ALBA
SYNCHROTRON LIGHT SOURCE

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Título puesto: Beam dynamics computations for the ALBA II storage ring upgrade

Curso: 2024/25

División: Aceleradores

Descripción del proyecto:

ALBA is a 3 GeV synchrotron ring with a circumference of 268 m an electron beam emittance of 4.5 nm rad. A new upgrade is foreseen maintaining the circumference and the energy, but reducing the emittance, so called ALBA II.

The ALBA beam dynamics group develops software both to simulate the accelerator performance and to measure and optimize parameters of the real accelerator. The student will help developing a specific project within that scope. The chosen project will depend on the group needs and the student preferences, for example:

a) the Magnets Group at ALBA provides highly detailed information of multipolar components per magnet for the future ALBA II ring. During the project the student will use this as input to define the polynomic expansion used in beam dynamics simulations, taking care of all different element combinations, and will evaluate their independent and combined effect on the beam dynamics parameters like dynamic aperture and Touschek lifetime;

b) contribute to the use and improvement of beam dynamics simulation codes for synchrotron light sources, for example, improve in speed the chaos indicator called frequency map through parallelization, increase the accuracy of the magnet misalignment modelling, implement other chaos indicators and evaluate their performance for ALBA II;

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Perfil del estudiante:

Student profile:

Physics student, or similar education

Requirements:

- Experience with Python or MatLab programming languages.
- Good level of spoken and written English.
- Good or very good math skills depending on the chosen project
- Knowledgements on Accelerator Physics could be an asset

Program:

- Introduction to the Accelerator Physics
- Introduction to accelerator linear optics, matrix formalism and the PassMethods approach
- Implement in Python/Matlab code for the specific calculations of the chosen project, including verifications
- Use the code to calculate beam dynamics parameters for ALBA II
- Documentation of the project.

Tutor: Oscar Blanco
Responsable División: Francis Pérez