Second OASYS School

DATES

Wednesday 12th, Thursday 13th, Friday 13th December 2019

SCOPE

The second OASYS school will be a hands-on meeting to fully exploit the possibilities of the different tools in the OASYS suite. They perform full simulations on synchrotron radiation beamlines and associated instruments. The school will cover the calculations of the power and flux emitted by the different synchrotron sources, the simulation of complete beamlines using ray tracing and wavefront methods, and the automation of the simulations using python-scripts. It will conclude with a code camp to learn how to program new OASYS add-ons and applications.

Audience is typically composed scientists, engineers, technicians, or managers who wish to learn more about simulations in x-ray optics applied to synchrotron instrumentation using OASYS. In particular, they will understand the characteristics of a synchrotron beam and obtain quantitative information on emitted flux and power, simulate the optical performance of a beamline, and apply a variety of tools to simulate partial coherent beams.

REGISTRATION

T.B.D. – web site for registration and link to the guest house

LEARNING OUTCOMES

This course will enable you to:

- describe/import the beamline elements in terms of the SYNED containers
- calculate power and flux emitted by synchrotron (white) sources and affecting the optical elements

- select and combine rays and wavefronts to describe synchrotron radiation by ray tracing and wavefront propagation, respectively. Be familiar with SHADOW, WOFRY and SRW.
- quantify the beam characteristics (flux, dimensions, intensity profiles) and compute optical images from geometrical and synchrotron sources
- transfer coherence into and throughout optical systems using Monte Carlo methods (SRW) and coherence mode decomposition (COMSYL).
- automatize tasks and perform long calculations using python scripts.
- learn how to extend OASYS functionalities writing new widgets and new applications.

COURSE DURATION

The full course lasts three days, although it is possible to follow only one, two or three days. The first day covers simulations of source emission (power and flux) and an introduction to simulate a beamline with ray tracing. Day 2 is dedicated to simulate optical systems with wave optics for coherent and partially coherent sources. Day 3 is a code camp to develop new applications in OASYS and perform OASYS-related programming.

PROGRAMME

Day 1

This first session is dedicated to calculate the flux and power emitted by synchrotron sources and simulate the beamline elements with ray tracing.

- Source emission (flux and power) using XOPPY
- Ray tracing a beamline with ShadowOui

Day 2

This second day will be dedicated to simulate optical systems and also a beamline using wave optics methods

- Combining ray tracing and wave optics with the HYBRID method
- Describe simple systems showing interference and diffraction using WOFRY

- Simulating a complete beamline with SRW
- Introduce methods for partial coherence: Monte Carlo multi-electron analysis with COMSYL, and coherence mode decomposition with COMSYL.

Day 3

This third day will be a full-day code camp to learn how to create new OASYS widgets and add-ons. It will also serve as a platform to learn how to automatize tasks in making parametric calculations and to perform long runs using scripts that run in a cluster.

INSTRUCTORS

M. Sanchez del Rio (ESRF), Luca Rebuffi (APS) and Xianbo Shi (APS).