

**XXIst International School on
Low Temperature Plasma Physics: Basics and Applications**

Experimental Workshop

How to get plasma parameters? From theory to reality.

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Many aspects of plasma diagnostics are going to be addressed during the School, underlining the suitability and usefulness of each method to get insight into one or another plasma parameter such as density, temperature, velocity, energy distribution function of different species. However, things may be slightly different when one faces the actual plasma and real experimental tools, and questions often arise: how does it work? What has to be taken care of? Are all the required conditions fulfilled to get reliable results? Etc...

The objective of this experimental workshop is to shed light on some difficulties and pitfalls that may be encountered when using plasma diagnostics tools. Real examples are going to be experienced using a DC plasma reactor. Two (maybe three) investigation tools will be implemented:

- Tunable laser absorption spectroscopy to determine the Ar (3P_2) metastable state density. Besides the presentation and fine description of all parts of the experiment, attention will be paid to the optical alignment, the optical saturation effect, the sensitivity to ambient temperature and various possible traps. Measurements will focus on the changes in the plasma, and therefore in the Ar (3P_2) concentration, with experimental conditions like the gas pressure, discharge current, gas mixture composition.
- Microwave interferometry to probe the electron density. Here also, various plasma conditions will be investigated. In those cases, the focus will be on the plasma dimensions (what is the length of the plasma? How does it change with plasma conditions?)
- Langmuir probe (provisional) is the tool most commonly used in un-magnetized low-pressure plasmas to measure the electron parameters. Measurements of the electron density and temperature and of the electron energy distribution function (eedf) will be carried out.

A brief reminding of those diagnostics methods will be given first, together with the underlying hypothesis and applicability range of each method. Attendees will be given the opportunity to do measurements by themselves to pinpoint the tricks and difficulties. In some cases, the quantities measured will be used to interact with the modelling workshop.

The workshop is limited to 10 students, preferable in the first year of a PhD thesis.