

Safe Machine Parameters
General Machine Timing
Cross-Check

Safe Machine Parameters

receives accelerator information

generates flags & values

directly transmitted and / or broadcast

injection procedure



Extraction Interlocks



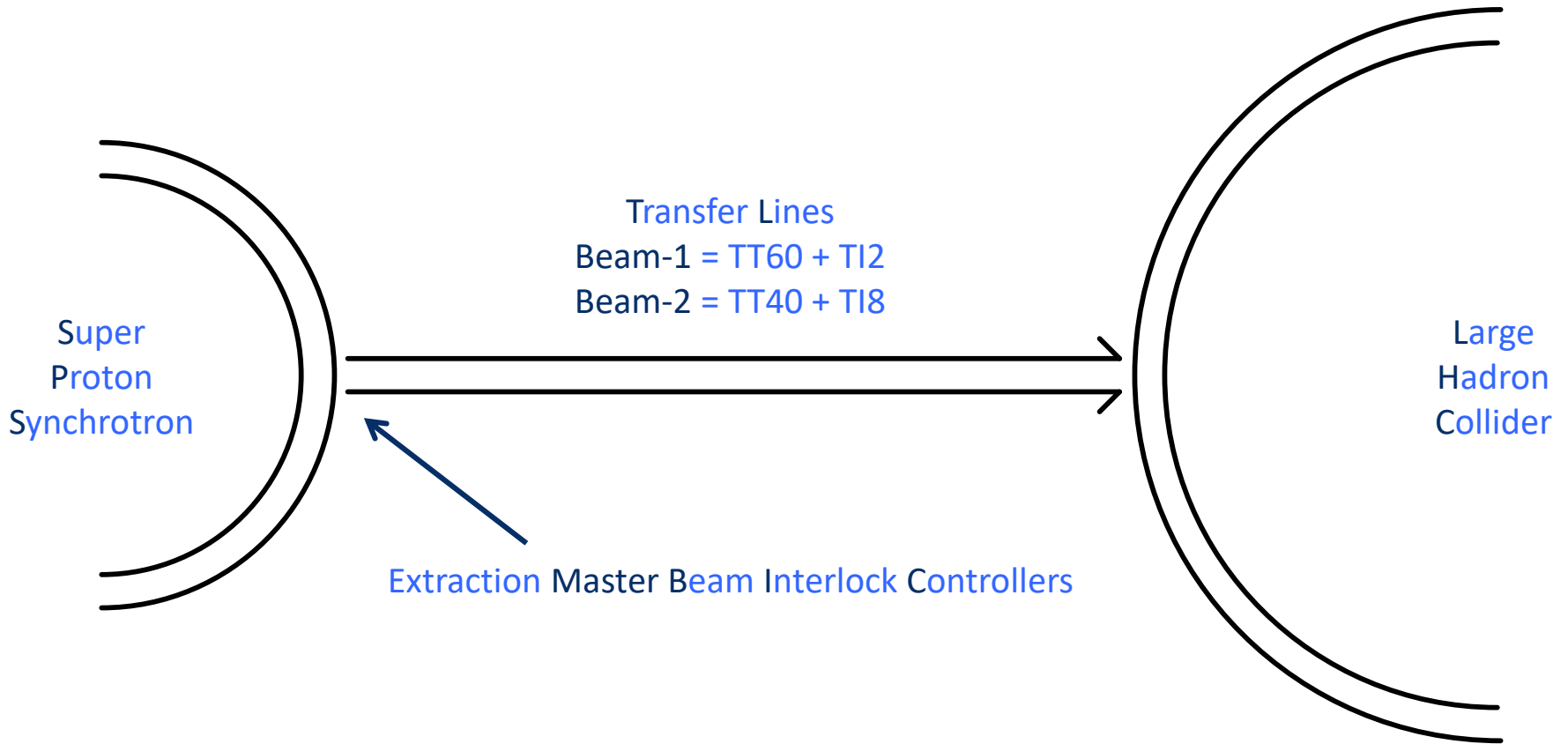
protection configuration

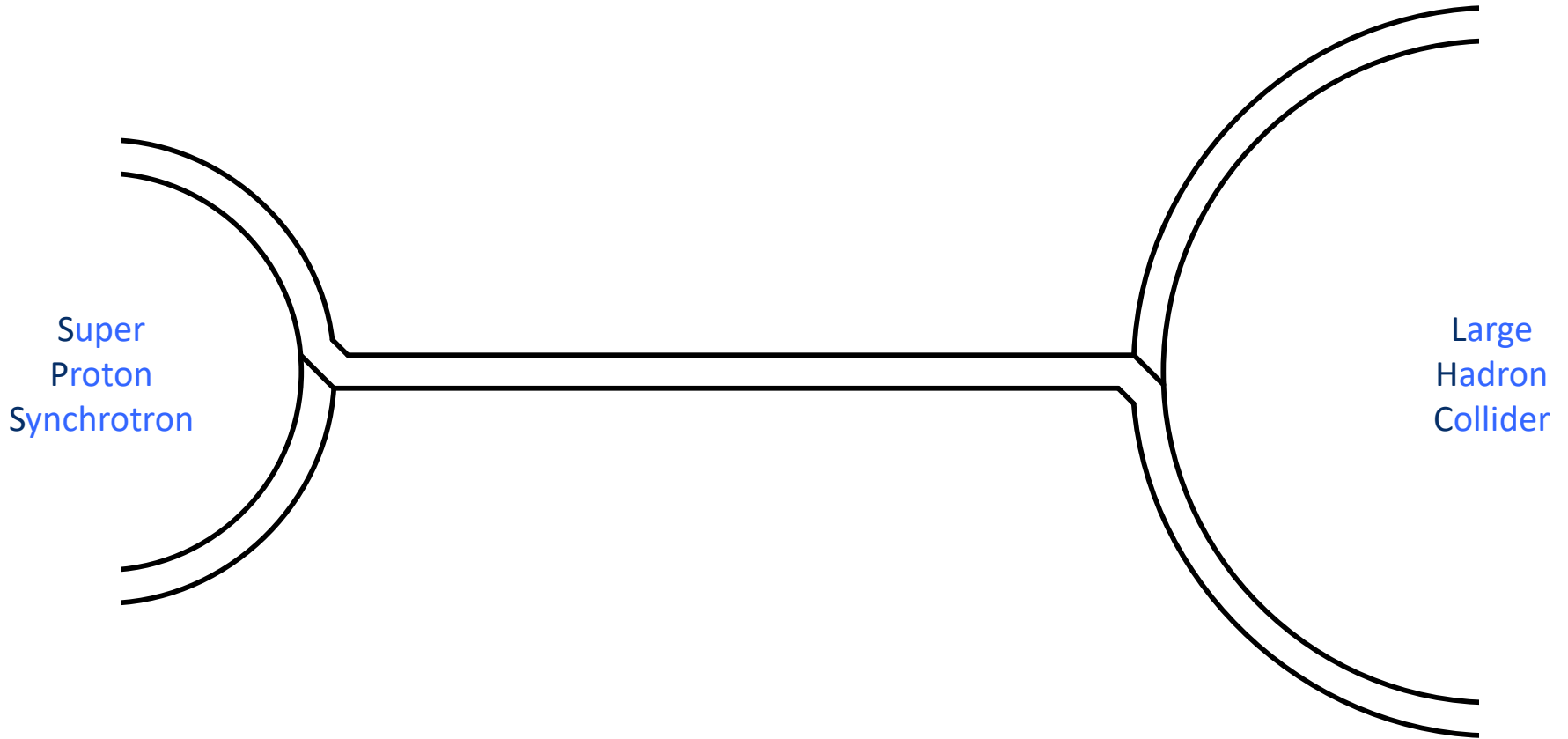
Beam Interlocks
Collimation
Beam Loss Monitors ...

