

Settings Management

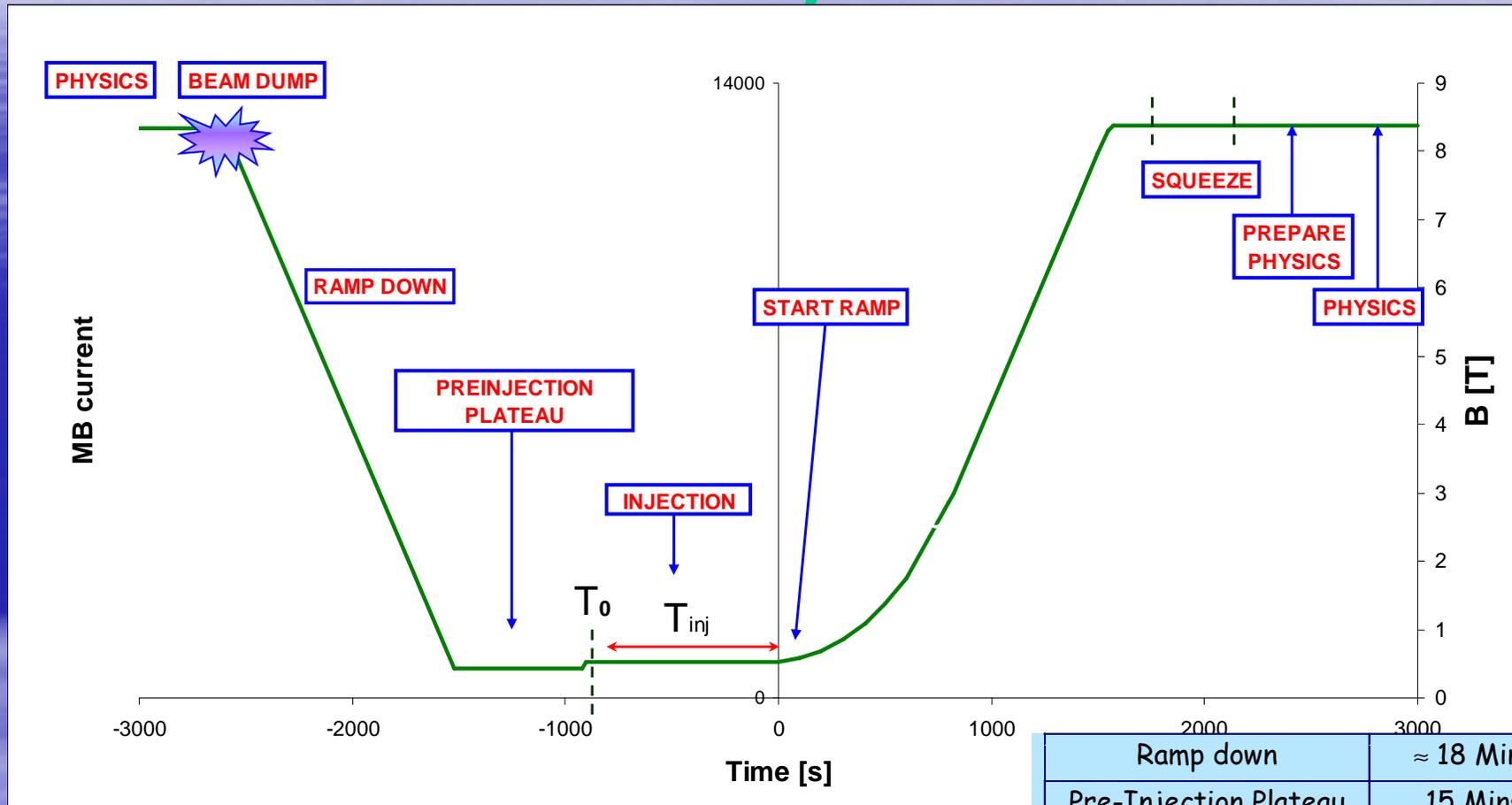
Presented by Lasse

Thanks, Mike

Outline

- LHC cycle
- LSA Terminology
- Parameter space
- HWC
- Conclusions

LHC cycle



Ramp down	≈ 18 Mins
Pre-Injection Plateau	15 Mins
Injection	≈ 15 Mins
Ramp	≈ 28 Mins
Squeeze	< 5 Mins
Prepare Physics	≈ 10 Mins
Physics	10 - 20 Hrs

LHC cycle

- - Different from SPS
 - SPS always fixed length supercycles
- **Pre Injection**
 - Probably fixed length-but might have several scenarios
- **Injection**
 - Indeterminate length
- **Ramp**
 - Fixed length-but might want to stop...
- **Squeeze**
 - Fixed length-but might want to stop...
- **Physics**
 - indeterminate length

- LHC cycle

- **LSA Terminology**

- Parameter space

- HWC

- Conclusions

LSA Terminology

- Supercycle concept extended to cope with differences
- Hypercycle:
 - Collection of Supercycles:
 - One Supercycle contains the settings needed to drive the LHC through one or several of the different phases, like preinjection, injection, ramp, squeeze, physics etc.

