



GEMaC

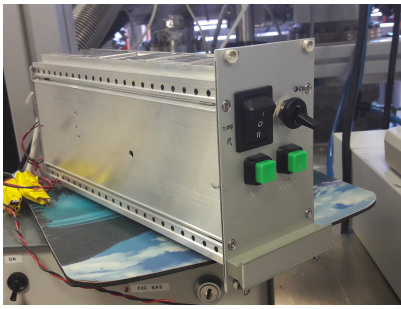
Groupe d'Étude de la Matière Condensée

INSTRUMENTATION SERVICE

The INSTRU service provides a technical support in scientific instrumentation to any team that could need some. An important part of our activities is to maintain and develop new functionalities for the computer programs used to control the experimental setups. This concerns in particular the growth reactors of NSP, DIAM and FOX teams, the transport measurement setups as well as the optical measurements of OEN team.

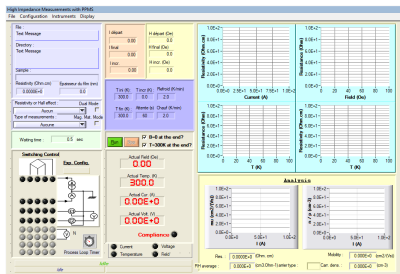
A few examples of INSTRU realisations:

Fabrication of electronic equipment, such as a temperature controller and a controller for the PLD growth reactor of the FOX team.



Controller for the PLD growth reactor for the positioners of the target carriers and the control of the power laser

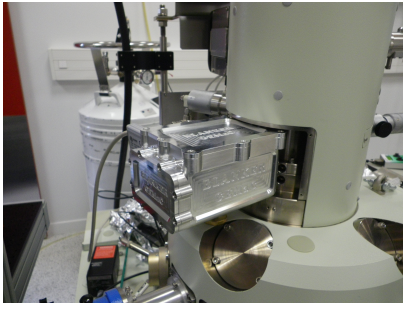
The development of a program that interfaces the physical property measurement system (PPMS) of the FOX team and a KEITHLEY 4200-SCS parameter analyser. This program allows to perform resistivity and Hall measurements in Van der Pauw configuration on very resistive samples ($>1\text{ G}$) while controlling the temperature (1.9 to 400 K) and the magnetic field (0 to 9 T).



Interface of the PPMS control software and of the Keithley 4200-SCS parameter analyser, allowing measurement of Hall voltages.

Conception and implementation of a time-resolved cathodoluminescence setup (TRCL): the principle is to locally excite the samples with a SEM electron beam. The electron beam is quickly shut down in order to switch off the excitation, and the arrival times of the photons emitted by the sample are measured. Thus the TRCL allows to study the transfer mechanisms of the injected carriers in heterostructures, to investigate the processes occurring at the interfaces, or to estimate the radiative and non-radiative transition rates in the materials synthesised in GEMaC.

The instrumentation service has developed the detection chain allowing to measure the luminescence emitted as a function of time, and has designed –in collaboration with the mechanical workshop– the equipment allowing to rapidly shut down the electron beam (see picture below). The time resolution of the bench is 100 ps and the detection system is sensitive to single photons in the UV-visible wavelength range.



Equipment developed by the INSTRU service and the mechanical workshop, allowing to rapidly deviate the electron beam out of the samples for time-resolved cathodoluminescence measurements.