Cold powering system integration and installation

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Outline

- Tunnel and new CE infrastructure;
- Overall layout of Cold Powering systems *(mainly on DFX/SC link/DFHX);*
- Installation sequence of *DFX/SC link/DFHX*
  - *SC link spool*
  - *Unspooling and insertion*
  - *DFX connection*
- Interfaces D1/DFX/SC link, *(SC link/DFHX not covered)*
  - *Connection interfaces, management of forces and thermal contractions in DFX*
- Summary (and work to do)

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Summary

- Preliminary integration study done, confirms geometrical feasibility (compatibility of tunnel passage wrt bending radia) for baseline SC link (i.e. type A)
- Preliminary installation sequence studied, confirms feasibility, but more work to be done with final tunnel arrangement (requested +4 m UL movement)
- Stiffness/forces of SC link and related installation/guiding tooling to be studied. Mock-up testing on existing prototypes can provide rapid and practical feed-back;
- Length compensation measures require undulations in UL, can compensate ± 3m → study of adjustment tools in UL
- Interface SC link DFX functionally clear: fixed points, compensation lyras in DFX, cable fixed point in SC link, vacuum barrier
- Interface DFX to D1 still evolving (tech.service module with 2 jumpers, cold diodes), but concepts exist
- DFHX installation/integration not covered, space allocation defined

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Limits/Open points & issues

- DFHX: not covered here, functional schemes to be finalized: cryo scheme, vaporizer, cooling of current leads; conceptual study will follow in 2nd ½ 2017
- DFM/DFHM: not covered here, but functionally will be similar to DFX/DFHX
- Cable interface to DFX being developed just now (following review of circuits) → 3D cable interface to DFX to be prepared (with geometries of splices)
- SC link stiffness for installation not yet defined → temporary/permanent tooling for installation/routing need to be studied;
- Final length of SC link to be confirmed based on more detailed integration/installation study (+4 m UL displacement)

Cold powering

- Each high luminosity point (Pt.1-5) requires:
  - 2 cold powering systems, 1 for the focusing triplets, one for matching section quadrupoles;
- 8 cold powering systems in total
- Each cold powering line includes:
  - 1 SC link (DSH);
  - 1 DFH(X or M), connecting the SC link to the current leads
  - 1 DF(X or M), connecting the SC link to the magnets
- In total:
  - 8 SC links of 2 types (+ 2 spares)
  - 16 DF boxes (+4 spare) of 4 types