

Topic: FUSENET Mini - Workshop on Magnetically Confined Toroidal Plasma

Introduction

Faculty of Nuclear Sciences and Physical Engineering at the Czech Technical University in Prague offers five-days mini-workshop on plasma experiments at GOLEM tokamak. Aim of the workshop is

- to have hands-on experience of tokamak operation and learn its basic principles.
- to learn basic instrumentation related to tokamak operation and diagnostics.
- to provide working experience with an integrated tokamak facility, including planning of experiments, plasma control, data acquisition and processing commonly used in today's fusion plasma experiments, finalization and presentation of experimental results.

GOLEM offers following physics tasks for the workshop-

Task 1: (All students) Hands-On measurements of plasma parameters like loop voltage, plasma current, toroidal magnetic field, electron temperature

Task 2: (3 students) Study of runaway electrons in GOLEM tokamak- This task aims to introduce NaI(Tl) scintillator to participants and measure runaways using the scintillator. Followed by data processing and analysis.

Task 3: (3 students) Plasma position control by vertical stabilization- The goal of the task is to measure plasma position by magnetic diagnostics, understand the measurement method and control plasma position by vertical stabilization coils

Task 4: (3 students) Turbulence characterization with ion saturation current measured with Langmuir probes- The goal of the task is to analyze the distribution function of density (I_{sat}) fluctuations, i.e. describe the skew, kurtosis and exponential or power law tails and to relate the findings to theory.

Task 5: (3 students) Temperature measurement by ball-pen probe - Correction of radial electric field profile by electron temperature measured by ball-pen probe

Task 6: (3 students) Density measurements by microwave interferometer

Programme

For the preparation of data processing, 3-4 weeks before the workshop, all the participants will communicate with their respective supervisors about the data analysis, softwares and the routines to be used during the workshop

Day 1: 04/03/2018

Talks

1. Introduction to tokamaks and GOLEM tokamak (1 hour) - Dr. Vojtech Svoboda / RNDr. Jan Stockel
2. Diagnostics for fusion plasmas - Dr. Vojtech Svoboda / RNDr. Jan Stockel
3. Runaway electrons in tokamaks (their physics and recent results from GOLEM tokamak) () - Pravesh Dhyani
4. Physics of Langmuir probes/ ball-pen probe () - Ondrej Grover
5. Plasma position measurements and its stabilization (0.5hour) - Pravesh Dhyani
6. Density measurements by microwave interferometer (0.5hour) - Ondrej Grover

GOLEM Visit

1. Hands-On experience with tokamak operation and plasma control+ Data processing in GOLEM tokamak using MATLAB and python

Welcome Dinner

Day 2: 05 March 2018

Tasks based experiments and data analysis: Each group will be engaged with their respective tasks

Day 3: 06 March 2018

Tasks based experiments and data analysis: Each group will be engaged with their respective tasks

Social Dinner

Day 4: 07 March 2018

Morning- COMPASS visit

Afternoon- Preparation of presentation by participants

Day 5: 08 March 2018

Morning- Preparation of presentation by participants

Afternoon- Presentations by participants (20+5 minutes)

Closing workshop

What is offered to the student (activity, accommodation, meals)

Maximum 15 students can be accommodated in the workshop. This workshop offers an interactive course on fundamental and advanced toroidal plasma physics, which is suitable for undergraduate and post-graduate students. The course covers important aspects of experimental work on tokamaks, i.e., tokamak operation, plasma control, diagnostics and processing of experimental data.

We will support each participant with five nights + six days accommodation, five lunches and three dinners during the workshop. A support of 100czk (~ €4) per meal will be arranged for workshop participants. In addition to this, welcome dinner and social dinner will be arranged.

Top-level budget breakdown

Accommodation: ~2500 EUR

Meals including welcome dinner and social dinner: ~550-850 EUR

Nal(Tl) scintillation probe + PMT + amplifier: ~2000 EUR

Total budget including overheads. 6000 EUR