

Magistrale Fisica - Master Thesis in Physics**Thesis type:** Experimental/modelling**Thesis title:** Diagnostic of fusion plasmas by Thomson scattering of laser light**Academic supervisor:** Leonardo Giudicotti**RFX supervisor:** Roberto Pasqualotto**Group Leader:** Paolo Innocente

Thesis abstract: Thomson scattering (TS) of laser light is a well known diagnostic technique for the measurement of spatial profiles of electron temperature T_e and electron density n_e in fusion plasmas. For the new Italian experiment DTT a TS system based on the LIDAR approach is being considered. In LIDAR TS, a laser pulse with time duration of ~ 150 ns (corresponding to a spatial extension of ~ 4.5 cm) is sent into the plasma and observed from the back. The spatial profile of T_e and n_e is determined measuring the time evolution of the scattering light. This technique poses considerable experimental challenges and requires the most advanced solutions in terms of laser and optics technology. In the framework of this activity the student will first achieve a general knowledge in TS diagnostics, by developing advanced modelling techniques of TS systems and working on the integration of state-of-the-art lasers, detectors and high speed digitizers in the diagnostic. In addition she/he will be involved in extensive laboratory tests for the complete characterization of TS components such as very high speed MCP-PMT detectors, very high speed digitizers and filter polychromators.

Submission Date: 10/10/2020**Status:** available**Previous knowledge:** Basic plasma physics and programming. Knowledge of laser and solid state physics are welcome but not mandatory.