Joint DESY and University of Hamburg Accelerator Physics Seminar

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(16:00 in Room 459/30b)

LHC Crab Cavities and Related Machine Protection

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Abstract

For the high–luminosity LHC upgrade program (HL–LHC), the installation of crab cavities (CCs) is needed to compensate the geometric luminosity loss due to the crossing angle and for luminosity leveling. One of the major challenges is the compatibility with machine protection specifications in the regime of >500 MJ stored beam energy. In a failure case (e.g. arcing in the coupler), the voltage and/or phase of a CC can change significantly with a very fast time constant below one LHC revolution. This can lead to large, global betatron oscillations of the beam. The status of the LHC crab cavity upgrade program is summarized. The impact of CC failures on the beam dynamics is discussed and the results of dedicated simulations are presented. Mitigation strategies to limit the impact of CC failures to an acceptable level are specified.

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