- So we are talking about:

Hypercycles

=>Supercycles

=>Cycles

=>Beamprocesses

=>Settings

LSA Terminology

- All 'features' from SPS/LEIR/? kept
 - Trim, Trim history etc. etc. etc.
- Supercycles will be generated beforehand, and put together to make a Hypercycle.
- In Supercycles with indeterminable length (e.g. Injection, physics) we will create Actual Settings

LSA Terminology

- Actual settings:
 - Snapshot of all settings@specified time
 - Can be trimmed
 - Incorporated into functions@specified time
- Need to create:
 - @ injection, @physics
 - @stops in ramps, @squeeze etc

LSA Terminology

The screenshot displays the 'SuperCycle generation' application window. The interface includes a menu bar with options: 'Generate new SC', 'Regenerate existing SC', 'Manage actual SC', 'View Settings', 'Edit types', and 'Manage types'. Below the menu bar, there are two main panels: 'Normal SuperCycles' and 'Actual SuperCycles'. The 'Normal SuperCycles' panel contains a list of cycle names, with 'PreCyc_sm18-precycling-50A_V1' selected. The 'Actual SuperCycles' panel contains a list of corresponding actual cycle names, with 'PreCyc_sm18-precycling-50A_V1_ACT@0_[START]' selected. At the bottom of the window, there is a 'CUSTOM' dropdown menu, a numerical input field set to '0', and a 'Regenerate actual SuperCycle from source' button. A footer bar contains the text 'Generate actual SuperCycle from selected SuperCycle and given point in time'.

SuperCycle generation

LHC

Generate new SC | Regenerate existing SC | Manage actual SC | View Settings | Edit types | Manage types

Generation | Incorporation

Normal SuperCycles

- PreCyc_sm18-precycling-50A_V1
- SM18_INJ_R50GEO
- SM18_ramp_1000_sbk_R50GEO
- ACTSTART_PreCyc_sm18-precycling_V1.sm18-precycling.BP0_V1
- ACTSTART_SM18-INJECTION.BP0_V3
- ACTSTART_TRACKING-TEST-1.1TeV.BP0_V2
- ACTSTART_TRACKING-TEST-7TeV.BP0_V1
- ACTSTART_ramp_01.BP0_V2
- ACTSTART_ramp_01V1.ramp_01.BP0_V1
- ACTSTART_ramp_31V1.ramp_31.BP0_V1
- ACTSTART_sm18-precycle-11k-FT.BP0_V3
- ACTSTART_squeeze-IR1.BP0_V1
- ACTSTART_squeeze-IR2-v2.BP0_V2
- ACTSTART_squeeze_1_31V1.squeeze_1_31.BP0_V1
- ACTSTART_squeeze_1_47V1.squeeze_1_47.BP0_V1
- ACTSTART_squeeze_31_47V1.squeeze_31_47.BP0_V1
- ACTSTART_squeeze_31_47V2.squeeze_31_47.BP0_V1
- PreCyc_SM18_MCS_precycle_V1
- PreCyc_SM18_MCS_precycle_V2
- PreCyc_sm18-precycle-11k-FT_V3
- SM18-INJECTIONV1
- SM18-INJECTION_10A
- SM18-INJECTION_50A
- SM18_ramp_1000_sbk_scy_10A
- SM18_ramp_1000_sbk_scy_50A
- SM18_ramp_top1000_scyV1
- TRACKING-TEST-1.1TeV1
- TRACKING-TEST-4.2TeV1
- TRACKING-TEST-7TeV1
- generateTestRaffi1Raffi1

Show archived

CUSTOM

0

Regenerate actual SuperCycle from source

Generate actual SuperCycle from selected SuperCycle and given point in time

LSA Terminology

The screenshot displays the TRIM application interface. At the top, the title bar reads "New TRIM application". Below it, there are icons for "LHC", a group of people, a refresh icon, and a power icon.

