



SAPIENZA
UNIVERSITÀ DI ROMA

Description
of the graphical
user interface



GUI – Graphical User Interface

- The GUI panel is characterized by several different windows dedicated to the control of the remote ellipsometer and to data flow



GUI – Graphical User Interface

Status Window displays the status, the residual time available, the number of users queuing and permits to choose the language

Status Window Displays the status, the residual time available, the number of users queuing and permits to choose the language



GUI – Graphical User Interface

Status Wait **Residual Time** Queued Users
Language English **Server** -1

Execute Experiment **Stop Experiment**

Poincare Sphere **Scattering**
Malus Law Phase retardation Reflectance Transmittance **Ellipsometry**

Fixed Parameters

Input Pol Angle [°]	45
Output Pol Angle [°]	-45

Control Parameters

Start Inc / Det Angle [°]	30
Final Inc / Det Angle [°]	60
Number of Steps	300
Start Phase Shift [°]	0
End Phase Shift [°]	360
Number of Steps	120

Sample
Gold Coated Prism

Sample Gold Coated Prism

Current Parameters

Incidence Angle [°]	49.8
Detection Angle [°]	49.8
Input Pol Angle [°]	-45
Output Pol Angle [°]	45
Phase Shift [°]	-11.937

Input EM Field

Three plots showing the electric field components E_x and E_y and the propagation direction z for different polarization states.

2D Map

Heatmap showing Intensity vs. Phase [°] and Angle [°].

GEP - Generic Elliptical Polarization

Plot showing the elliptical polarization state in the E_x - E_y plane. Legend: Output Polarizer (red), Input Polarizer (green), Polarization after Phase Shift (blue).

Experimental Data Plot

Plot of Intensity [arb.un.] vs. Phase [°]. The curve shows a sinusoidal oscillation.

Video - Decrease BIN for a better image (more bandwidth)
Cam ID 0 Bin 4

Execute Window Permits to launch and stop the measurement and displays a progression percentage bar



GUI – Graphical User Interface

Status: Wait Residual Time: Queued Users
Language: English Server: -1

Execute Experiment Stop Experiment

Poincaré Sphere Scattering

Malus Law Phase retardation Reflectance Transmittance **Ellipsometry**

Control Parameters

Fixed Parameters	Control Parameters
Start Inc / Det Angle [°]	30
Input Pol Angle [°]	45
Output Pol Angle [°]	-45
Number of Steps	300
Start Phase Shift [°]	0
End Phase Shift [°]	360
Number of Steps	120

Sample: Gold Coated Prism

Current Parameters

Incidence Angle [°]	49.8
Detection Angle [°]	49.8
Input Pol Angle [°]	-45
Output Pol Angle [°]	45
Phase Shift [°]	-11.937

Download the experimental data at
<https://remotelab.ing2.uniroma1.it/~ellipsometer/>

Video - Decrease BIN for a better image (more bandwidth) Cam ID: 0 Bin: 4

Input EM Field

2D Map

GEP - Generic Elliptical Polarization

Experimental Data Plot

Operation Mode Window Permits to chose a specific operation mode and to input values of the parameters that can be controlled by the user



GUI – Graphical User Interface

Status: Wait Residual Time: Queued Users
Language: English Server: -1

Execute Experiment Stop Experiment

Poincaré Sphere Scattering
Malus Law Phase retardation Reflectance Transmittance Ellipsometry

Control Parameters

Fixed Parameters	Control Parameters
Start Inc / Det Angle [°]	30
Input Pol Angle [°]	45
Output Pol Angle [°]	-45
Sample	Gold Coated Prism
Start Phase Shift [°]	0
End Phase Shift [°]	360
Number of Steps	120

Current Parameters

Incidence Angle [°]	49.8
Detection Angle [°]	49.8
Input Pol Angle [°]	-45
Output Pol Angle [°]	45
Phase Shift [°]	-11.937

Input EM Field

2D Map

Download the experimental data at
<https://remotelab.ing2.uniroma1.it/~ellipsometer/>

Sample Gold Coated Prism

Experimental Data Plot

Setup Window Sketch of the optical layout and address of the remote directory where data can be downloaded by ftp by the user



GUI – Graphical User Interface

Status: Wait Residual Time: Queued Users
Language: English Server: -1

Execute Experiment Stop Experiment

Poincaré Sphere Scattering
Malus Law Phase retardation Reflectance Transmittance Ellipsometry

Fixed Parameters	
Input Pol Angle [°]	45
Output Pol Angle [°]	-45

Control Parameters	
Start Inc / Det Angle [°]	30
Final Inc / Det Angle [°]	60
Number of Steps	300
Start Phase Shift [°]	0
End Phase Shift [°]	360
Number of Steps	120

Sample: Gold Coated Prism

Current Parameters	
Incidence Angle [°]	49.8
Detection Angle [°]	49.8
Input Pol Angle [°]	-45
Output Pol Angle [°]	45
Phase Shift [°]	-11.937

Download the experimental data at
<https://remotelab.ing2.uniroma1.it/~ellipsometer/>

