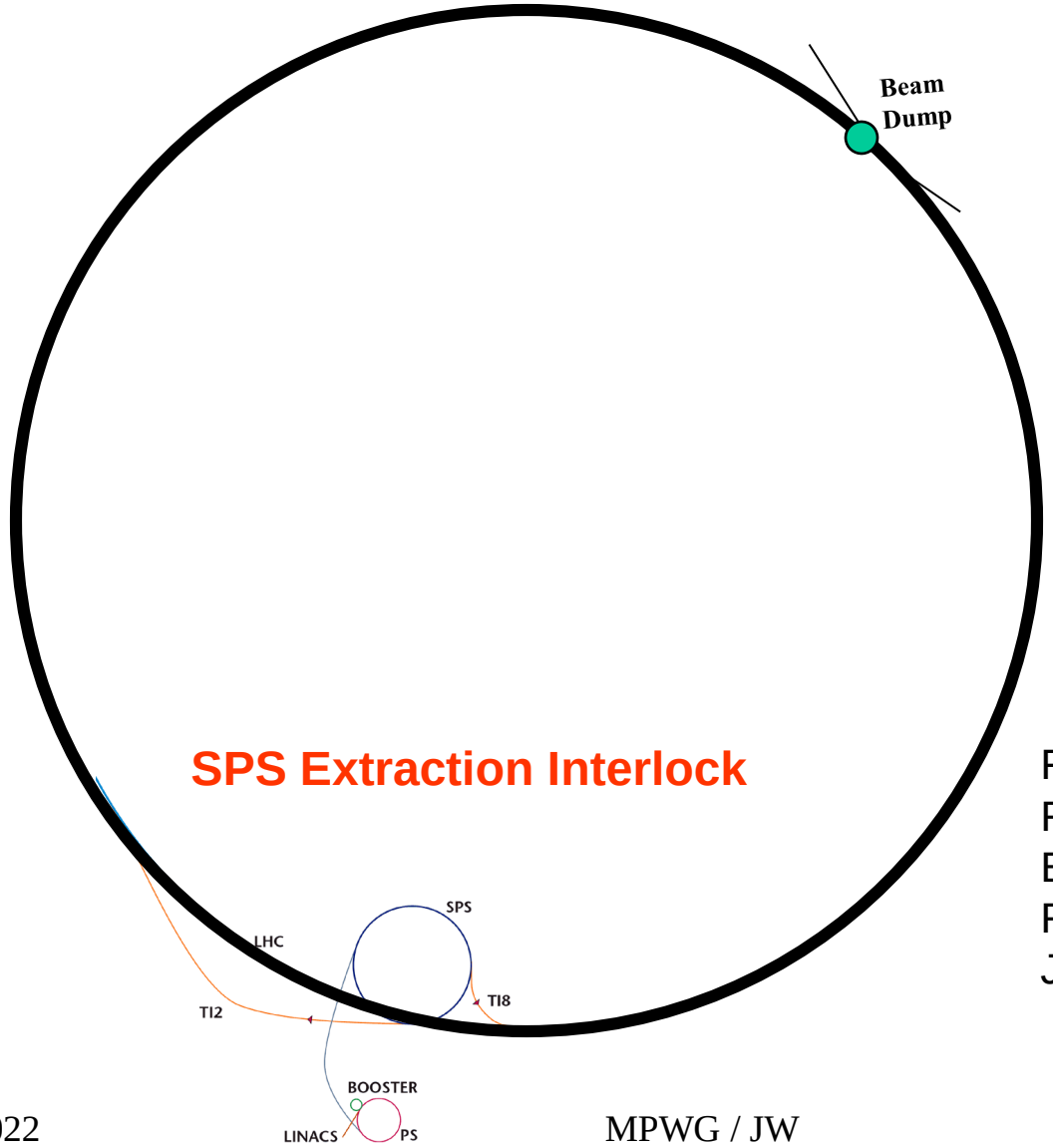
SPS Extraction Interlocks : the TED case



SPS Extraction Interlock

From of a discussion between
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J. Wenninger

The Safe Beam Flag (SBF)