The main interface is divided into several sections:

- Supercycles:** A list of supercycles with a "Show archived" checkbox. The list includes:
 - PreCyc_sm18-precycling-50A_V1
 - PreCyc_sm18-precycling-50A_V1_ACT@0_[S
 - SM18_INJ_R50GEO
 - SM18_INJ_R50GEO_ACT@0_[START]
 - SM18_ramp_1000_sbk_R50GEO
 - ACTSTART_PreCyc_sm18-precycling_V1.sm1
 - ACTSTART_SM18.INJECTIONBP0_V3
- ParticleTransfer:** A dropdown menu set to "SM18". Below it are tabs for "Cycle" and "Beam Process". The "Cycle" tab is active, showing "SM18-INJECTION (0->990)". A "Select All" button is at the bottom.
- Parameter selection - SM18:** A section with a "System" dropdown set to "PHYSICS : MOMENTUM". Below it is a list of parameters: "MOMENTUM", "NO SYSTEM", and "SM18-V2". A "Show Field(s)" button is at the bottom right.

Below these sections, there are controls for "Setting part" (Value, Target, Correction) and "Time base" (SuperCycle, Cycle/BeamProcess). A "Trim History" button is also present.

The main display area shows a graph titled "Displayed Function: SM18BEAM/MOMENTUM". The y-axis ranges from 449 to 451, and the x-axis ranges from 0 to 900. A horizontal blue line is drawn at y=450. The graph area is currently empty.

On the right side, there is a vertical toolbar with the following buttons:

- Trim (scissors icon)
- Abort Trim (STOP sign icon)
- Cancel Last Trim (trash can icon)
- Send 2 Hardware (forklift icon)
- Trim Expert Params (checkbox)

At the bottom left, there are "Graph" and "Table" tabs, and a small toolbar with icons for zoom and search.

LSA Terminology

New TRIM application

LHC

Supercycles

- PreCyc_sm18-precycling-50A_V1
- PreCyc_sm18-precycling-50A_V1_ACT@0_[S
- SM18_INJ_R50GEO
- SM18_INJ_R50GEO_ACT@0 [START]
- SM18_ramp_1000_sbk_R50GEO
- ACTSTART_PreCyc_sm18-precycling_V1.sm1
- ACTSTART_SM18.INJECTIONBP0_V3

Show archived

ParticleTransfer

SM18

Cycle Beam Process

SM18-INJECTION_ACT3@0 [START] (0-

Select All

Parameter selection - SM18

System

- MOMENTUM
- NO SYSTEM
- SM18-V2

PHYSICS : MOMENTUM

SM18BEAM/MOMENTUM

Show Field(s)

Setting part : Value Target Correction

Trim History

Time base : SuperCycle Cycle/BeamProcess

Parameter	Value
SM18BEAM/MOMENTUM	SM18_INJ_R50GEO_ACT@0 [START].SM18-INJECTION_ACT3@0 [ST... 450.0

Trim

Abort Trim

Cancel Last Trim

Send 2 Hardware

Trim Expert Params

LSA Terminology

New TRIM application

LHC

Supercycles

- SM18_ramp_1000_sbk_scy_10A
- SM18_ramp_1000_sbk_scy_10A_ACT@0_[ST
- SM18_ramp_1000_sbk_scy_10A_ACT@1010
- SM18_ramp_1000_sbk_scy_10A_ACT@1110
- SM18_ramp_1000_sbk_scy_10A_ACT@1210
- SM18_ramp_1000_sbk_scy_10A_ACT@1310
- SM18_ramp_1000_sbk_scy_10A_ACT@1410

Show archived

ParticleTransfer

SM18

Cycle Beam Process

SM18_ramp_top1000_cy (0->2600)

Select All

Parameter selection - SM18

System

- MOMENTUM
- NO SYSTEM
- SM18-V2

PHYSICS : B3

- logical.MB.A.A1/B3
- logical.MB.A.A2/B3
- logical.MB.F.A1/B3
- logical.MB.F.A2/B3

Show Field(s)

Setting part : Value Target Correction

Trim History

Time base : SuperCycle Cycle/BeamProcess

Displayed Function: logical.MB.A.A1/B3

SuperCycle	Value
0	-10.5
100	-10.8
250	-9.5
500	-5.0
750	-3.5
1000	-3.0
1250	-2.8
1500	-2.6
1750	-2.5
2000	-2.5
2250	-2.5
2500	-2.5

