

**Tipo di tesi:** Triennale

**Corso di Laurea:** Fisica/Ingegneria

**Tipologia:** Sperimentale

**Titolo della tesi:** Identification of the ion-ion plasma transition in SPIDER

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**Responsabile di Programma:**

**Argomento della tesi:**

Negative hydrogen Neutral Beam Injectors (NBIs) are the workhorses of future fusion reactors, such as ITER, where they are foreseen to deliver up to 33MW of power to heat the fusion plasma. The negative hydrogen ions are extracted from a RF plasma. The production of negative ions is ensured by the presence of a magnetic filter field, which cools down the electrons in the so called extraction region and allows the formation of negative ions. To further improve the production of negative ions, cesium is usually evaporated inside the source and deposited on the plasma walls, reducing the work function of the surfaces. This drastically increases the density of negative hydrogen ions near the surfaces, causing the formation of an ion-ion plasma.

SPIDER, the prototype ion source of ITER NBIs, is equipped with a set of 66 Langmuir probes, embedded in the plasma grid and bias plate electrodes in the expansion region. These sensors were extensively used during the last SPIDER campaigns with the injection of cesium, and a reduction of the electron saturation current was observed, indicating the emergence of a nearly ion-ion plasma regime. The aim of the thesis is to analyze the experimental data collected during the campaign, and develop a model to interpret the measurements.

**Competenze richieste (se necessarie):**

**Data della proposta:**

**Stato:** (assegnata/non assegnata)

**Laureando/a:** (quando sarà assegnata)