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Dead zone analysis of ECAL barrel modules under static and dynamic loads

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The ILD silicon-tungsten electromagnetic calorimeter (ILD Si-W ECAL) is a sampling calorimeter with tungsten absorber and highly segmented silicon layers to achieve precise jet energy measurements by particle flow concept. In this context, we started to study the impact of environmental loads on the Electromagnetic CALorimeter (ECAL) barrel detector. This ECAL barrel consists of several independent modules which are mounted on the Hadronic CALorimeter (HCAL) barrel itself mounted on the cryostat coil and the yoke. We need to estimate the gap required for ECAL modules assembly and operation to avoid mechanical contacts over the barrel lifetime. In the meantime, we need to minimize those gaps to reduce dead spaces and optimize detector hermeticity. The aim is to study the gap between ECAL barrel modules. To do so, we performed several FE static analysis with two different HCAL barrel designs. Moreover, because of the implantation site of the whole project in Japan, seismic analysis were carried out in addition to static ones. This article shows results of this analysis done with the FE method in ANSYS. First results show impacts of HCAL design on the ECAL modules motion in static load. The second part dedicated to seismic approach on a larger model (including yoke and cryostat) gives additional results on earthquake consequences.

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