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## Frequency Scanning Interferometry to monitor the position of accelerator cold components inside their cryostat

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In the frame of the High Luminosity LHC (HL-LHC) project, we propose a novel method to monitor the position of accelerators components inside their cryostat, based on Frequency Scanning Interferometry (FSI). We achieve such a result by installing retroreflective measurement targets on the internal cold components and by using specialized feedthroughs or viewports for the FSI laser beam delivery. This configuration allows micrometric distance measurements between the FSI beam origin and the target. The final accuracy depends on the number of distance measurements and their configuration. We present two examples of application: the position determination of two crab cavities inside their cryostat, in a cold and radioactive environment, and the monitoring of a cold mass inside a dipole cryostat, at cold. In both cases, we introduce the context of measurements, the chosen configuration after simulations, the results achieved and lessons learnt. We conclude by extrapolating these two setups to the HL-LHC project.

**Primary author:** Mr RUDE, Vivien (CERN)

**Co-authors:** Mrs ZEMANEK, Anna (CERN); Dr MAINAUD DURAND, Helene (CERN); Mr SOSIN, mateusz (CERN)

**Presenter:** Dr MAINAUD DURAND, Helene (CERN)

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