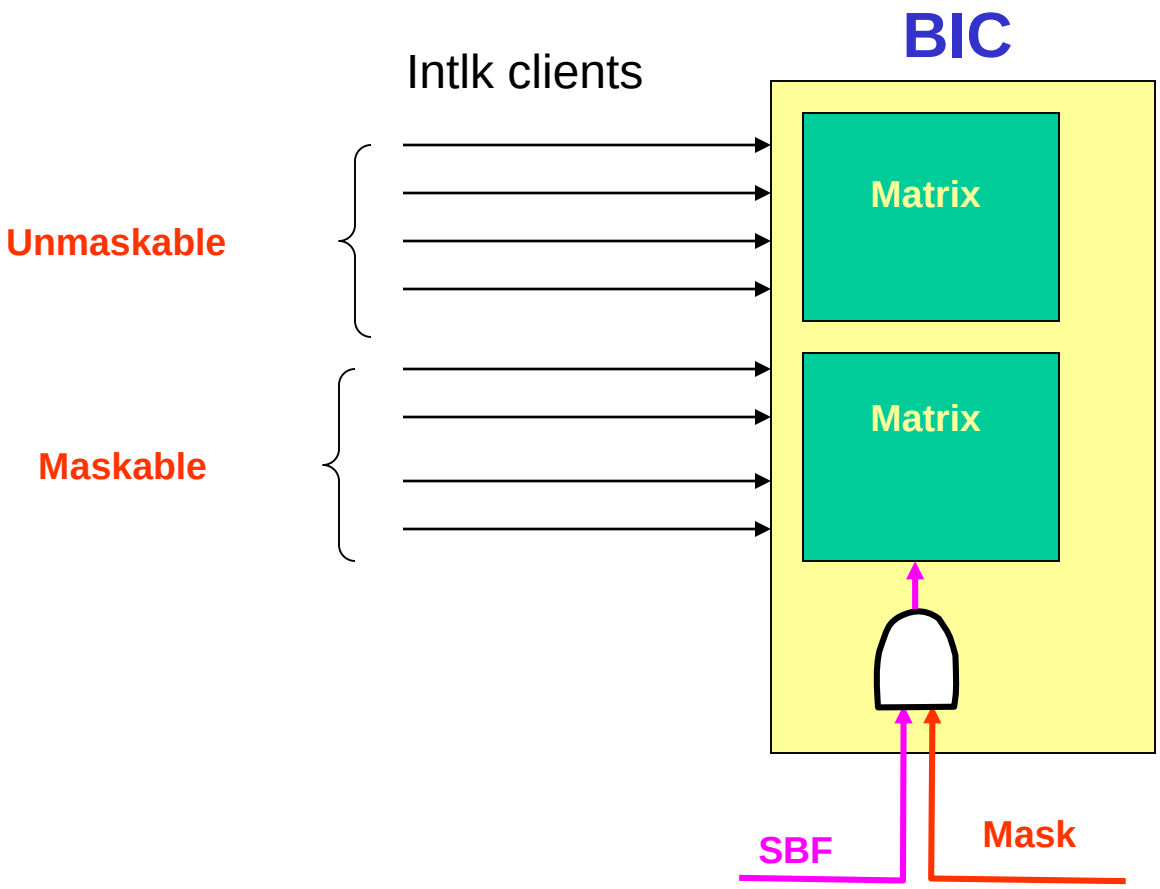
The “problem” :

- On various ‘occasions’ it is necessary for efficient machine operation, commissioning and testing to mask certain interlocks.
  - The TT40 extraction test is a very good example (Bruno’s talk MPWG 03-10-2003)

The solution :

- Provide a flag to indicate that conditions are safe for masking, i.e. the beam intensity is < threshold.
- Masking is only permitted/accepted when the SBF is present.
- Interlocks that are masked are automatically re-activated when the SBF makes a transition from safe to unsafe.

