

Machine Protection

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Super-FRS control workshop

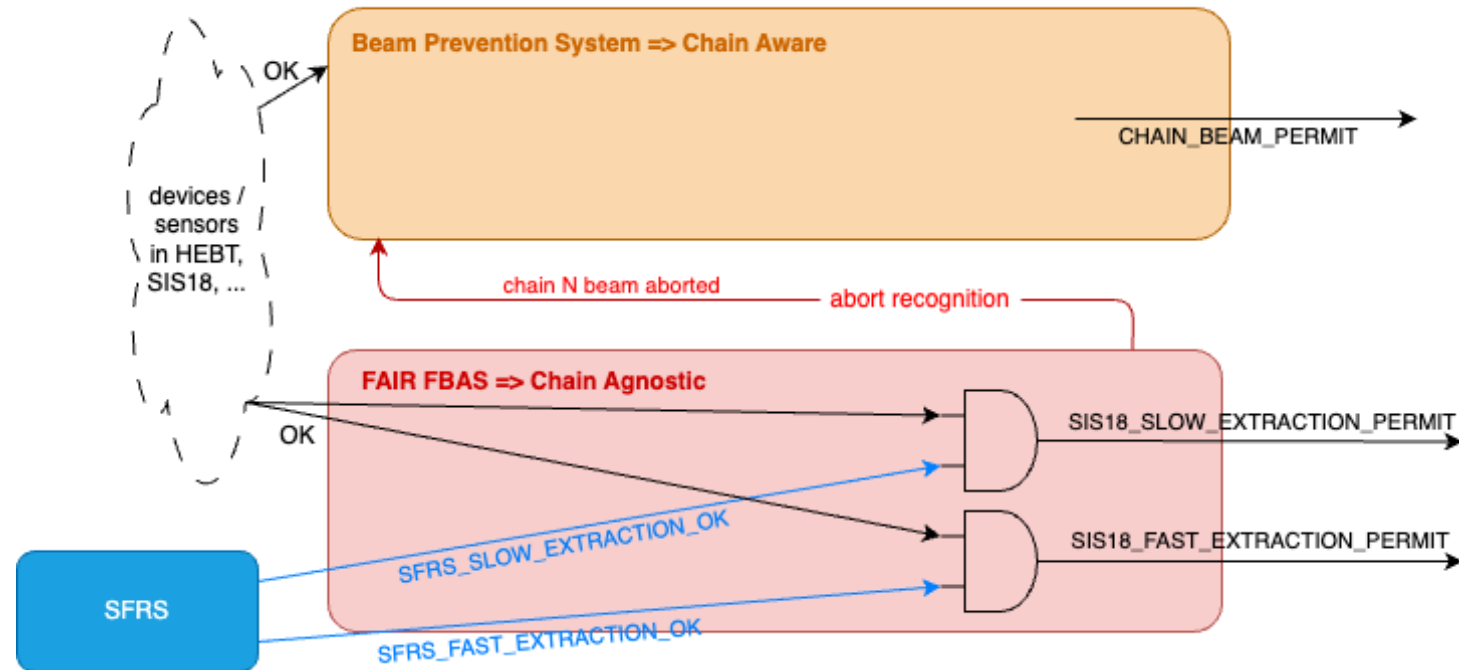
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Currently foreseen basic concepts

2 reaction strategies concept

→ **FBAS**: interrupt now!! (chain* agnostic)

- **FAST_EXTRACTION_PERMIT**:
if FALSE beam is not extracted
- **SLOW_EXTRACTION_PERMIT**:
if FALSE slow extraction is not started or aborted



→ **Beam prevention** (chain* specific)

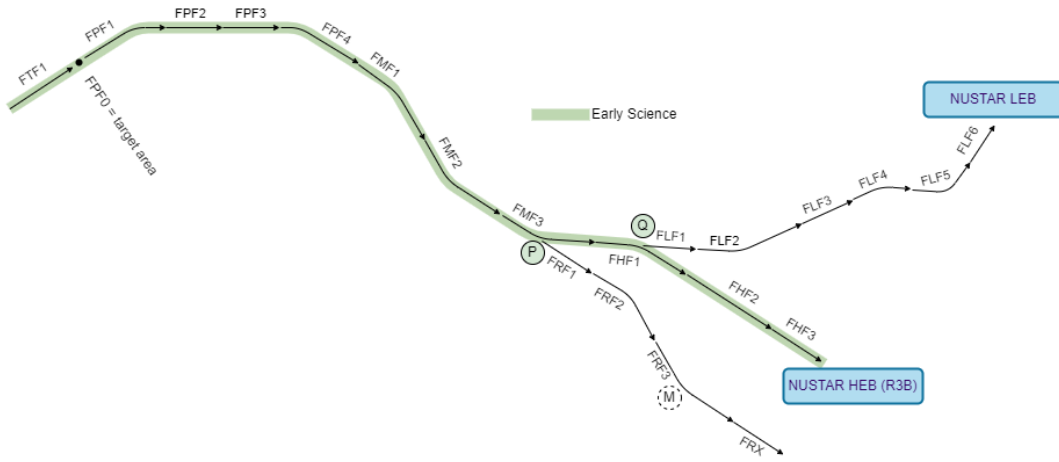
Prevents beam production for the subsequent occurrences of specific beam production chain (preemptive machine protection)

- **CHAIN_BEAM_PERMIT**:
if FALSE, no beam is produced for this chain

Currently foreseen: (only) destination information is available

*Chain \Leftrightarrow Beam Production Chain

SFRS Ideas and Concept (S. Pietri et al.)



Standards FHF1 experiment:



MATS experiment (high power to FRF1, waiting ECE approval):



R3B beamtime:



FMF2 SEC experiment, charge changing cross sections



SEC experiment, tensor force



- 3 risk levels
- Configuration depends on the experiment type
- May require higher level of flexibility?
- **MPS must not prevent normal operation of the spectrometer**

Syst.	Name	Time	FBAS	FBAS	FBAS
PC	Magnet failure - dipole	20 ms	Y	Y	N
PC	Magnet failure – correctors/quadrupoles	20 ms	Y	N	N
PC	Magnet <u>soll/ist</u> not correct – dipoles	20 ms	Y	Y	N
PC	Magnet <u>soll/ist</u> not correct – correctors/quadrupoles		Y	N	N
QuD	Quench detection triggers	100 ms	Y	Y	N
VAC	Breach of vacuum, valves closing	100 ms	Y	Y	Y
Targ	Target wheel change rotation speed (resolver output)	20 ms	Y	n.a.	n.a.
Drives	Drives moving not requested (<u>ist/soll</u>)	100 ms	Y	Y	N
BeaC	Beam catchers moving not request	100 ms	Y	n.a.	n.a.
CSD	Software interlock from user application – rate counter	100 ms	Y	C	N
Exp	Signal interlock from experimental stations	100 ms	Y	C	N
TGA	Signal interlock from no cooling/pressure/gas etc...	100 ms	Y	Y	Y

Table 2: triggering FBAS example.

- **Currently foreseen:** MPS/FBAS concepts follow the “KISS” principle
 - **Questions and ideas to discuss:**
 - Can the current FBAS & beam prevention design cover all cases?
 - Which devices shall not be included at all, in order not to unnecessarily block the spectrometer operation
 - Flexibility required at SFRS may require a more complex concept?...
 - More flexibility for the Interlock Logic* Configuration?
 - *Logic: which devices to include in FBAS and when
 - Can there be something more flexible, but still work without changing the interlock system logic frequently?
 - ...
- Shall be discussed in a dedicated meeting