We are looking for a PhD candidate (m/f/d)

Damage limits of superconducting magnets in case of impact by high intensity particle beams

Job description:

The Institutes for Beam Physics and Technology (IBPT) and for Technical Physics (ITEP) within KIT develop concepts and technologies for novel accelerators and light sources, with a particular focus on specialized superconducting magnets. The Machine Protection & Electrical Integrity Group (MPE) of CERN’s Technology Department (TE) is responsible for the design, construction, operation and maintenance of the protection systems, electrical and electronics instrumentation as well as diagnostic systems required to operate and to protect the Large Hadron Collider (LHC) and its injectors.

The proposed PhD project is part of a collaboration of KIT (IBPT&ITEP) and CERN (TE/MPE) to study the damage limits of superconducting magnets due to the direct impact of high intensity particle beams. Understanding the dominating damage mechanisms is crucial for the development of effective machine protection concepts for the High-Luminosity upgrade of the Large Hadron Collider (HL-LHC), the Future Circular Collider (FCC), and many other future large accelerator projects.

The proposed project will focus on experimentally studying these damage limits with sample coils, considering the effects of aging during long-term operation of an accelerator.

The successful candidate will

• finalize the design of samples, track their manufacturing and qualification at KIT;
• will design and implement the experimental set-up at CERN based on the experience from previous damage experiments;
• perform the beam experiment;
• analyse the results and conclude on their applicability on superconducting accelerator magnets and put that into a scientific context to describe the tolerance capabilities.

This work also includes the development and conduction of simulations with respect to energy deposition and thermo-mechanical effects for the design of the beam experiment and their interpretation.

Qualification:

• Masters in physics or electrical engineering
• Basic understanding of particle accelerators and superconducting magnets will be beneficial
• Software skills in CAD, ANSYS, Monte-Carlo code, Electromagnetic simulation software or similar will be welcome
• Fluency in both spoken and written English

Organizational unit:

The proposed PhD project will be performed as part of a research collaboration of KIT and CERN. The candidate will apply for the 3-year CERN PhD program and be based at CERN. The PhD is foreseen to be supervised by Prof. Anke-Susanne Müller and Prof. Tabea Arndt at KIT.

Starting date: 01.01.2021

Application by: 19.10.2020

Please apply via the CERN recruitment website (CERN doctoral student program) and in parallel send the full application documents to the contact persons Dr. Axel Bernhard (axel.bernhard@kit.edu) and Dr. Daniel Wollmann (daniel.wollmann@cern.ch).

Contact person in line-management:

For more information please contact Dr. Axel Bernhard, E-Mail: axel.bernhard@kit.edu or Dr. Daniel Wollmann, E-Mail: daniel.wollmann@cern.ch