



HL-LHC IT String Test 1st MPE brainstorming

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Outline

- Scope of HL-LHC string test
- Components
- Schedule

- Discussion on MPE requirements and test wish list.

THE SCOPE of the HL LHC STRING

MAIN GOAL

The HL LHC IT STRING will be a test stand to STUDY and VALIDATE the COLLECTIVE BEHAVIOURE of the different systems of the HL LHC: magnets, magnet protection, cryogenics for magnets and superconducting link, magnet powering, vacuum, and interconnections between magnets and superconducting link, alignment, interlocks.

TIMELINE

The test is necessary to be performed BEFORE the series equipment will be INSTALLED in the future HL LHC machine. The HL LHC STRING test is planned for a total duration of max. 2 years while it will be operated in alternate with the HL LHC SC LINK test station using the same cryogenic installations and electrical powering systems.

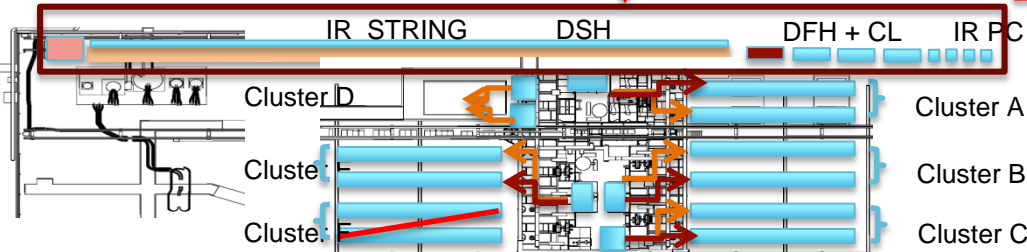
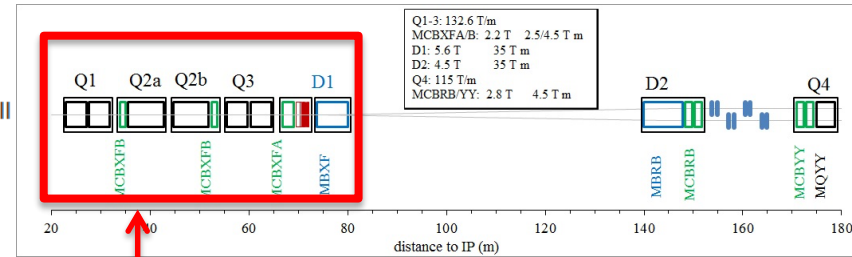
IT STRING COMPONENTS

In the HL-LHC configuration, the Inner Triplet (IT) region of IR1 and IR5 will be heavily modified. In particular the Q1-Q2-Q3-D1 magnets will be completely different from the present LHC magnets, all based on new technology:

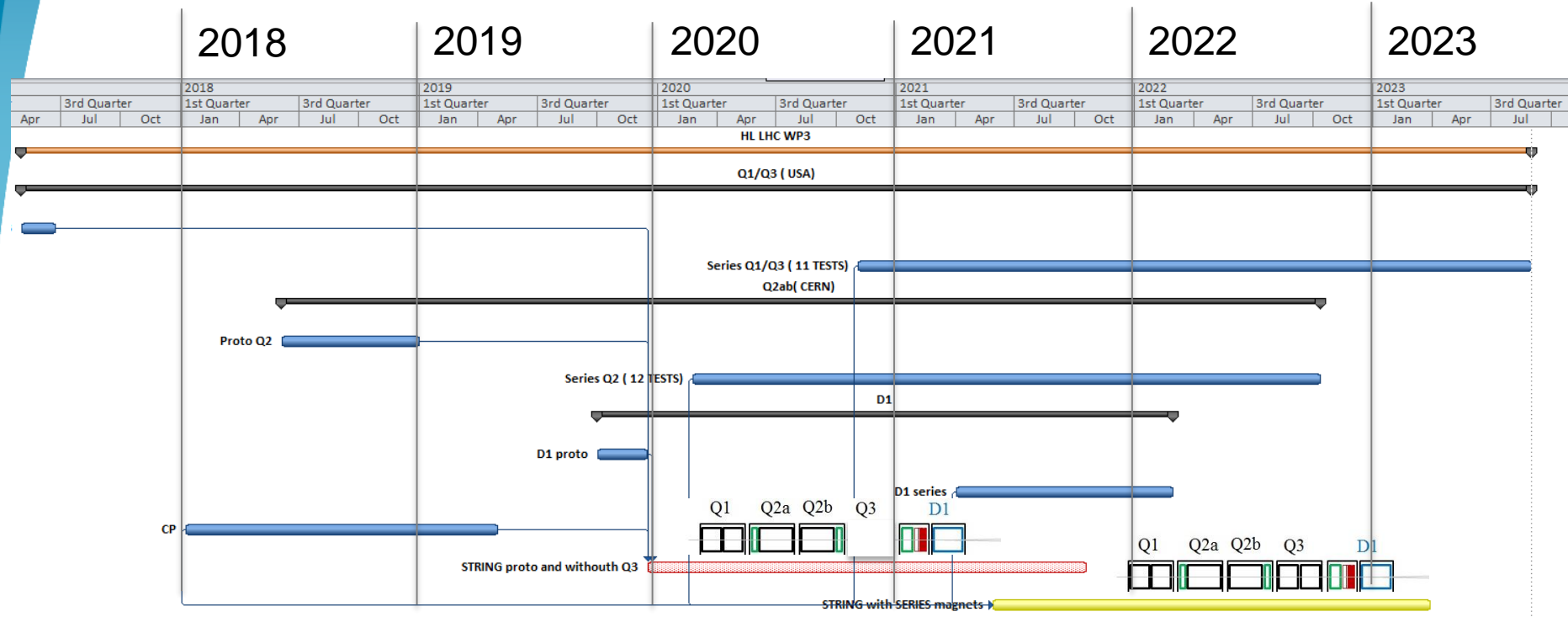
- Superconductor for D1 (present D1 is normal conducting)
- Nb₃Sn technology for the IT quadrupoles (present triplet is based in Nb-Ti)
- New powering and protection scheme

In addition, the aperture will be much larger, the cold mass configuration will be completely different and the corrector package will be substantially modified as configuration and technology, too.

For the above-mentioned reasons, a full integral test of the HL-LHC equipment from Q1 till D1 including the DFX (called IT string) is foreseen in the project, in condition as similar as possible to the operational ones. This IT string will be assembled in SM18 test facility, using prototypes or first-of-series equipment and is intended to be both a technical and an integration test. Not only the magnets, but also the entire electric circuit, the cryogenic equipment, the vacuum elements and alignment system must be under test in a configuration as near as possible to the final one.

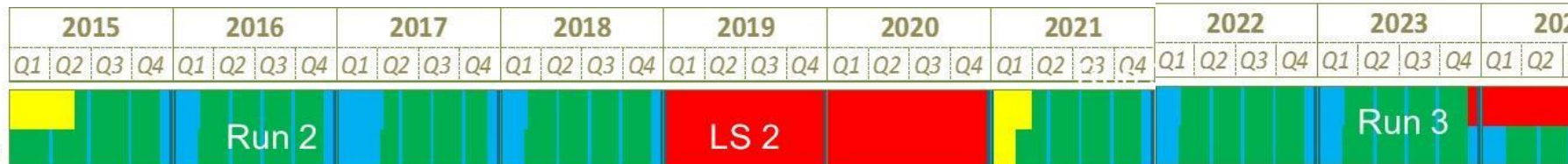


TIMLINE : HL LHC STRING



STRING Phase1

STRING Phase2



LHC Injectors

Some notes from meeting IT string meeting 17.11.2015

- String goals to use full HL-LHC topology i.e. magnets, magnet protection, cryogenics, sc link, powering, vacuum, interconnections between sc link and magnets, alignment, interlocks + control systems
- Two phased approach
- Magnets: D1, Q3, Q2b, Q2a, Q1 + corrector packages + D2, if D1 and D2 will be powered together.
- SM18 sc link test station + visitor area
- Testing up to ultimate current
- Alignment of beam screen after quench —> to be discussed with alignment experts how and what could be done.
- Test electro magnetic coupling between different circuits.
- Use of quench antennas?

MPE wish list - brainstorming

- Test electro magnetic coupling between different circuits.