*fast *safe *reliable *available

CERN = System Safety

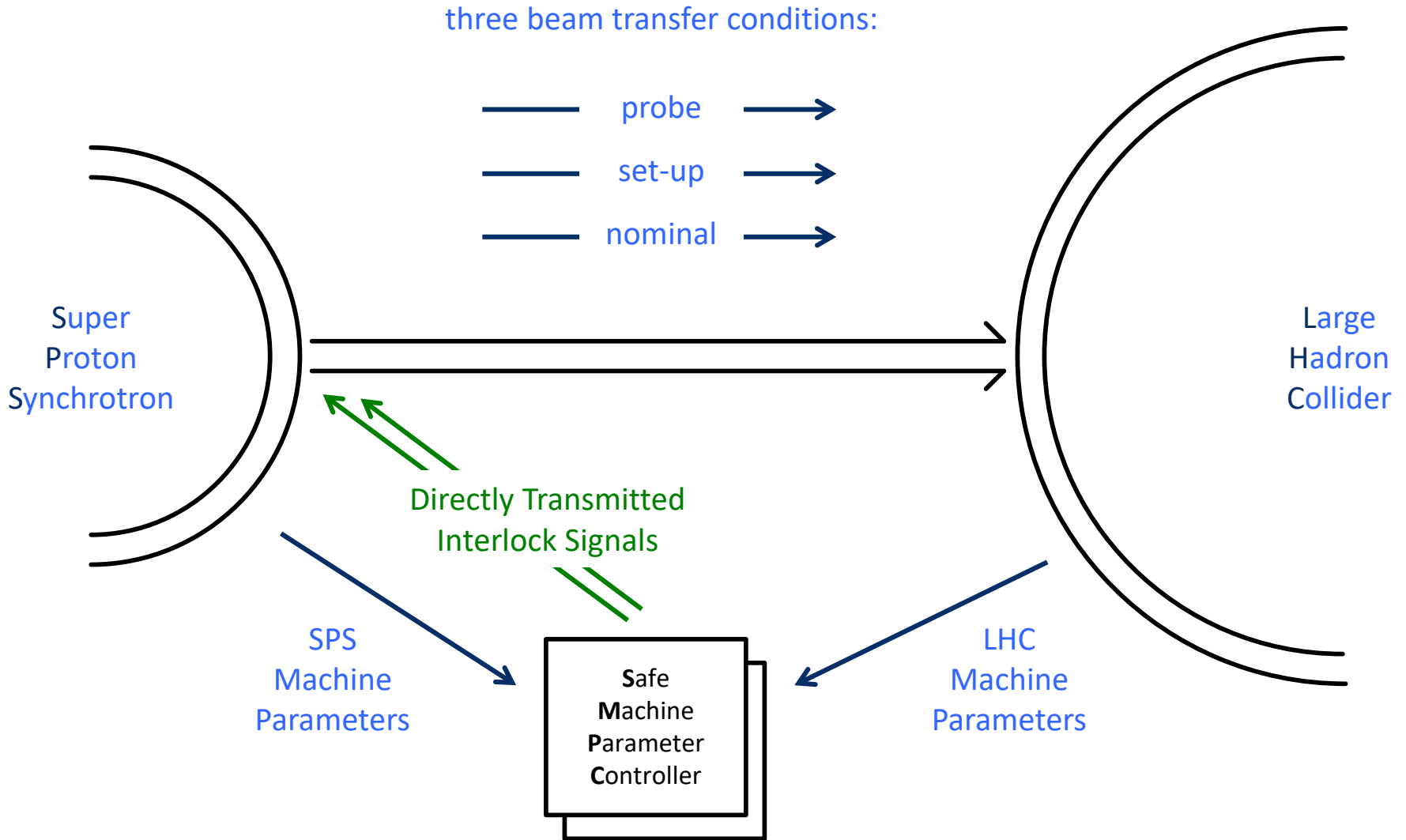
**Directly
Transmitted**



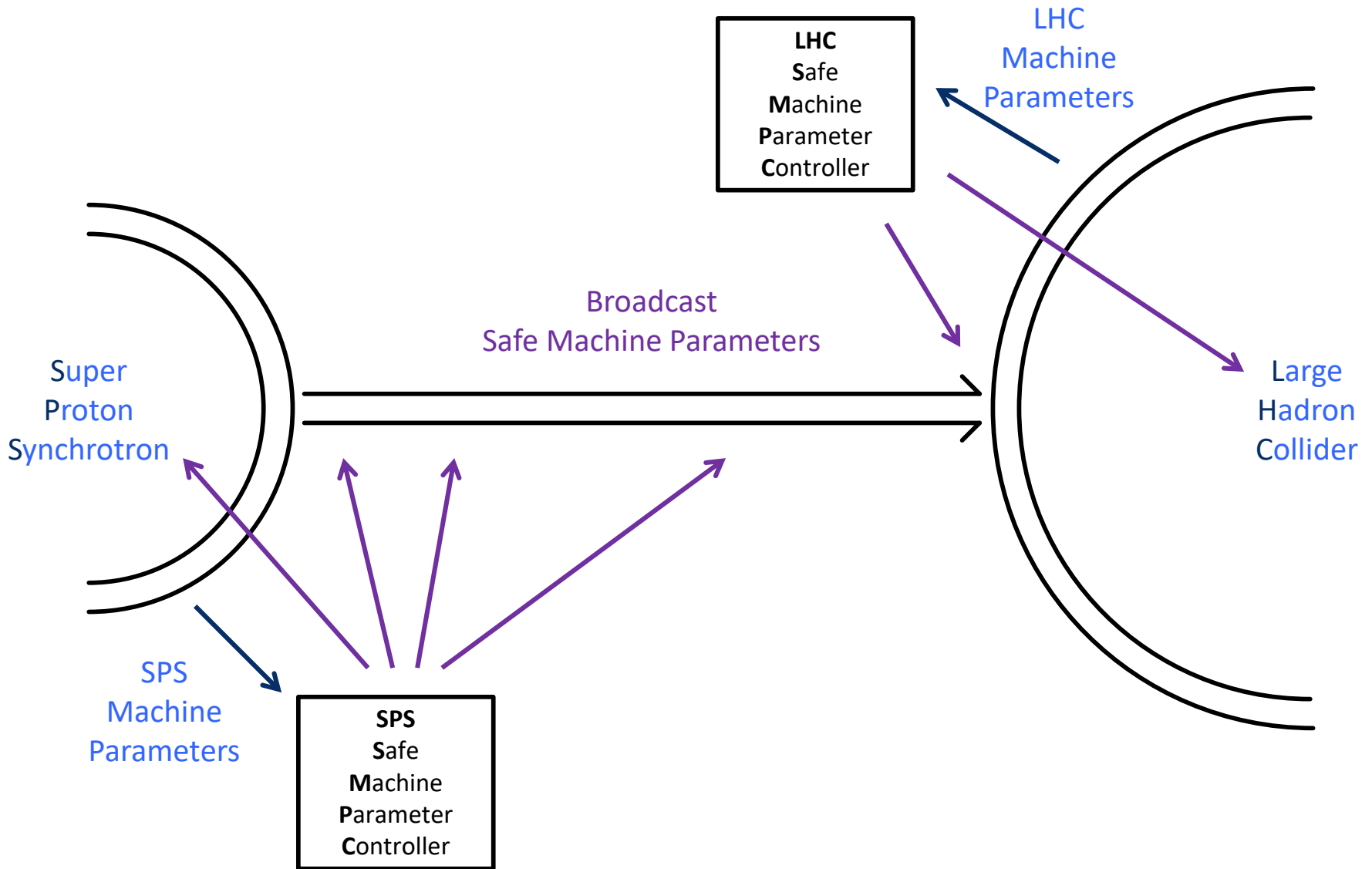


Super
Proton
Synchrotron

