

The Beams and Applications Seminar Series

Electron beam dynamics operations, simulation, and theory in 3rd generation synchrotron light sources

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Bldg. 401, Room B-2100

Friday April 13, 2:30 pm

Host: Louis Emery

Abstract:

The properties of the x-ray beams in the beamlines of 3rd generation light sources come from a combination of the electron beam properties, the undulator/wiggler fields that induce the radiation, and the x-ray optics in the beamline. In considering the needs of the vast array of uses of the x-ray beam, an understanding of the electron beam properties is necessary. Particularly when low vertical emittance reaches the diffraction limit for the x-rays, the question of which techniques will gain or lose in the trade-offs related to the different operating modes and parameters becomes more complex. On the other hand, many x-ray scientists and users of the radiation have very little knowledge of the physics and operation considerations determining the electron beam and the resulting x-ray properties out of the undulator. In this talk, I will describe my experience in electron beam measurements, simulation and education at the European Synchrotron Radiation Facility in Grenoble, France. I will outline my understanding of the different simulation tools available for the electrons and x-rays and how they may be made to interact better, pointing out where potential research may be necessary. Finally, I will describe my experience coordinating the collaborative development of the Accelerator Toolbox Matlab based beam dynamics code, and its use as both a research and teaching tool, crossing the boundary between the electron beam and the x-rays.

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