Trim

Abort Trim

Cancel Last Trim

Send 2 Hardware

Trim Expert Params

Graph Table

LSA Terminology

Supercycles

- SM18_ramp_1000_sbk_scy_10A
- SM18_ramp_1000_sbk_scy_10A_ACT@0 [ST
- SM18_ramp_1000_sbk_scy_10A_ACT@1010
- SM18_ramp_1000_sbk_scy_10A_ACT@1110
- SM18_ramp_1000_sbk_scy_10A_ACT@1210
- SM18_ramp_1000_sbk_scy_10A_ACT@1310
- SM18_ramp_1000_sbk_scy_10A_ACT@1410

Show archived

ParticleTransfer

SM18

Cycle Beam Process

SM18_ramp_top1000_cy_ACT1@0 [ST

Select All

Parameter selection - SM18

System

MOMENTUM

NO SYSTEM

SM18-V2

PHYSICS : B3

- logical.MB.A.A1/B3
- logical.MB.A.A2/B3
- logical.MB.F.A1/B3
- logical.MB.F.A2/B3

Show Field(s)

Setting part : Value Target Correction

Trim History

Time base : SuperCycle Cycle/BeamProcess

Parameter	Value
logical.MB.A.A1/B3	SM18_ramp_1000_sbk_scy_10A_ACT@0 [START].SM18_ramp_top1000_cy_ACT1@0 [START]
	-10.174637829640183

You are Trimming a setting belonging to a NON-ACTIVE SUPERCYC...

Trim

Abort Trim

Cancel Last Trim

Send 2 Hardware

Trim Expert Params

LSA Terminology

The screenshot shows the TRIM application interface with the following components:

- Supercycles:** A list of supercycles including SM18_ramp_1000_sbk_scy_10A and SM18_ramp_top1000_cy_ACT1@1110.
- ParticleTransfer:** A dropdown menu set to SM18, with sub-tabs for Cycle and Beam Process.
- Parameter selection - SM18:** A list of parameters including MOMENTUM, NO SYSTEM, and SM18-V2.
- PHYSICS:** A dropdown menu set to B3, with a list of logical parameters like logical.MB.A.A1/B3.
- Setting part:** Radio buttons for Value, Target, and Correction.
- Time base:** Radio buttons for SuperCycle and Cycle/BeamProcess.
- Trim History:** A table with the following data:

Parameter	Value
logical.MB.A.A1/B3	SM18_ramp_1000_sbk_scy_10A_ACT@1110.SM18_ramp_top1000_cy... -3.056517028334606
- Trimming Panel:** Buttons for Trim, Abort Trim, Cancel Last Trim, and Send 2 Hardware.
- Trim Expert Params:** A checkbox that is currently unchecked.

You are Trimming a setting belonging to a NON-ACTIVE SUPERCYCL...

