PHYS480: Introduction to the Physics of Particle Accelerators

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Lectures: Two times a week (Monday and Thursday 8:30 Elliot 161)

Office Hours: I will post office hours on the BrightSpace" site.

Prerequisite: 321A Classical Mechanics I and 326 Electricity and Magnetism

Calendar Description:

An introduction to particle accelerators. The course will start with a survey of different accelerator concepts and some important concepts of electromagnetism and special relativity. The main topics are beam optics and RF systems for acceleration. The course is of interest for students interested in entering the field of particle accelerators and students mainly interested in particle or medical physics who would like to learn the fundamentals of accelerator science. Throughout the course, I will use CERN's LHC as an example in problems and worked exercises.

Organizational Details:

The course will be delivered in a blended approach. Students are expected to read the material before the lectures and complete quizzes. In the classroom sessions, I will repeat important concepts based on the readings and quizzes before we work together on problems.

There will be nine assignments in total, either reading with a quiz (6) or homework (3).

Assessment:

- 30% for quizzes based on readings. This assessment is mainly to test if reading was done thoroughly
- 30% homework
- 40% Final exam (oral)

Course Material:

I will not use a single text book. All materials will be provided via Brightspcace. This includes book chapters, slides and lecture notes.

The textbook Rob Appleby et al - The Science and Technology of Particle Accelerators is ***available as a free ebook from the UVic library.***

Marking and Grades:

The skills you must demonstrate in this course include

- Explain different accelerator concepts and their application
- Solve simple linear beam dynamics problems using Hill's equation
- Calculate beam steering and focusing for normal and superconducting dipole and quadrupole magnets
- Calculate radiofrequency fields and figures of merit for cavities and waveguides

Examinable material includes everything discussed in class, in the assigned readings, and topics I think you should be able to deduce from those. Grades will be assigned in accordance with the narrative descriptions in the undergraduate calendar.