

1. INTRODUCTION

This document describes the activities carried out in 2004 in the frame of the Contract of Associated Laboratory on Plasma Physics and Engineering, signed on November 23rd 2001 between “Instituto Superior Técnico” (IST) and “Fundação para a Ciência e a Tecnologia” (FCT). These activities are inserted in two thematic areas:

- Controlled Nuclear Fusion;
 - Technologies of Plasmas and High-Power Lasers,
- and have been performed by staff of two Research Units of IST:
- Centro de Fusão Nuclear (CFN);
 - Centro de Física dos Plasmas (CFP).

The CFN research staff has been organized in four scientific groups:

- Group of Experimental Physics (Head: Carlos Varandas);
- Group of Microwave Diagnostics (Head: Maria Emilia Manso);
- Group of Theory and Modelling (Head: Fernando Serra);
- Group of Control and Data Acquisition (Head: Jorge Sousa)

which carried out in 2004 the following projects¹:

- Tokamak ISTTOK (Figure 1.1);
- Participation in the Collective Use of the JET Facilities by the EFDA Associates;
- Participation in the ASDEX-UPGRADE Programme;
- Participation in the TJ-II Programme;
- Participation in the MAST Programme;
- Participation in the TCV Programme;
- Participation in the ITER Project (Figure 1.2);

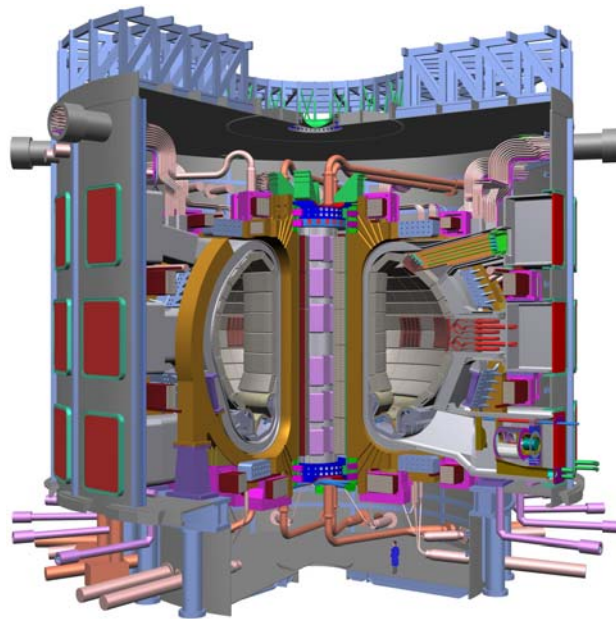


Figure 1.2 – The tokamak ITER

- Other Activities on Theory and Modeling;
- Other Activities on Control, Data Acquisition and Signal Processing.

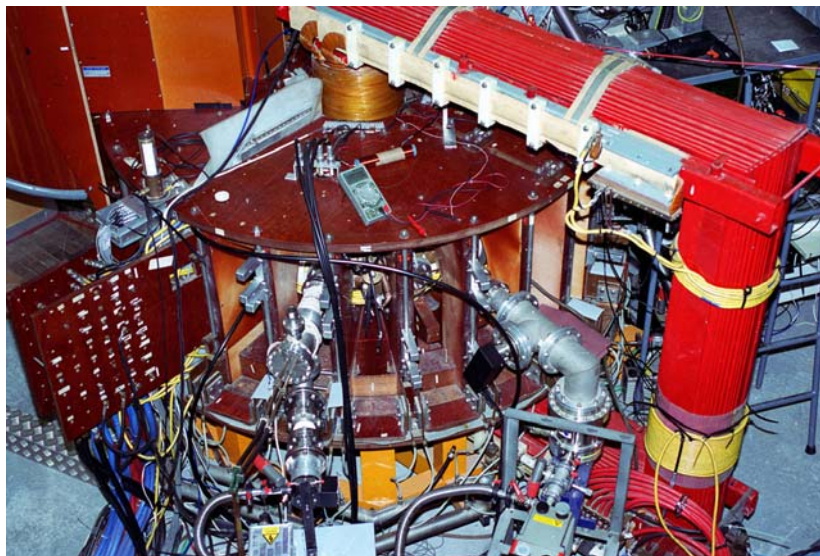


Figure 1.1 – The tokamak ISTTOK

¹ In the frame of the Contract of Association between the “European Atomic Energy Community” (EURATOM) and IST.

