Contribution ID: **127** Type: **Talk**

【331】Linearised dynamical model for electron cloud induced instabilities

Thursday 30 August 2018 17:00 (15 minutes)

The interaction of the proton bunches with its surrounding in the LHC can lead to the production of large amounts of free electrons in the beam pipe. These so-called electron clouds are able to induce coherent beam instabilities by interaction with the proton bunches, effectively limiting the maximal intensity of the beam. We extend a semi-analytical code for the beam transverse oscillation modes by implementing a model based on linearised equation of motion for protons and electrons. The results are compared to a simplified model and to previous studies based on macroparticle simulations. They are found to be in qualitative agreement with the other estimates. The parametric dependance of the instabilities for the LHC at top energy is discussed.

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Session Classification: Nuclear, Particle- & Astrophysics (TASK)

Track Classification: Nuclear, Particle- and Astrophysics (TASK)