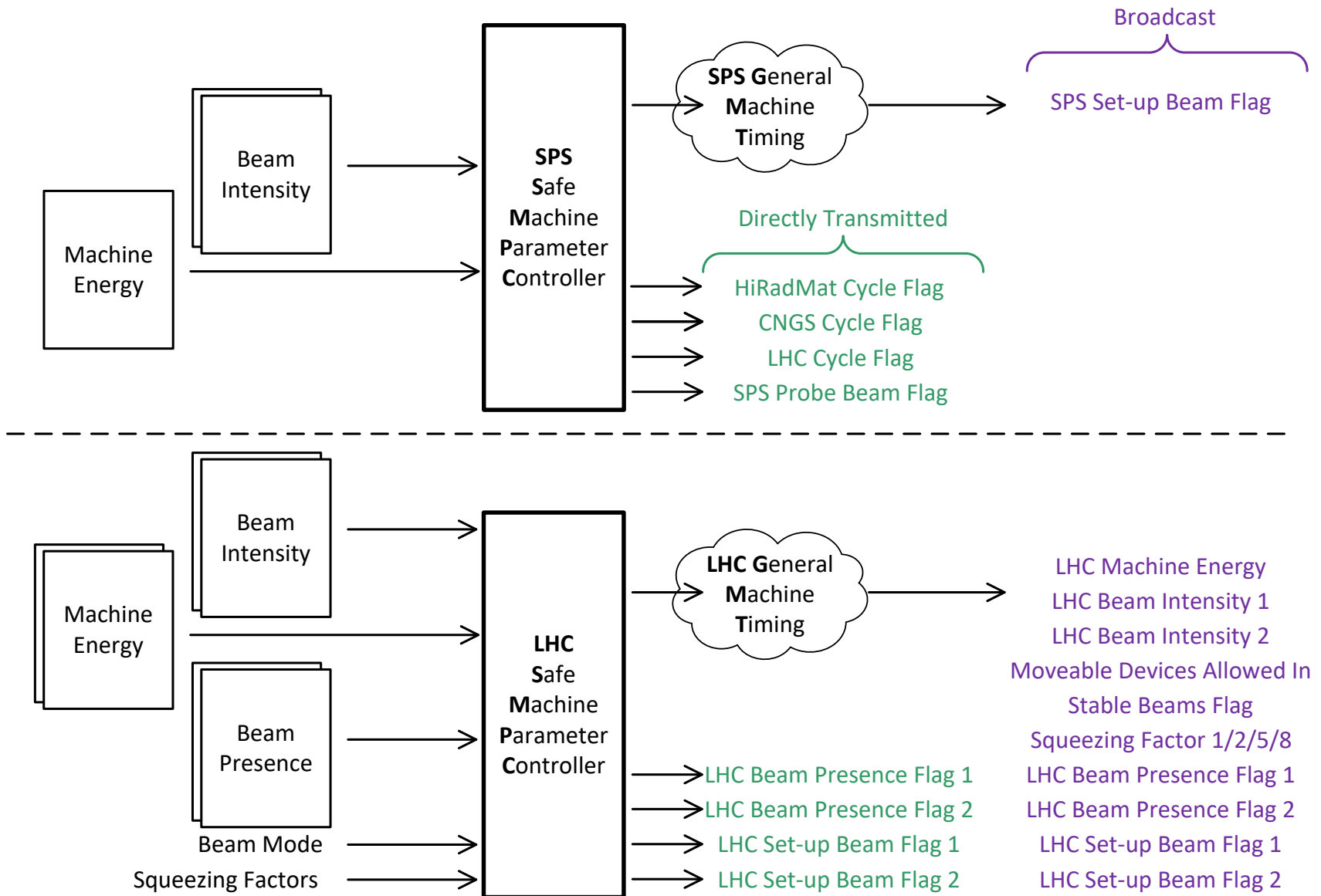
Large
Hadron
Collider



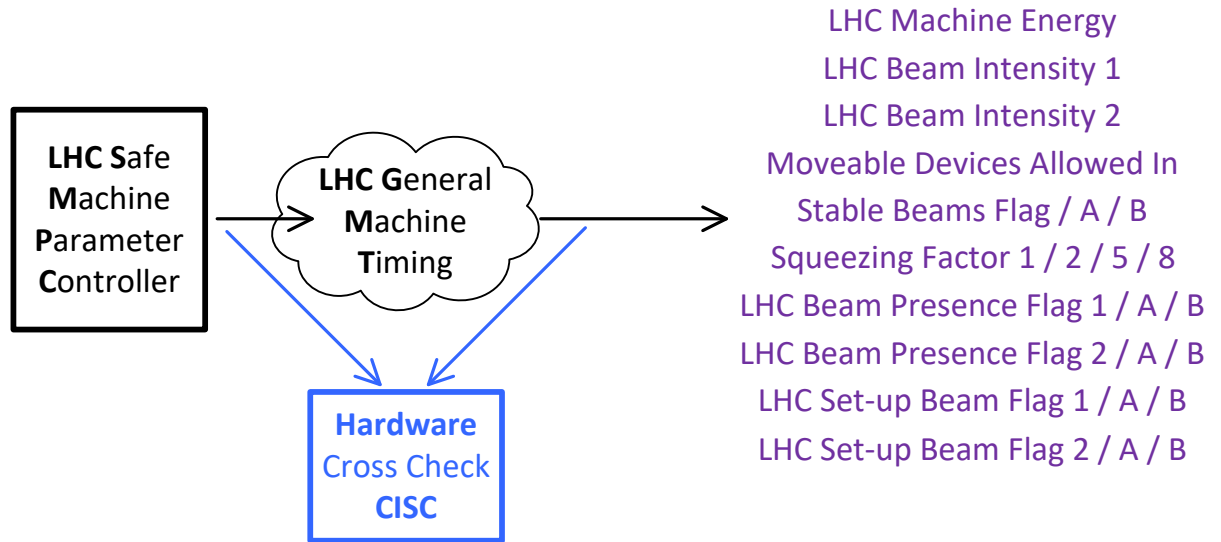
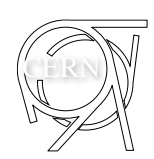
Broadcast



Controllers



Safe Machine Parameters