The CFP research staff has been organized in three scientific groups:

- Group of Lasers and Plasmas (Head: José Tito Mendonça);
- Group of Space Plasmas (Head: Armando Brinca);
- Group of Gas Discharges and Gaseous Electronics (Head: Carlos Matos Ferreira).

which performed activities in the following research lines:

- Ultra high power, ultra-short lasers² (Figure 1.3);
- Theory and simulation on extreme plasma physics²;
- Studies on complex and space plasmas;
- Space plasma physics
- Environmental Plasma Engineering (Figure 1.4);
- Modelling of plasma reactors.

The research and development activities carried out in the frame of these projects are described in detail in chapters 2 to 13, which also present the main scientific and technical results. Chapter 14 describes other activities and chapter 15 contains the list of publications.

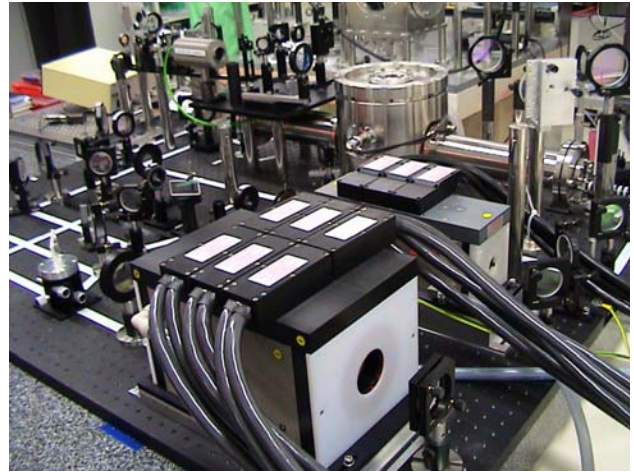


Figure 1.3 – Ultra-short laser system

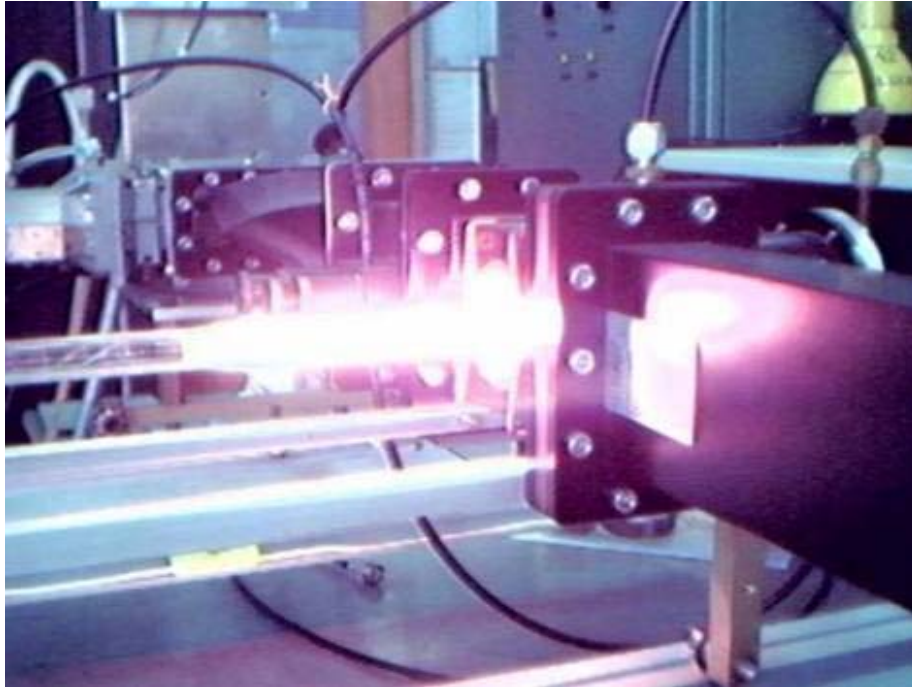


Figure 1.4 – Surface wave sustained discharge

²In the frame of the Contract of Association EURATOM/IST.