

FTEC Project: Computation of the beam coupling impedance from precomputed fields

Department:

BE

Description:

The computation of the beam coupling impedance is usually performed with a dedicated commercial software. In the framework of reducing the dependence of the impedance calculations on a specific commercial software, it is of particular interest to investigate alternative computation methods. A solution could be using a more standard frequency domain or eigenmode solver which is common to all the main electromagnetic commercial tools and where also open source solutions are available. The goal of the project is to develop a code that takes as input the electromagnetic fields obtained by using numerical techniques (FIT, FDTD or FEM) and compute the impedance taking into account the appropriate boundary condition in the beam direction, i.e. performing the mode matching considering the connection to the beam pipe. The theory to perform this last step has been developed and tested for a simple pill-box cavity by the father of the beam coupling impedance V.G. Vaccaro. Comparisons with CST Wakefield solver will be performed to validate the impedance calculation for more complex devices.

Functions and training value:

You will be contributing to the development of computational methods of the beam coupling impedance.

You will collaborate with experienced colleagues which will enable you to acquire a deep knowledge of accelerator physics and electromagnetic modelling while developing your teamwork skills.

Qualification / skills required:

- Master's degree in physics or engineering or equivalent
- Good programming skills (e.g. Python) and knowledge of electromagnetism and electromagnetic modelling will be an asset