- LHC cycle
- LSA Terminology
- **Parameter space**
- HWC
- Conclusions

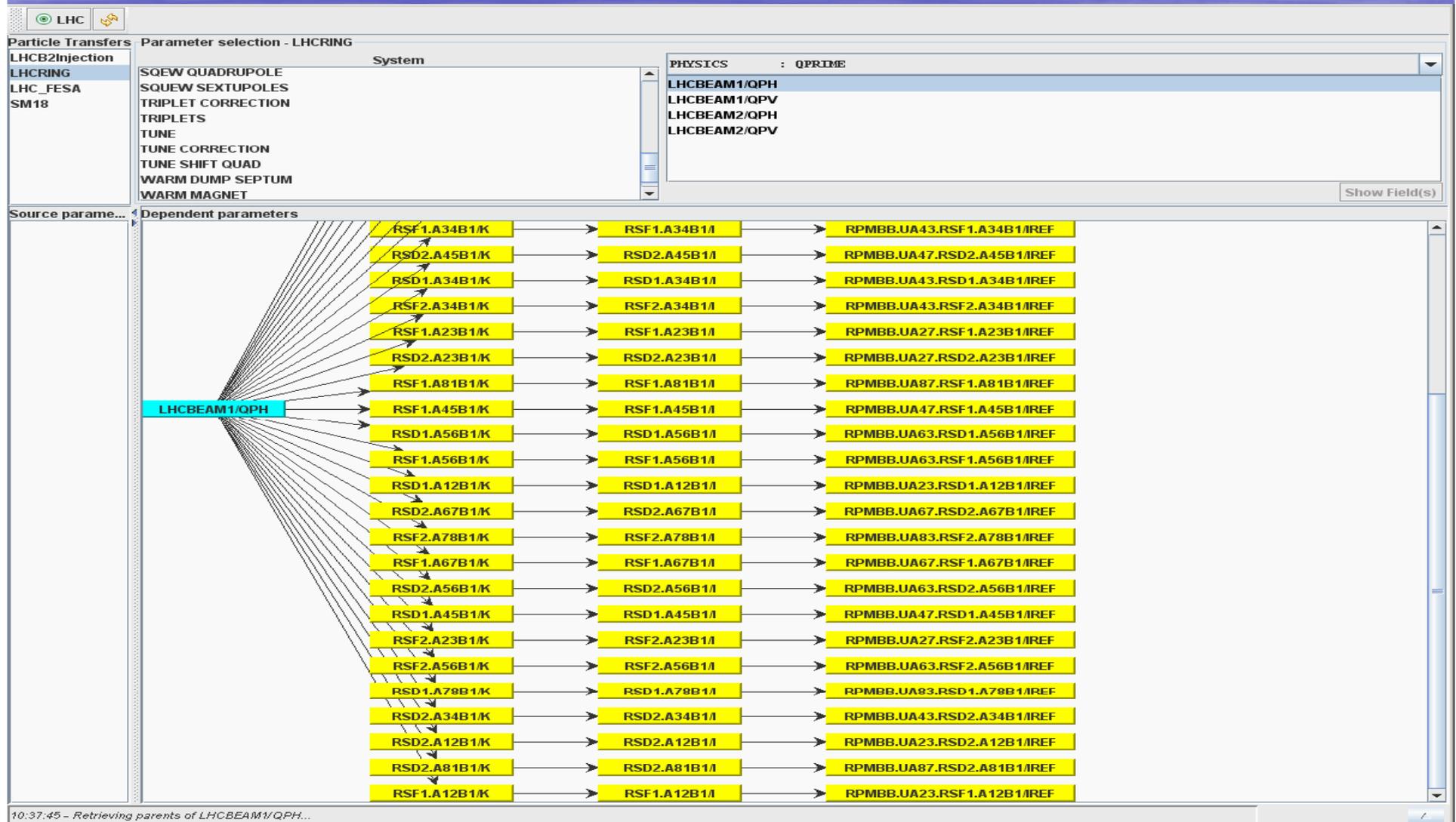
Parameter space

- High level parameters
- Two beams-so
 - QHB1, QHB2, QPB1, QPB2 etc.
- Knobs
- Snapback, decays etc.
- Nested PC - triplets
- Around 70% covered

Parameter space

- To be completed over next months:
 - RF
 - Collimators
 - Knobs
 - ???
 - ??
 - ?

Parameter space



Parameter space

LHC

Particle Transfers

LHCB2Injection

LHCRING

LHC_FESA

SM18

Parameter selection - LHCRING

System

SQEW QUADRUPOLE

SQEW SEXTUPOLES

TRIPLET CORRECTION

TRIPLETS

TUNE

TUNE CORRECTION

TUNE SHIFT QUAD

WARM DUMP SEPTUM

WARM MAGNET

HW MAGNITUDE : K

MQXA1.L1/K

MQXA1.L2/K

MQXA1.L5/K

MQXA1.L8/K

MQXA1.R1/K

MQXA1.R2/K

MQXA1.R5/K

Show Field(s)

Source param...

