

Zgoubi Workshop Agenda

26 – 30 August 2019

Monday, 26 August — Introduction to Zgoubi

Talks: F. Méot, D. Abell, K. Hock / V. Ranjbar, D. Kelliher

Tutorial leaders: P. Moeller, D. Abell, K. Hock, D. Kelliher, C. Hernalsteens

Machines: Los Alamos PSR, AGS, eRHIC, Radial Sector FFA

Schedule for Monday

09:00 – 09:50 Talks Mo1 – Mo3
09:50 – 10:10 Coffee Break
10:10 – 10:30 Talk Mo4
10:30 – 11:00 Tutorial TutMo1
11:00 – 12:30 Tutorial TutMo2
12:30 – 13:30 Lunch (on your own)
13:30 – 14:30 Tutorial TutMo2 (cont.)
14:30 – 15:00 Coffee Break
15:00 – 17:30 Tutorial TutMo3

Mo1: *Overview of Zgoubi* — François Méot [20 min]

Mo2: *Los Alamos PSR for Code Benchmarking* — Dan Abell [15 min]

Mo3: *AGS Booster for eRHIC, BNL EIC* — Kiel Hock / Vahid Ranjbar [15 min]

Mo4: *FFA Renaissance* — David Kelliher [20 min]

TutMo1: *Introduction to Zgoubi using Sirepo* — Paul Moeller [30 min]

This tutorial provides a brief introduction to the Sirepo interface for Zgoubi.

TutMo2: *Intro to Zgoubi with the Los Alamos PSR* — Dan Abell & Kiel Hock

This tutorial is built around a simple machine: the ten-cell, 797 MeV Los Alamos PSR. The initial exercise illustrates the basic Zgoubi files for input and output, and it demonstrates how to choose an appropriate step size. The following two exercises introduce the standard linear and nonlinear analyses — including tune, chromaticity, and Twiss functions. In the final exercise, we add both spin and acceleration, and simulate the crossing of a spin resonance.

TutMo3: *FFA Tutorial* — David Kelliher & Cédric Hernalsteens

We simulate a 150 MeV, zero-chromaticity radial-sector FFA. This will include synchrocyclotron-like spiraling accelerated orbit, scaling lattice functions. If time allows, include multi-turn injection, and/or RF capture, and/or dynamic aperture computation.

Tuesday, 27 August — Electron Ion Colliders

Talks: B. Nash, V. Morozov, K. André

Tutorial leaders: F. Lin, B. Nash

Machines: JLEIC

Schedule for Tuesday

09:00 – 09:45 Talks Tu1 – Tu3
09:45 – 10:10 Coffee Break
10:10 – 12:30 Tutorial TutTu1
12:30 – 13:30 Poster Session and Lunch
13:30 – 15:00 Tutorial TutTu1 (cont.)
15:00 – 15:30 Coffee Break
15:30 – 17:30 Tutorial TutTu1 (cont.)

Tu1: *Physics of Electron Rings* — Boaz Nash [15 min]

Tu2: *Polarized Electrons in Designs for JLEIC* — Vasiliy Morozov [15 min]

Tu3: *LHeC Design* — Kevin André / Cédric Hernalsteens, [15 min]

TutTu1: *ESRF and JLEIC Electron Ring Simulations* — Fanglei Lin & Boaz Nash

This tutorial will include three exercises to study the simulation of synchrotron radiation (SR) and electron spin dynamics in Zgoubi. The first will focus on a single dipole magnet to explore the details of the Monte Carlo method. The second introduces the ESRF lattice and simulates the process of beam equilibration in the presence of SR. And the third exercise will simulate spin dynamics and polarization lifetime in the 12 GeV, figure-8, zero-spin-tune lattice for JLEIC.

Wednesday, 28 August — CBETA Energy Recovery Linac

Talks: N. Tsoupas

Tutorial leaders: F. Méot, N. Tsoupas

Machines: CBETA ERL

Schedule for Wednesday

09:00 – 09:20 Talks We1

09:20 – 09:45 Coffee break

09:45 – 12:00 Tutorial TutWe1

12:30 – __?__ Excursion to Rocky Mountain National Park (lunch on the bus)

We1: *Field Map Simulations for the CBETA Accelerator*— Nicholaos Tsoupas [20 min]

TutWe1: *CBETA ERL* — François Méot & Nicholaos Tsoupas

CBETA recirculates electron bunches to 150 MeV using a superconducting RF linac, FFA return arcs, four-line spreader and combiner sections, and energy recovery. A series of three exercises will introduce the students to the simulation of a four-pass ERL. These exercises showcase several of Zgoubi's strengths. It is also an opportunity to introduce accurate tracking in magnet field maps. The exercises build on the tutorials of the previous two days.

Thursday, 29 August — Electrostatic Devices in Zgoubi

Talks: L. Serani, F. Méot, D. Abell

Tutorial Leaders: L. Serani, F. Méot

Machines: Magneto-Electrostatic spectrometer, Wien filter spin rotator, *ExB* Nanoprobe

Schedule for Thursday

09:00 – 09:55 Talks Th1 – Th3
09:55 – 10:10 Coffee Break
10:10 – 12:30 Tutorial TutTh1
12:30 – 13:30 Lunch (on your own)
13:30 – 15:00 Tutorial TutTh2
15:00 – 15:30 Coffee Break
15:30 – 17:30 Tutorial TutTh3

Th1: *Electrostatic Spectrometers* — Laurent Serani [20 min]

Th2: *ExB Nanoprobe* — François Méot [20 min]

Th3: *Electrostatic Machines for pEDM* — Dan Abell [15 min]

TutTh1: *Magneto- and Electrostatic Mass Separator* — Laurent Serani

TutTh2: *Wien Filter, Fringe Fields* — François Méot & Laurent Serani

TutTh3: *ExB Nanoprobe* — François Méot

Simulate various machines/devices with electrostatic elements: an electrostatic ring, a combined *ExB* mass separator, a Wien filter spin rotator, and an *ExB* achromatic final focus system. Simulations for these devices will introduce workshop participants not only to additional element types in Zgoubi, but also to new types of analyses with Zgoubi.

Friday, 30 August — Future Developments for Zgoubi, Interfaces, and User Feedback

Talks: F. Méot (?), D. Abell (?), P. Moeller (?), D. Kelliher, C. Hernalsteens

Schedule for Friday

09:00 – 10:30 Presentations on Future Developments for Zgoubi

10:30 – 10:45 Coffee Break

10:45 – 11:45 Sirepo / Python Interface Discussion

11:45 – 12:15 Workshop Summary and User Feedback

12:15 Adjourn Workshop

Fr1: *The Future of Zgoubi* — François Méot & Dan Abell [15 min]

Fr2: *Future Directions for Sirepo Zgoubi* — Paul Moeller [15 min]

Fr3: *PyZgoubi* — David Kelliher [30 min]

Fr4: *Zgoubidoo* — Cédric Hernalsteens [30 min]