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EMC characterization of Tracker Detectors

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The control of electromagnetic interference (EMI) phenomena is a very important aspect of any electronic device in order to ensure the correct performance of a whole physics experiment. This aspect is particularly important in the future tracker systems, due to the problems that may appear as a result of the proximity of noise sources to high sensitive modules, fast transients and topology.

During the last years and via AIDA2020 EU Project, EMC tests have been performed on several tracker detectors such as CMS at CERN and Belle II at KEK in order to decrease and minimize the electronics integration problems due to electromagnetic noise. EMC tests allow conducting noise studies on physics detectors to improve the noise immunity of the front-end electronics (FEE) in order to assess compatibility with the noise generated by the power supplies, transmitters or any other noise source present in the detector. This design criterion ensures the correct integration of modules, hybrids, FEE and power units, and helps in the design of each of the circuitry to minimize the electromagnetic interference coupled to each of them. This knowledge can be used to set grounding and EMC design rules for future experiments, which allows developing robust FEE designs against electromagnetic interference and sets the preliminary specifications for the power units compatible with any FEE.

This contribution shows how to perform an EMC characterization of a tracker detector. Special attention is paid to the type of test that can be performed as well as the main goal of these sets of EMC tests. Also, this work will show how the outcomes from this tests are used by electronics designers to develop robust designs of detector electronics against electromagnetic noise

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