6.1 - Project name

Participation in the COMPASS programme

6.2 - Project team

Name	Degree	% participation
H. Fernandes	Doctorate researcher	5%
Jorge Sousa	Doctorate researcher	5%
Rui Gomes	Doctorate researcher	5%
Ivo Carvalho	Master degree researcher	30%
Daniel Valcárcel	Master degree researcher	20%
André Sancho Duarte	Master degree researcher	55%
Tiago Valeriano Pereira		10%
Bernardo Carvalho	Doctorate researcher	10%
Bruno Santos	Master's degree researcher	20%

6.3 - Summary and highlights of research achievementes

Provide a concise description of the main research achievements during the year.

Figures, tables, graphics etc must have captions.

Graphic files must be submitted separately from the text (i.e. not embedded), and have a resolution of at least 150 dpi.

6.3.1 Introduction

6.3.2 Control and data acquisition

6.3.2.1 Development of the COMPASS plasma controller and timing system

- *Development and test of control algorithms; commissioning.*
  Not done. The COMPASS tokamak was shutdown to install diagnostics just on the week the tests with plasma were supposed to begin. The machine did not yet recovered the operational conditions thus the real-time feedback tests were postponed.

- *New activity: model for the integrated control of equilibrium field power supply (EFPS) and the vertical field fast amplifier (FAv).*

  A model was developed for control optimization using the two vertical field power supplies on COMPASS: the equilibrium field power supply (EFPS) that is able to generate a strong vertical magnetic field with a slower rise time and the vertical field fast amplifier (FAv) that produces a weaker magnetic field with a faster rise time. The achieved solution generates a minimal current set-point on the fast amplifiers (Fav) to leave operational space for rapid responses when needed.

- *New activity: design and commissioning of the crowbar interruptions trigger board for the COMPASS fast amplifiers (FA) controller.*

  A board was developed to accommodate the immediate shutdown of the fast amplifiers in an event of a malfunction in the tokamak coils and the consequent firing of the corresponding crowbar. The code on the FA control board was updated to implement this interruption, shutting down the FA current for about 1 minute before being controllable again.

- *New activity: COMPASS Data Acquisition system maintenance.*
  The debugging of faults on the FireSignal Data Acquisition software was performed and is an ongoing task.

6.3.2.1 Machine control

The gas puffing controller was modified in order to meet the required specification regarding manual puffing of gas for wall conditionning at the beginning of a session or for inserted gas amount calibration. Additionally, the firmware of the controller was modified in order to avoid buffer overruns. Modifications on the front panel java application were also successfully implemented. The puffing system was tested and is completely operational.

6.3.3 - DIAGNOSTICS

Implementation and installation of a diagnostic for plasma rotation measurements:

The alignment and calibration of the spectrometer has been successfully performed. The alignment turned out to be much more difficult than expected since, during transport to Prague, the inner diffraction gratings were totally loose from their support implying a new alignment from root. The calibration has been performed. For that purpose it was necessary to measure the distance between too known, high intensity, spectral line from a Zn lamp (468 and 472 nm) and, afterwards, to extrapolate the position of the CIII spectral

line at 465 nm used in this diagnostic to measure the rotation velocity from Doppler shift. The inverse linear dispersion of the system has been measured to be close to 1.71 Angtrom/mm.

The spectrometer was moved from the dark room, where calibration had been done, to the tokamak hall. Alignment of the observation line path (input lens and two aligment mirrors) has been performed using a Helium-Neon laser. The unshifted (zero velocity) spectral line has been observed during tokamak discharge, with a iXon LS897 Andor camera (512x16 micro-m channels, up to 2 ms frame aquisition time), showing impressive S/N ratio signal (**Figure espectro**). This spectrum was aquired during a 15 ms COMPASS discharge.

Optics on the tangential (vertical) port has been installed aiming at measuring the shifted wavelength. No experimental results of the poloidal velocity were obtained due to unavailability of plasma operation.