

FBG sensors for Humidity and temperature monitoring in trackers systems

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The accurate monitoring of environmental humidity inside the tracker envelop is of extreme importance in order to assure the good performance of the detector (for detecting leakage in the cooling circuits or other tracker failures involving a reduction of the environmental dryness). So is the control of electronic and sensor temperature (for detecting bad performance of the cooling system, problems with electronics and sensors). Due to the very hostile operating environment working conditions (ionizing radiation, magnetic field, EMI...) it is hard to find a common humidity or temperature sensor for this application and the current state-of-the-art technique is based on sniffing part of the envelop atmosphere inside the tracker envelope and measure the humidity outside the envelop.

Fiber Bragg Grating optical fiber sensors are suitable for working under these very hostile conditions (they are not sensitive to EMI or magnetic fields, and they can be made radiation hard). For this reason, it is interesting to use FBG sensors to monitor humidity and temperature in tracker volume. The sensitivity to humidity of FBG sensors with different coatings has been tested trying to develop a reliable humidity sensor. It has been studied too the repeatability and the possible influence of radiation in humidity sensitivity. For the temperature monitoring several sensors have been studied in order to avoid humidity effect and several fixing systems have been tested in order to avoid strain transmission to the fibers. As a case of application actually the FBG sensors are intended to be installed in Belle II tracker for humidity and temperature monitoring.

Summary

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