General Machine Timing
Cross-Check



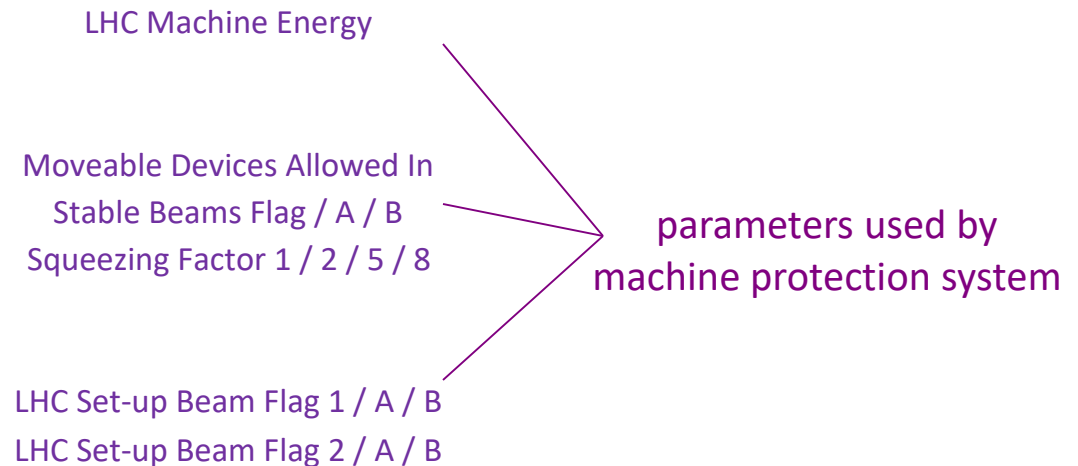
Safe Machine Parameters
Transmission

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General Machine Timing
Broadcast

