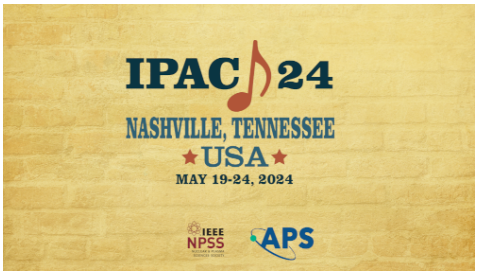

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Continuous position estimation for the full remote alignment system of the High Luminosity LHC upgrade

Thursday, 23 May 2024 16:00 (2 hours)

The Full Remote Alignment System (FRAS) is an alignment system remotely controlled and monitored that comprises almost one thousand permanent sensors distributed along the 200 meters of equipment that will be installed in the frame of the High Luminosity LHC (HL-LHC) project on either side of the ATLAS and CMS detectors. The sensors, along with their electronics and a system of motorized actuators, will be used to adjust the relative positions of the components remotely, in real time, with no human intervention needed in the irradiated environment of the tunnel. In this contribution we describe the design and the implementation of the position estimation algorithm which is a core-component of the FRAS. This algorithm will process the data provided by all the sensors to determine exact positions and orientations of the associated components in real-time. The position estimation module is designed as a reusable C++ library and builds on the existing CERN LGC, a modular least-square software. It will be fully integrated into the FRAS software stack and is entirely file-less during operation. In this paper we will demonstrate its performance in a realistic case study and showcase its ability to provide position updates on a much higher frequency than the required 1 Hz.

Footnotes

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