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Temporal Resolution Analysis of the β-Dependency of Radially Coupled FFC Designs

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In the last few years, we investigated a new type of Fast Faraday Cups (FFC). This type radially couples the bunch to the inner conductor of a coaxial geometry. The main benefit of this FFC is that two methods to suppress secondary electrons (SE) from impacting the output signal can be applied: by a bias potential and geometrically, through hitting the inner conductor only inside a drill hole. Aside from the reduction of the total amount of SE through the geometrical limitation, the drill hole also leads to a temporal separation of the primary signal from the SE signal. It is even possible to separate them completely. However, a higher temporal separation contradicts the maximum bandwidth, and hence the temporal resolution, of this FFC type. Two versions of these radially coupled FFCs have been tested at the hadron facilities GSI UNILAC, PHELIX, and FRANZ. The focus of these tests was on improving geometrical suppression.
In this contribution, we examine the potential usage of this type of FFC for high β lepton facilities, evaluating the technical limitations through CST simulations by comparing the existing RCFFCs with a bandwidth-optimized version.

Summary

Primary author: KLAPROTH, Stephan (Technische Hochschule Mittelhessen)

Co-authors: PENIRSCHKE, Andreas (Technische Hochschule Mittelhessen University of Applied Sciences); DE GERSEM, Herbert (TU Darmstadt); SINGH, Rahul (GSI Helmholtzzentrum für Schwerionenforschung GmbH(GSI))

Presenter: KLAPROTH, Stephan (Technische Hochschule Mittelhessen)

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