

STUDY OF HEAT DEPOSITION ON THE FIRST WALL OF TCABR

In the modernization of the TCABR tokamak, it was necessary to improve the first wall of this equipment. For this improvement, the MHD model will be used, which will still be adapted for the specific objectives of this project. Basically, around the Strike Points (SPs), which are the points where the plasma interacts with the tokamak wall, it is necessary to study the heat flux profile and optimize it with computational assistance, in which the PSD code will be used in order to create a set of synthetic kinetic MHD equilibria. In addition, the heat flux in all Strike Points for various magnetic configurations will also be calculated, all this in order to guarantee the best operating condition of the tokamak.



TCABR WILL BE IMPORTANT FOR THE DEVELOPMENT OF NUCLEAR FUSION BECAUSE WITH IT WE WILL BE ABLE TO MORE EASILY STUDY CERTAIN CHARACTERISTICS OF THE PLASMA.

RESPONSIBLE: LUCAS PORTA
ADVISOR: GUSTAVO CANAL



JAS OPTICA

DEVELOPMENT OF AN ELECTRON SPECTROMETER FOR ENERGY CHARACTERIZATION OF LASER-ACCELERATED ELECTRON

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OBJECTIVE

This study focuses on the development and assembly of an electron spectrometer, which will be included in a laser electron acceleration system, to determine the kinetic energy of beams with a size of 100 μm.

LASER PARTICLE ACCELERATION

- The acceleration of electrons by ultrashort laser pulses was introduced in 1973 by Tajima and Dawson, who proposed to accelerate electrons by quickly modulating the charge of a plasma channel by the laser.
- When ultra-short pulses are focused on a gas target, ionization of atoms occurs and the ponderomotive force expels electrons from the laser area, generating waves of charge density.
- In high charge gradient regions, the electrons are trapped and accelerated in the wake of the pulse, in a process called laser wakefield acceleration (LWFA).

ELECTRON SPECTROMETER

To determine the electron energy spectrum, a Thomson spectrometer is used. In its simplest form, the grid of spectrometer is composed by a region with constant magnetic field, with its field lines orthogonal to the direction of the electron propagation, and a collector.

ELECTRON PROPAGATION

Measurement of the frequency of cyclotron radiation in uniform magnetic fields to determine the geometric necessity for the geometry of the spectrometer.

OPTICAL SYSTEM

An optical system will be developed to create an image of LWFA emission, which efficiently emits green light around 532 nm, that will be used as a reference element, as an external EEB, and this system will include optical filtration of the stronger LWFA emission to minimize noise generated by other light sources.

RESULTS

The resolution of the spectrum of electron of charged particles in uniform magnetic fields was used to determine an algorithm for efficient energy ranges of electron.

ELECTRON SPECTROMETER

To be suitable of solution for the electron detection has been obtained which allowed the development of the resolution of electron for charged particles in uniform magnetic fields, considering the magnetic situation.

With the definition of new geometry to use the spectrometer and resolution to determine the magnetic field and the magnetic field to capture the first energy range and also the energy characteristic of the electron.

Equation: $E_e = \gamma m_e c^2$