UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

COURSE SYLLABUS

Plasma Physics Laboratory II

2425-1-F1701Q132

Aims

The focus is on the plasma applications, both those involving gas discharges and those aimed to the controlled thermonuclear fusion.

The course aims to the learning of general ideas and experimental tecniques for the characterization of electrical discharges in gas mixtures and their use in material processing, as well as for the characterization of neutron and gamma detectors for fusion plasmas.

Contents

Plasmas produced in electrical discharges in gases.

Low pressure cold plasmas.

Radiofrequency plasmas.

Cold plasmas at atmospheric pressure.

Plasma diagnostics.

Plasma processing for material treatments.

Neutron detectors

Gamma detectors

Detailed program

The laboratory starts with an introduction on electrical discharges in gases,
on elementary processes in plasmas and on plasma processing of materials.
We also discuss nuclear fusion and the diagnostics aimed to the fusion products.

Experiments will be realized in small groups concerning, partially at student will, according to the available instrumentations and the number of students:

a) Characterization of a glow discharge
b) Characterization of a plasma produced by a radiofrequency antenna
c) Characterization of a DBD, Dielectric Barrier Discharge
d) Characterization of plasma-material interactions also with atomic physics methods.
e) Characterization of neutron and gamma detectors

Prerequisites

It is required to have attended to the Plasma Physics Laboratory I.

It is useful but not needed to have attended to general courses of Plasma Physics.

Maths and physics concepts given in the first-level degree.

Teaching form

Activities will be held in laboratory.
Introductory delivered in face-to-face delivery mode;
Laboratory activities delivered in face-to-face interactive mode.
Introductory lectures will be delivered in Italian.
Assistance during the laboratory experiments will be provided in Italian, or in English on request.

Laboratory: 72 hours (6 cfu)

Textbook and teaching resource

References:

Y.P.Raizer, Gas Discharge Physics, Springer-Verlag, 1991.
M.A. Lieberman and A.J. Lichtenberg, Principles of Plasma Discharges and Materials Processing, Wiley, 1994.
I.H. Hutchinson, Principles of Plasma Diagnostics, Cambridge University Press, 1990.

website: http://virgilio.mib.infn.it/labdida/doku.php?id=laboratorio_di_plasmi

Semester

First year, second semester

Assessment method

Oral (after the presentation of a written report of the experiments performed).

Questions concern the experiements preparation and the results of the measurements.

Evaluation focuses on expression precision, the awareness of the subject and the capability

to connect experimental results with basic plasma properties.

Mark range:

18-30/30

Office hours

During the year:

Book a meeting by email (ruggero.barni@unimib.it), at the teacher office (U2-3029, III floor) and/or the other teacher office (gabriele.croci@unimib.it, U2-3013, III piano).

Sustainable Development Goals

AFFORDABLE AND CLEAN ENERGY