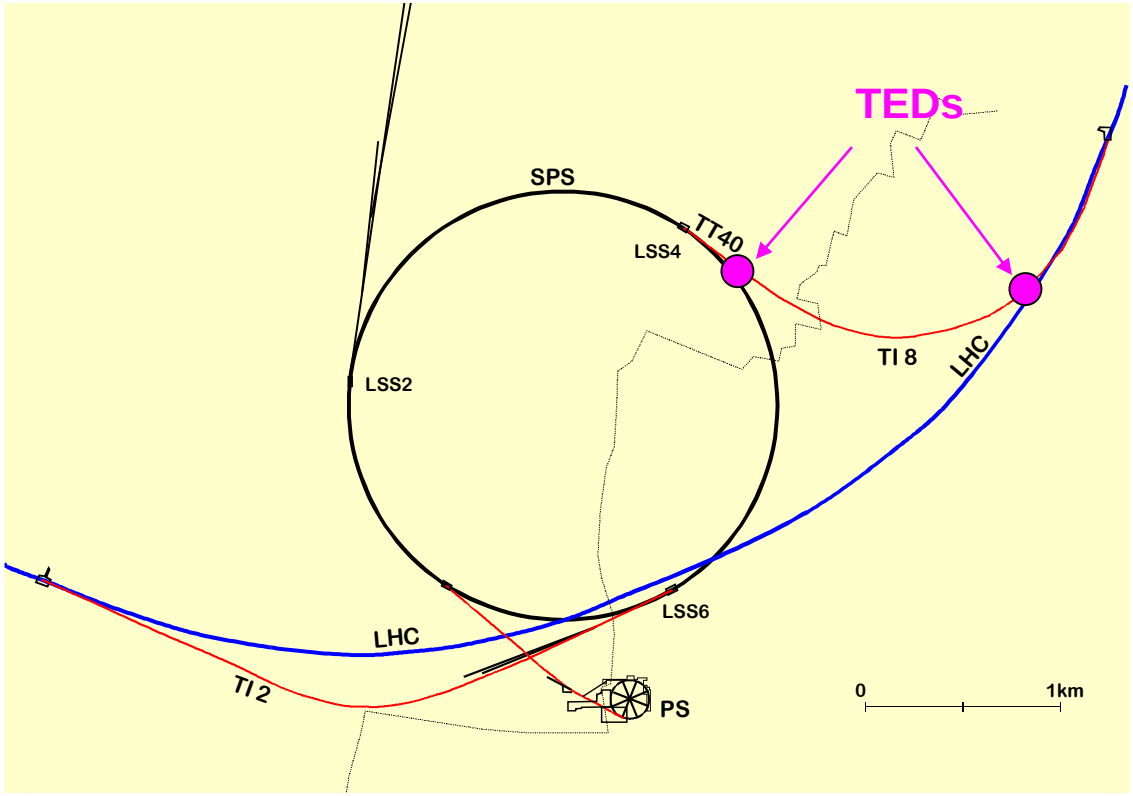
The next generation BIC



TT40 / TI8 operation

Before each filling period of the LHC :

- Downstream TED dump IN-BEAM.
- Check the line settings with low / high (?) intensity beam.
- Test must be possible whatever the state of the LHC interlocks – Efficiency !



TI8 downstream BIC(s)

One (or more) BICs will be installed in SR8.

Client interlocks from the SPS :

- Power converters (ROCS)
- Beam losses (to be confirmed)
- …

Client interlocks from the LHC :

- Beam permit loop ring 2
- Injection kicker ring 2

To test the line we will have to routinely bypass the LHC interlocks since this test phase is likely to overlap the LHC end of run recovery when the beam permit for the LHC rings may be OFF for some time (beam dump fired) !

If we cannot bypass the LHC interlocks we can only test the line when the LHC is up & running. This may not be very efficient !

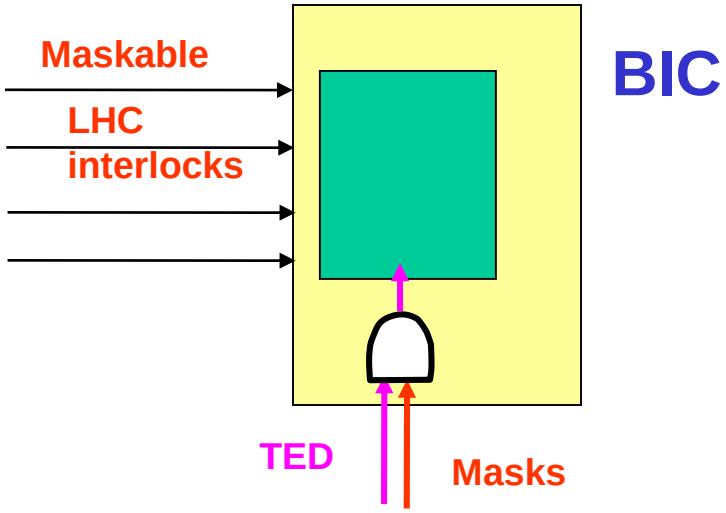
Proposal for one TI8 downstream BIC

One BIC in SR8 concentrates the LHC interlocks.
Client interlocks from the LHC :