Dependent parameters

MQXA1.L1/K

MQXA1.L1/I

RPHFC.UJ14.RQX.L1/REF

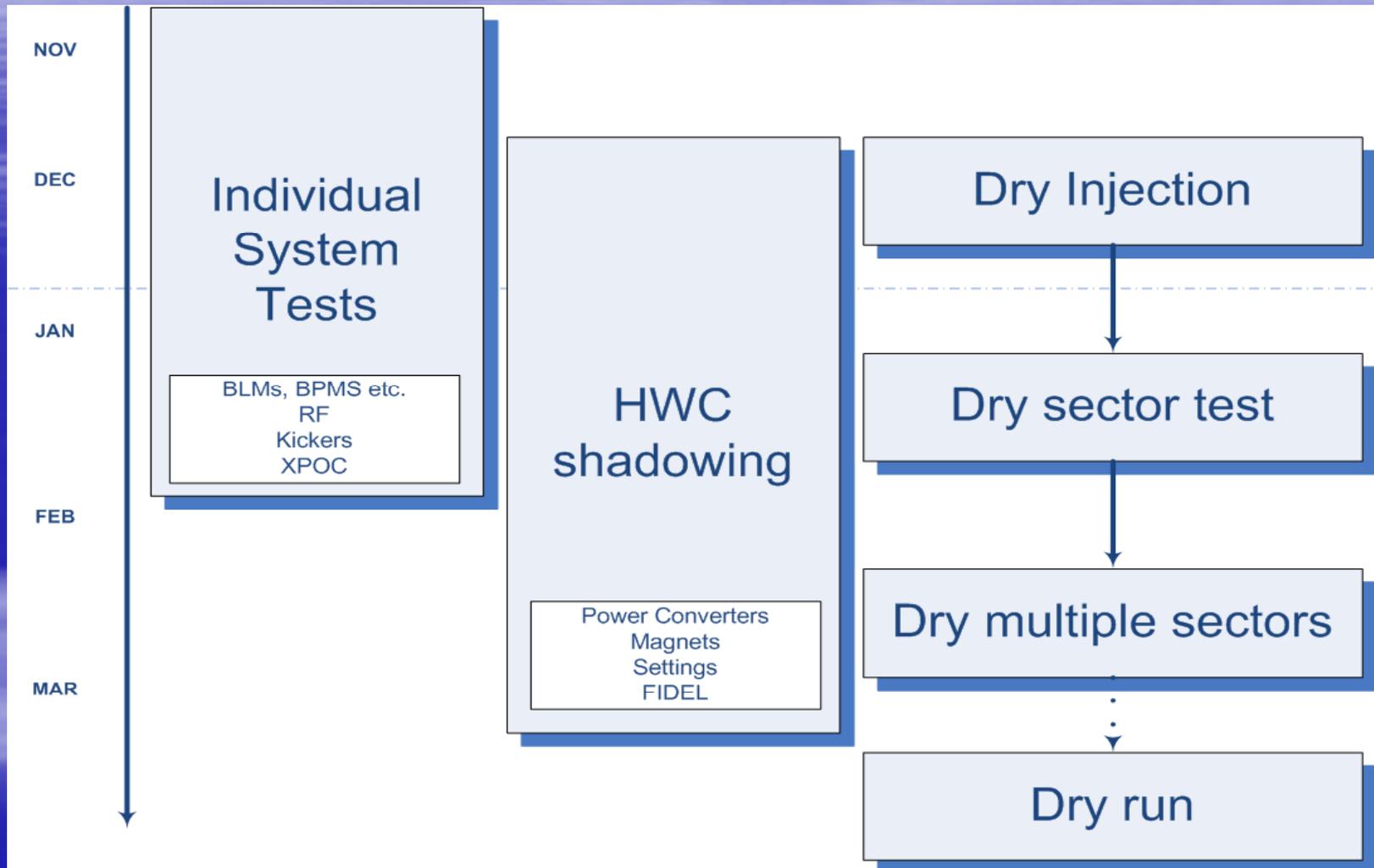
RPMBB.UJ14.RTQX1.L1/REF

RPHGC.UJ14.RTQX2.L1/REF

```
graph LR; MQXA1.L1.K[MQXA1.L1/K] --> MQXA1.L1.I[MQXA1.L1/I]; MQXA1.L1.I --> RPHFC.UJ14.RQX.L1.REF[RPHFC.UJ14.RQX.L1/REF]; MQXA1.L1.I --> RPMBB.UJ14.RTQX1.L1.REF[RPMBB.UJ14.RTQX1.L1/REF]; MQXA1.L1.I --> RPHGC.UJ14.RTQX2.L1.REF[RPHGC.UJ14.RTQX2.L1/REF];
```

- LHC cycle
- LSA Terminology
- Parameter space
- **HWC**
- Conclusions

HWC



HWC

- In the shade of HWC
 - When systems are getting ready:
 - Create full parameter space for system
 - Create settings using LSA tools
 - do preinjection, injection, ramp, squeeze, bumps, etc.
 - create break points, actual settings, trim, incorporate,
 - compensate for snapback, b2, b3, b4, b5, decay etc. etc.

Get used to the machinery (training??)!!

- LHC cycle
- LSA Terminology
- Parameter space
- HWC
- **Conclusions**

Conclusions

- 70% of Parameter space covered
- Slowly moving into exploitation
- HWC shadowing important step
 - Allows us to familiarize with the different software components
- We all will need to learn how to...

Conclusions

- Precycle
- Create Actual settings
- Prepare ramp
- Create stops (breakpoints) in ramp etc.
- Start ramp
- Trim parameter
- Incorporate
- Etc.etc.etc

Conclusions

- Do we need more **training** than what the HWC will give us?
- Have fun, folks!