



Protection system for the SC links definition

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Acknowledgements:

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International Review of the Conceptual
Design of the Cold Powering System for
the HL-LHC Superconducting Magnets

Outline

- Requirements for quench detection and boundary conditions
 - Link layout, voltage taps, detection settings
- Proposed solutions
 - Quench detection electronics, integration into LHC supervision etc.
- Open issues
 - Powering scheme for higher order correctors

Conclusions

- Requirements in terms of protection specified by the equipment designer are fully compatible with the quench detection electronics too be used within HL-LHC
 - Proposed voltage tap layout is appropriate, there is no need to route instrumentation wires through the cold part of the link but external warm cabling should be aligned to the link cryostat
 - Additional functionality like the usage of a Nb_3Sn wire for the protection of the complete link can be accommodated as well
 - Monitoring of splices will be integrated as requested; interlocking capability can be added(also at a later stage) if needed
- Quench Detection Systems (QDS) for the s.c. links, bus-bars and HTS leads will be based on the standard QDS for HL-LHC
 - Completely new development based on the experience gained with the LHC QDS so far
 - In the past dedicated systems had been designed for each type of magnet or superconducting element to ensure optimal quench detection characteristics
 - Aim of the new designs is a versatile system capable of covering most of the quench detection requirements for the superconducting circuits of the LHC

Open points

- Powering scheme / layout for higher order correctors still to be finalized
 - s.c. link versus local powering → important input as not always active quench detections systems are required