

Implementation of a Graphical User Interface for the PBCI Code



TECHNISCHE
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Proposal for a HiWi job

Study field: Computational Engineering | Electrical Engineering | Physics | Computer Science
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Description

At the TEMF institute, multiple in-house codes are developed. Among them, one called PBCI (Parallel Beam Cavity Interaction) is being used to simulate electromagnetic fields in particle accelerator components. Currently, the code is used as a command line tool with input and output provided by text files. As the code is increasingly used by researchers beyond the developing staff at TEMF, such as CERN or DESY, usability becomes an important aspect of the software. Its highly optimized implementation and the variety of adjustments possible require a clean and easy way to set up a simulation.

This Hiwi-Job aims to implement a graphical user interface (GUI) for the command line tool in order to increase usability. As PBCI will remain to be used as a command-line tool in cluster computing, the GUI will be a standalone program. Hence, no prerequisites exist in terms of knowledge about numerical methods or electromagnetic theory, even though both are advantageous.

Decisions about the implementation details are yet to be done and can also depend on the HiWi's input. Likely, the implementation will be in C++ and use the Qt framework. Good coding style will be focused and close cooperation with the supervisors will be provided.

Work plan

- Conceptual work: Sketching the layout of a graphical interface that matches workflow and improves usability and understanding. Possibly using software engineering methods to validate the concept.
- Research on visualization tools and widget toolkits.
- Step-wise implementation: First, a back end to interact with the text files and to control PBCI is needed. Then, an interface to manipulate settings is to be build, based on the concepts defined before. Visualization tools are included as far as time allows and necessity dictates.

Prerequisites

Joy in programming and an interest in learning python and/or C++. No prerequisites are needed in terms of electromagnetic theory or numerical methods, yet both are advantageous. Feel free to pass by Jonas Christ for more details.

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