- Beam permit loop ring 2
- Injection kicker ring 2
- ..

Instead of the SBF we use a signal derived from the TED position to allow LHC interlock masking !

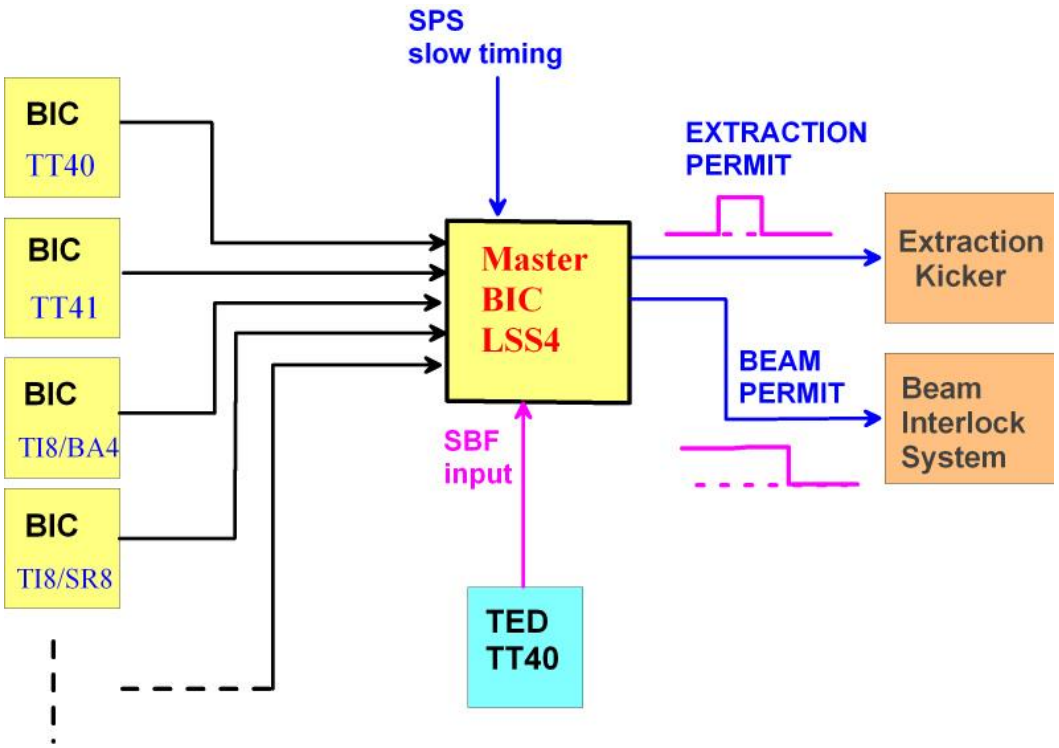
Ensures safe and flexible operation and testing of TI8 independently of the LHC status.



East / LSS4 Extraction Interlocks

- Interlocks are grouped geographically / logically into zones.
- Each zone is associated to one (or more) BICs.
- A MASTER BIC (timing sensitive !!) supervises all LSS4 extractions.

A signal derived from the TT40 TED would give us operational flexibility to test the extraction system up to the TT40 TED independently of the status of CNGS-TT41/TI8 while ensuring good safety !



The Safe TED Flag (STF)

- To allow flexible operation of TI2 and TI8 it must be possible to mask interlocks from the LHC.
- This masking may have to be performed on a daily (!) basis.
- If we do not foresee a safe masking strategy now : sooner of later someone (including the top AB management) will push to mask such interlocks to enhance the efficiency.
- We propose to derive a Safe TED Flag from the TED positions to safely manage the LHC interlock masking !