

Laboratory project: experimental techniques in plasmas, nuclear physics and materials

Academic Year: (2019 / 2020)

Review date: 05-05-2020

Department assigned to the subject:

Coordinating teacher: CASTRO BERNAL, MARIA VANESSA DE

Type: Compulsory ECTS Credits : 6.0

Year : 1 Semester : 2

REQUIREMENTS (SUBJECTS THAT ARE ASSUMED TO BE KNOWN)

Basic knowledge of Atomic Physics, Electrodynamics, Material Science and Solid State Physics (graduate level).

OBJECTIVES

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- Development of laboratory projects related to plasma diagnostic (microwave-based apparatus, radiation spectroscopy and probes)
- Development of laboratory projects on nuclear physics (particle detectors characterization, total absorption gamma-ray spectroscopy)
- Development of laboratory projects on mechanical properties of materials and microstructure (tensile properties, plastic deformation and application of PAS in microstructure investigation)

DESCRIPTION OF CONTENTS: PROGRAMME

1. PLASMA DIAGNOSTICS. Interaction of lasers, microwave and infrared radiation, light atoms and heavy ions with plasmas: Thomson scattering, Laser induced fluorescence, reflectometry, interferometry, active charge-exchange spectroscopy and heavy ion beam probe diagnostics. VIS, VUV, soft and hard X-ray spectroscopies, electron cyclotron emission, magnetic and electrostatic probes. Measurement of fusion products.
2. NUCLEAR PHYSICS. Characteristics of detectors for alpha and gamma particles: Ionisation and scintillation detectors and photomultipliers. Neutron detectors. Signal transmission and electronics for pulse signal processing: amplifiers, analogical to digital converters.
3. MECHANICAL PROPERTIES. Structural Materials in Fusion Reactors. Mechanical Testing. Elastic Deformation. Materials Failure. Dislocations and Strengthening Mechanisms.

LEARNING ACTIVITIES AND METHODOLOGY

Laboratory sessions.

ASSESSMENT SYSTEM

Attendance to the laboratory sessions is compulsory. Evaluation of the reports.

% end-of-term-examination:	0
% of continuous assessment (assignments, laboratory, practicals...):	100

BASIC BIBLIOGRAPHY

- William Callister Fundamentals of Materials Science and Engineering, John Wiley & Sons.