

Proposition de stages et mémoires

2020-2021

Le Service de Métrologie Nucléaire poursuit des activités dans les domaines de la proton thérapie et de la physique des accélérateurs avec plusieurs partenaires incluant l'Organisation Européenne pour la recherche nucléaire (CERN), Ion Beam Applications (IBA), le SCK-CEN et Royal Holloway (University of London). Les mémoires suivants sont proposés dans le cadre de ces collaborations aux étudiants de MA2 pour l'année académique 2020-2021.

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Intra-beam scattering (IBS) models and impact on the luminosity lifetime of future colliders

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The phenomenon of intra-beam scattering (small angle Coulomb scattering) in charged particles bunches circulating in particle accelerators places limitations on the luminosity lifetime of future colliders. The Robert R. Wilson Prize for Outstanding Achievement in the Physics of Particle Accelerators has been awarded in 2017 to Piwinski, Bjorken and Mtingwa; recognizing both the significance of their theory and models of IBS and the impact it plays for the performances of future colliders and light sources.

The work proposed for this project aims at comparing the existing models (both semi-classical and models following a quantum field approach) and their physical interpretations and to implement numerical methods to solve them for a realistic model of a particle collider. As a second stage, numerical simulations will be carried out to study in detail the evolution of the luminosity of specific future collider designs. The student will be given the opportunity to discuss those results with experts at CERN.

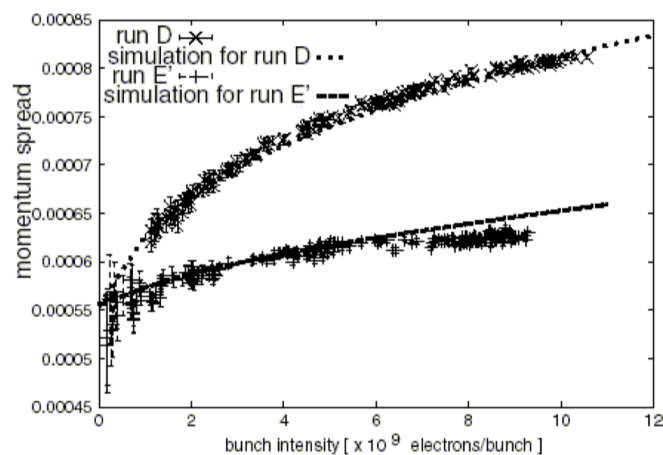


Figure 1 Observation of emittance growth in KEK ATF.