

Proposition de stages et mémoires

2021-2022

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 2021-2022.

Pour toute information complémentaire :

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2. Simulation of antiproton production for the CERN antimatter factory using a Monte-Carlo code based on Geant4

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The CERN antiproton complex has been producing antiprotons since the 1970s using intense 26 GeV proton beams from the CERN Proton Synchrotron impacted on a metallic target. The production capability and reliability of the accelerator complex to produce extra low-energy antiprotons have been increased recently, with the commissioning of a new low-energy ring (ELENA) and with the design of a new target, among other activities. The so-called “antimatter factory” will thus be the host of exciting new activities and experiments for years to come.

This project aims at modelling the antiproton target region (starting from the extraction line coming from the CERN Proton Synchrotron, including the target and the magnetic horn and the antiproton decelerator injection line), to assess the antiproton production and capture performance, using a numerical code based on Geant4: BDSIM. Using BDSIM, a model of the magnetic transport line, of the target and surrounding shielding will be constructed and numerical simulation will be carried out and discussed in detail.

The student interested in this project is encouraged to follow the course PHY-H504 “Introduction to particle accelerators” to have the opportunity to visit the antiproton complex and to share its results with CERN experts.



Figure 1 The antiproton decelerator target region and its associated shielding blocks.