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## EMC tests at the location of the DCCT and ADC calibration laboratory at FAIR project

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The requested beam precision of the Facility for Antiproton and Ion Research (FAIR) requires the regular calibration of the main components of the current control system such as the Zero-Flux Direct Current-Current Transducer (DCCT) and the analogue-to-digital converter (ADC) module at a level of 1ppm or better. To reach this goal, a dedicated calibration laboratory is designed and prepared for construction. Due to the requirement to use a power converter in the vicinity of calibration arrangement and the limitation of available space, the calibration laboratory is to be located in the building where the power converters of the beam transfer lines are installed. In order to determine the spurious electromagnetic emissions from these power converters and the associated power distribution system, EMC tests were conducted. On the basis of the results, requirements for the electromagnetic shielding and other EMC mitigation measures were defined. As expected, typical inductive components such as transformers were identified as relevant sources of low frequency magnetic field. Unexpectedly, significant levels of low frequency magnetic field were identified in the planned calibration laboratory when all power converters were turned-off (including their supply cables and filters). This launched a further investigation which led to the conclusion that the 400V supply system in a TN-C (Terre Neutre Combiné) or TN-C-S (Terre Neutre Combiné Séparé) configuration is an additional source of low frequency magnetic disturbances. The paper presents the approach of the EMC investigation, the EMC test results and the conclusions. Measures to reduce electro-magnetic interferences for sensitive instrumentation systems are presented. The authors would like to highlight to the accelerator community the significance of a structured EMC assessment of the EM environment including the design of the power supply configuration in order to minimise the effects of electromagnetic interference in sensitive and complex instrumentation systems.

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