

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Introduction

Motivation:

16L2 events have been a major operational issue in 2017 in addition 16L2 is a location with regular UFO-like events.

→ It is important to improve our understanding of the:

- Triggering mechanism and conditions (beam energy, solenoid current, corrector currents, …)
- Origin of UFO-like event
- Different phases of the event in 16L2
- Variation of the loss pattern (bunch-by-bunch, spatial, …) in 16L2 and IP7
- Development of instabilities
- Effects of conditioning due to beam operation
- Deconditioning after an event

Strategy:

- Trigger 16L2 events by using high intensity 25 ns beam with a large number of bunches and lowering the corrector and solenoid current to zero at 450 GeV or 6.5 TeV.
- Use many blown up bunches in both planes to identify the plane in which the UFO is moving with the dBLM, as demonstrated in MD#2036.
- Record data with the available instrumentation (BLMs, diamonds, ADT, …)
- **No change of interlocks or settings !**

Injection plan

- Inject 2460 bunches with 1.3e11 ppb, 25 ns BCMS beam in both beams
- Blow up 196 bunches per plane and beam: horizontal/vertical
- Change solenoid and corrector settings
- Between 8-9 events could be triggered in 8 hours

16L2 attempt	Parameters
1	450 GeV, solenoid 0 A, corrector 0A
2	Solenoid on, corrector 0 A
3	Solenoid on, corrector on
4-6	Solenoid 0A, corrector on, scan corrector current for a few events.
7-8	Solenoid on, corrector on, scan corrector current for a few events.
9	6.5 TeV with 1500 bunches, solenoid 0 A, corrector 0A

Filling scheme: 25ns_2460b_2448_2052_2154_144bpi_19inj

12 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b

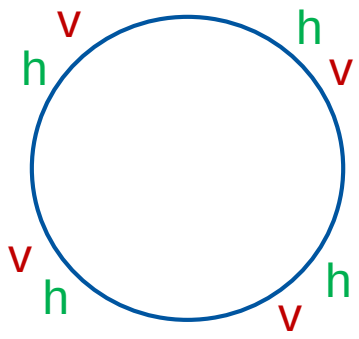
48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b

48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b

48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b | 48 b

Backup plan

- If no events are triggered after one hour
- Inject 1548 bunches with 1.1e11, ppb 25 ns BCMS beam in both beams
- Blow up 196 bunches per plane and beam: horizontal/vertical
- Change solenoid and corrector settings.
- 2-3 events could be triggered in 8 hours, one with solenoid off and one on.



This scheme allows to distribute the blown up bunches and have ~20 µs data on UFO motion even with low count rates of ~50%

Filling scheme: 25ns_1548b_1536_1396_1456_96bpi_17inj

12 b	48 b	48 b	48 b	48 b	48 b	48 b	48 b	48 b
	48 b	48 b	48 b	48 b	48 b	48 b	48 b	48 b
	48 b	48 b	48 b	48 b	48 b	48 b	48 b	48 b
	48 b	48 b	48 b	48 b	48 b	48 b	48 b	48 b

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