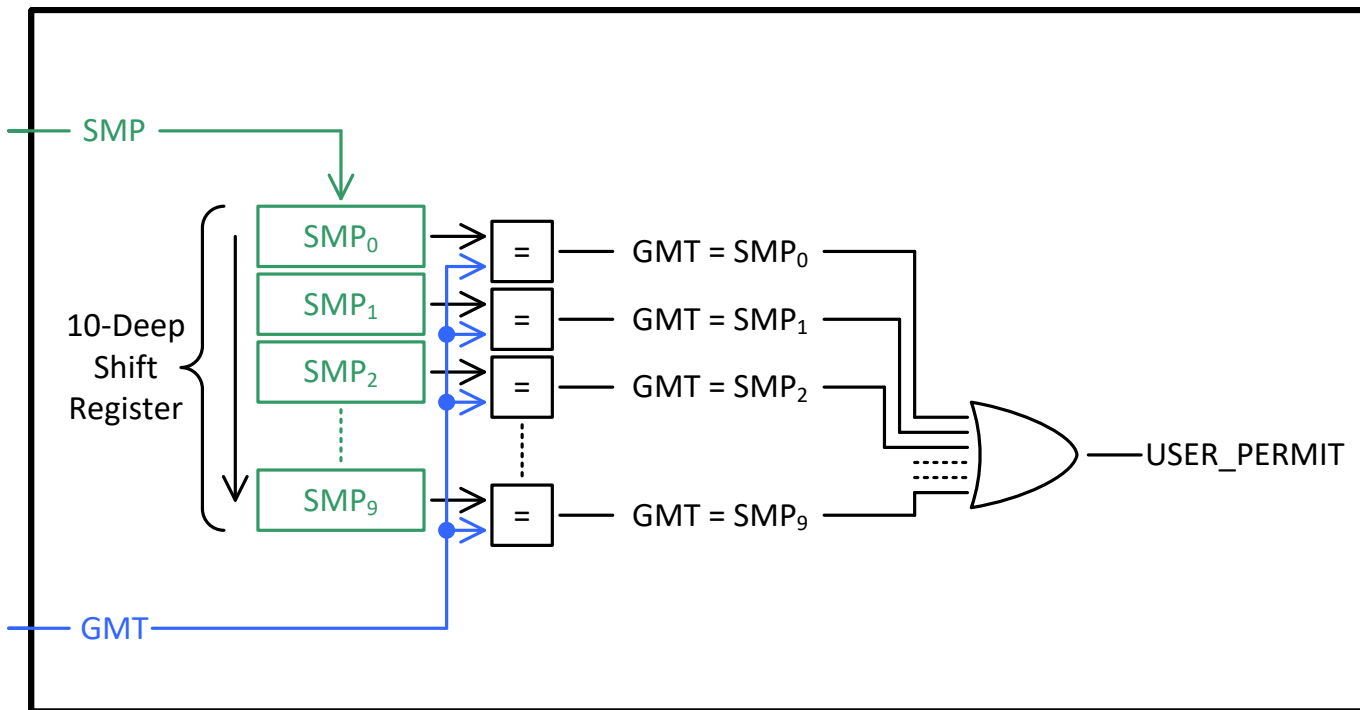
Set-up Beam Flag stuck TRUE

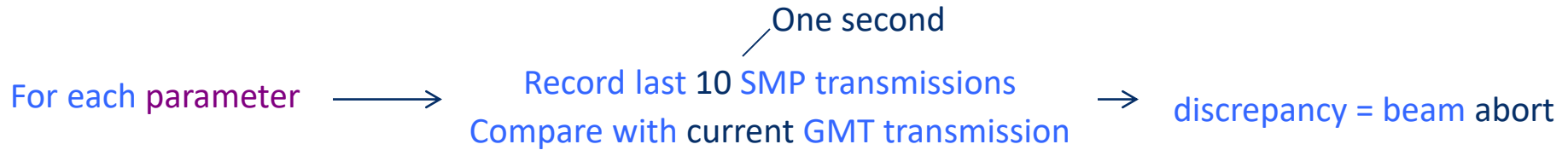
Energy stuck at 450 GeV



Cross-Checker Implementation

For each parameter \longrightarrow Record last 10 SMP transmissions \longrightarrow discrepancy = beam abort
 Compare with current GMT transmission





