Titulo puesto: Software for the ALBA accelerator beam dynamics
Curso: 2023-24
División: Aceleradores

Descripción del proyecto:

- 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 withing that scope. The chosen project will depend on the group needs and the student preferences. Two possible projects are proposed as an example:
- Gaussian Processes for beam lifetime optimization. The beam lifetime is a key parameter of the storage ring, it depends on the distribution of the magnetic fields along the accelerator and in particular on the settings of the sextupole magnets. The goal would be to implement an optimizer based on Gaussian processes [1] (or similar) that changes the sextupole settings to optimize the beam lifetime.
- Contribution to the Python Accelerator Toolbox (PyAT) collaboration project. Several accelerator physicists within the European community are developing a new simulation code in Python based on the AT code which used to run only on Matlab. The collaboration is quite advanced but there are several active areas that need further development. The goal would be to contribute within a specific active PyAT project [2] during the time of the student stay.
- [1] C.E Rasmussen, “Gaussian Processes for Machine Learning” (https://gaussianprocess.org/gpml/chapters/RW.pdf).
- [2] https://github.com/atcollab/at

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Perfil del estudiante:

Student profile: Physics and/or Mathematics student

Requirements:

- Experience with programming languages like Python, C or Matlab.
- Basic knowledge optimization algorithms is desirable.
- Experience with Git is desirable.
- Good level of spoken and written English.

Program:

- Introduction to accelerator beam dynamics.
- Introduction to accelerator simulation codes.
- Introduction to the ALBA accelerator control system.
- Development of the chosen beam dynamics software.
- Documentation of the project.

Tutor: Zeus Martí

Responsable División: Francis Perez

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