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EMC characterization of vertex detectors within the framework of AIDA2020 project

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The use of silicon vertex detectors has been used frequently in particle physics and astrophysics detectors. They have been used in astrophysics satellites to detect X-rays, gamma rays and matter/anti-matter as well as in particle physics experiments at CERN or KEK.

During the last years, physics community has been paid attention to the noise issues in this type of detectors. As a result, more detectors designers demand specific facilities in order to perform EMC test. The test results help them to identify sensitive areas of the detector electronics, characterize the coupling mechanism between the noise and sensor and define the noise emissions level compatible with the FEE. Via the AIDA-2020 project, the physics community now has access for the first time to an EMC laboratory specially focused on EMC tests for electronic noise characterization and grounding diagnostics at the Instituto Tecnológico de Aragón (ITAINNOVA) in Spain. The EMC facility has already been used for this purpose during the two first years of the project.

This paper presents a general overview of EMC tests that have been performed on prototypes of vertex detectors at ITINNOVA within AIDA2020 project. The paper shows the type of test that can be performed as well as the analysis and curves that can be obtained to identify the coupling mechanisms between the noise and front end electronics. Today this understanding is critical to define design recommendations and specify the electronics and system topology to increase the FEE robustness to EMI in anticipation of the challenging power distribution schemes proposed for future generation of vertex detectors.

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