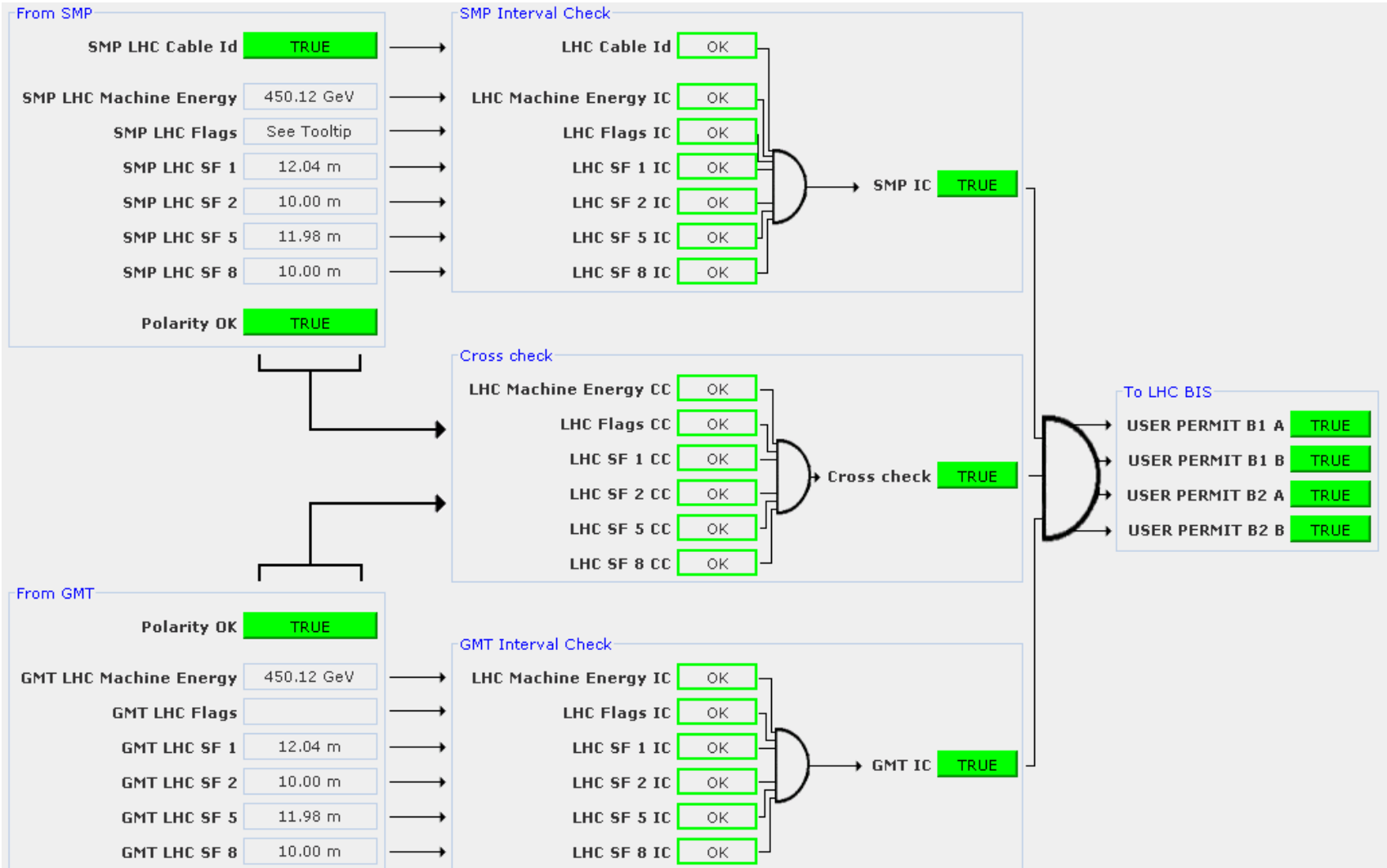
also checks cable presence & parameter reception rate

- GMT can drop a parameter
- GMT can rearrange parameter transmission order
- GMT cannot change payload of parameter

