Contribution ID: 7

Optimization of twin electron bunch dynamics for PWFA

optimizing the dynamics of twin electron bunches in the photoinjector, surfing in the same radio-frequency (RF) bucket of the electron gun and downstream accelerating modules, is of crucial importance for potential plasma wake-field acceleration experiments at the European XFEL in the future. The topic is practically challenging due to the optimization of multiple beam and machine operation parameters aimed for specifically required twin bunch configuration and thus the resulting longitudinal phase spaces. Such a technical goal could not be straightforwardly achieved using existing beam dynamics codes and consequently adding complexities to practical machine tuning.

A suitable candidate should carry out dedicated studies first using existing and well-justified beam dynamics code (e.g. ASTRA), and then develop a new scheme / interface for twin-bunch optimization using a preferable programming language (such as python, C++ or Matlab) based on advanced schemes (e.g. Bayesian optimization). Such an enhanced tool should serve the goal for twin bunch optimization in the simulations and provide useful guidance for optimizing the twin bunch beam dynamics in the XFEL injector experimentally.

Group

MXL

Project Category

B3. Research on accelerators

Special Qualifications

- 1. prior experience in programming (Python, C++ or Matlab) and/or beam dynamics in the photoinjector;
- 2. self-motivation to achieve research goals and willing to cooperate

DESY Site

Hamburg

Primary authors: Dr SCHOLZ, Matthias (MXL (XFEL)); Dr LONG, Tianyun (MPA2 (Beam-Driven Plasma Accelerators)); Dr CHEN, Ye Lining (MXL (XFEL))

Presenter: Dr CHEN, Ye Lining (MXL (XFEL))