

**Cycle of studies:** Master LM

**Degree course:** Energy engineering

**Title of the thesis:** High-frequency modelling of the Acceleration Grid Power Supply of SPIDER experiment

**Type:** Modelling

**RFX Supervisor:** A. Ferro

**Academic supervisor:** P. Bettini

**Head of the RFX research group:** E. Gaio

**Leader of the RFX research program:** V. Toigo

**Description of the thesis:**

SPIDER is the test-bed of the negative ion beam source of the ITER Heating Neutral Beam Injectors (NBI). The Acceleration Grid Power Supply (AGPS) provides negative dc voltages up to -96 kV to the SPIDER acceleration grids, and dc currents up to 75 A. Frequent arc breakdowns occur between the acceleration grids, due to the short gap required by the beam optics. They represent short-circuits at the AGPS output, which cause voltage collapse and high frequency voltage and current oscillations, which stress the AGPS and the other items connected at the same potential. A thesis is proposed, aiming at studying the propagation of these voltage transients along the AGPS output cable, and the voltage fluctuations occurring on the AGPS. The work includes the development of a high-frequency model of the AGPS components, considering the stray inductances and capacitances, estimated analytically, from test reports or through measurements on the field. The results of the model will be compared with the available measurements to provide a first validation, and will give useful inputs to define possible improvements of the plant.

**Previous experience (if necessary):**

**Date:** 22/11/2021

**Status:** Available

**Name of the student:**