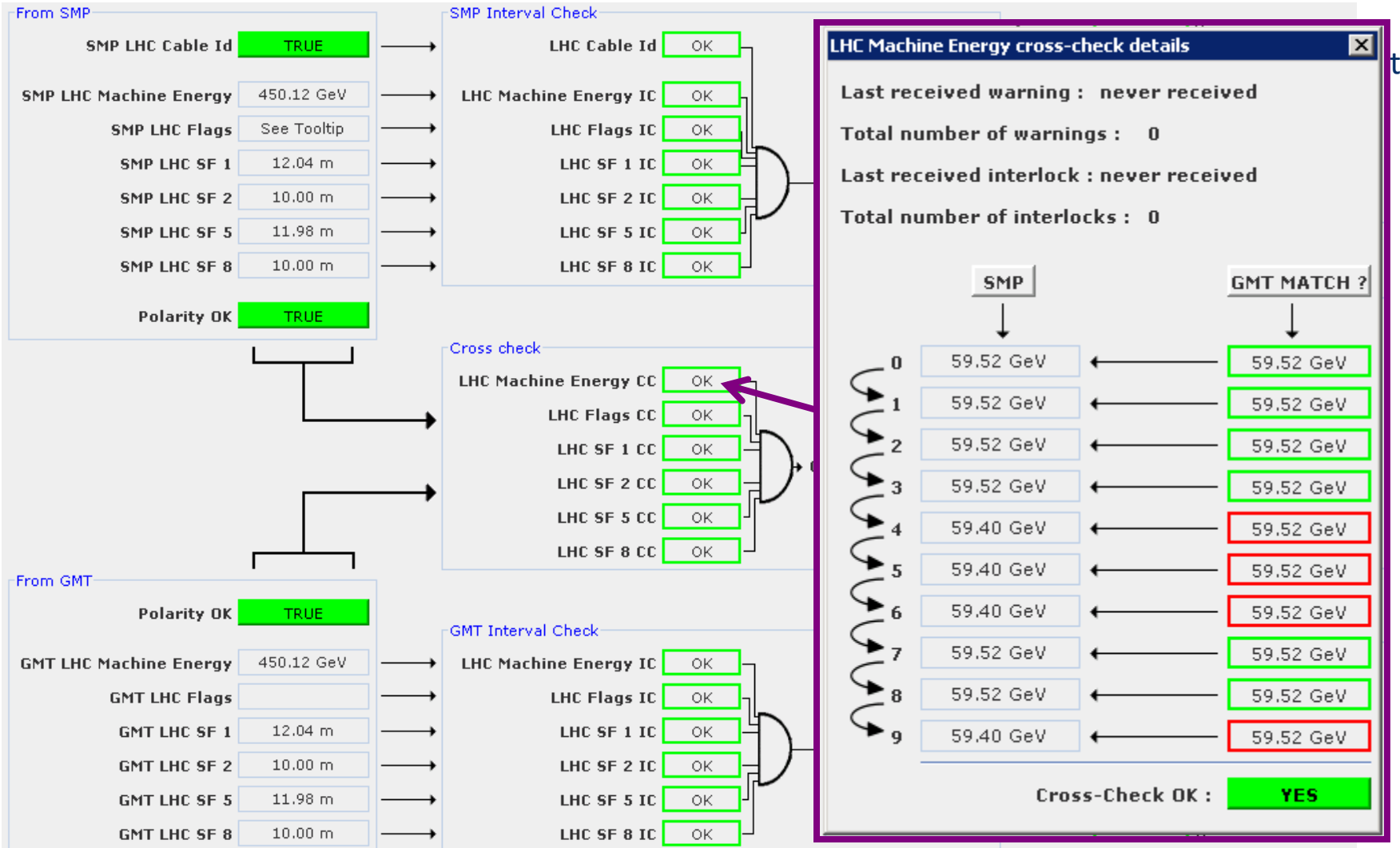
now connected to BIS

For

port



For



t

Warnings recorded when:

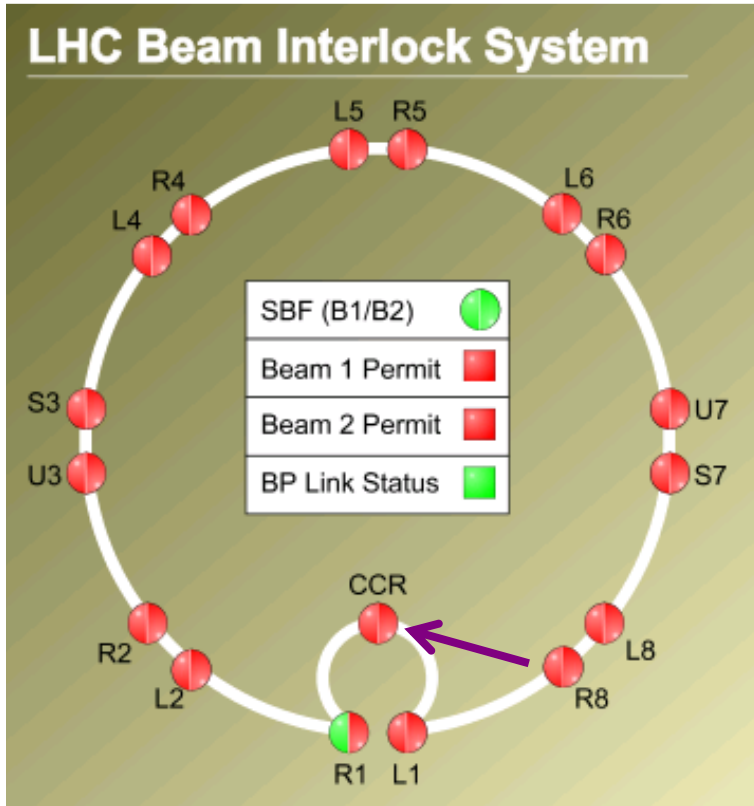
- GMT drops a parameter
- GMT rearranges parameter transmission order

Automatic observation by CISC
Never observed...

Interlock raised when:

- GMT drops three consecutive parameters
 - GMT changes payload

Interlock through BIS
Never observed...



atic obser
Never ob

erlock to
Never ob

BIC Overview

CIB.CCR.LHC.B1 X CIB.CCR.LHC.B2 X

SHOW VIEW MASK/UNMASK COMMAND

SAFE BEAM FLAG TRUE

SOFTWARE	INPUT	DISABLED	MASK SET	MATRIX	PERMIT
INIT	TRUE			FALSE	FALSE
1	Programabl... TRUE	NO		TRUE	
2	SMP b1 TRUE	NO		TRUE	
3	not used	YES			
4	Operator Bu... TRUE	NO		TRUE	
5	ACCESS FALSE	NO		FALSE	
6	not used	YES			
7	not used	YES			
8	not used	YES	NO		
9	not used	YES	NO		
10	not used	YES	NO		
11	MKI test mo... TRUE	NO	NO	TRUE	
12	not used	YES	NO		
13	not used	YES	NO		
14	not used	YES	NO		

Does it actually work?

- 1) Arm loops...
- 2) Send single bad energy in timing editor...
- 3) Observe...

SMP hardware project **will be** closed.

- Reactive consolidation / maintenance only
- New needs = new requests e.g. LS1 SBF tables

SMP software project **ongoing** .

- Pre-op / DIAMON / Post-Op **now functional**
- **complete logging functional simple format**

See J.-C. Garnier up next

fin – thank you!