Video - Decrease BIN for a better image (more bandwidth) Cam ID: 0 Bin: 4

Input EM Field

2D Map

Experimental Data Plot

Output Polarizer Input Polarizer Polarization after Phase Shift

Parameters Window Shows the values of the control parameters during a measurement



GUI – Graphical User Interface

Status Wait **Residual Time** Queued Users
Language English **Server** -1

Execute Experiment **Stop Experiment**

Poincaré Sphere **Scattering**
Malus Law Phase retardation Reflectance Transmittance **Ellipsometry**

Fixed Parameters
Input Pol Angle [°] 45
Output Pol Angle [°] -45

Control Parameters
Start Inc / Det Angle [°] 30
Final Inc / Det Angle [°] 60
Number of Steps 300
Start Phase Shift [°] 0
End Phase Shift [°] 360
Number of Steps 120

Sample
Gold Coated Prism

Current Parameters
Incidence Angle [°] 49.8
Detection Angle [°] 49.8
Input Pol Angle [°] -45
Output Pol Angle [°] 45
Phase Shift [°] -11.937

Download the experimental data at
<https://remotelab.ing2.uniroma1.it/~ellipsometer/>

Video - Decrease BIN for a better image (more bandwidth) Cam ID 0 Bin 4

Input EM Field
Three plots showing the electric field components (Ey, Ex) and propagation direction (z) for different polarization states.

2D Map
Heatmap of Intensity vs. Phase [°] and Angle [°].

GEP - Generic Elliptical Polarization
Plot showing the elliptical polarization state with axes for Output Polarizer, Input Polarizer, and Polarization after Phase Shift.

Experimental Data Plot
Intensity [arb.un.] vs. Phase [°] showing a sinusoidal curve.

Camera Window Shows the real time conditions of the remote ellipsometer and permit to change binning to face bandwidth limitations



GUI – Graphical User Interface

Status: Wait Residual Time: Queued Users
Language: English Server: -1

Execute Experiment Stop Experiment

Poincaré Sphere Scattering
Malus Law Phase retardation Reflectance Transmittance Ellipsometry

Control Parameters

Fixed Parameters	Control Parameters
Start Inc / Det Angle [°]	30
Input Pol Angle [°]	45
Output Pol Angle [°]	-45
Number of Steps	300
Start Phase Shift [°]	0
End Phase Shift [°]	360
Number of Steps	120

Sample: Gold Coated Prism

Current Parameters

Incidence Angle [°]	49.8
Detection Angle [°]	49.8
Input Pol Angle [°]	-45
Output Pol Angle [°]	45
Phase Shift [°]	-11.3

Download the experimental data at
<https://remotelab.ing2.uniroma1.it/~ellipsometer/>

Video - Decrease BIN for a better image (more bandwidth) Cam ID: 0 Bin: 4

Input EM Field

2D Map

GEP - Generic Elliptical Polarization

Experimental Data Plot

Plot Window Shows the real time plot of the experimental measurement in the operation mode chosen by the user



GUI – Graphical User Interface

Status: Wait Residual Time: Queued Users
Language: English Server: -1

Execute Experiment Stop Experiment

Poincaré Sphere Scattering
Malus Law Phase retardation Reflectance Transmittance Ellipsometry

Fixed Parameters

Input Pol Angle [°]	45
Output Pol Angle [°]	-45

Sample: Gold Coated Prism

Control Parameters

Start Inc / Det Angle [°]	30
Final Inc / Det Angle [°]	60
Number of Steps	300
Start Phase Shift [°]	0
End Phase Shift [°]	360
Number of Steps	120

Download the experimental data at
<https://remotelab.ing2.uniroma1.it/~ellipsometer/>

Sample: Gold Coated Prism

Current Parameters

Incidence Angle [°]	49.8
Detection Angle [°]	49.8
Input Pol Angle [°]	-45
Output Pol Angle [°]	45
Phase Shift [°]	-11.937

Video - Decrease BIN for a better image (more bandwidth) Cam ID: 0 Bin: 4

Input EM Field

2D Map

GEP - Generic Elliptical Polarization

Output Polarizer (red arrow)
Input Polarizer (green arrow)
Polarization after Phase Shift (blue arrow)

Experimental Data Plot

Polarization Window Shows the real time polarization state after the **input polarizer**, after the **LCR** cell and after the **analyzer**



GUI – Graphical User Interface

Status: Wait Residual Time: Queued Users
Language: English Server: -1

Execute Experiment Stop Experiment

Poincaré Sphere Scattering
Malus Law Phase retardation Reflectance Transmittance Ellipsometry

Control Parameters

Fixed Parameters	Control Parameters
Start Inc / Det Angle [°] 30	Input Pol Angle [°] 45
Final Inc / Det Angle [°] 60	Output Pol Angle [°] -45
Number of Steps 300	Sample Gold Coated Prism
Start Phase Shift [°] 0	Incidence Angle [°] 49.8
End Phase Shift [°] 360	Detection Angle [°] 49.8
Number of Steps 120	Input Pol Angle [°] -45
	Output Pol Angle [°] 45
	Phase Shift [°] -11.937

Download the experimental data at
<https://remotelab.ing2.uniroma1.it/~ellipsometer/>

Video - Decrease BIN for a better image (more bandwidth) Cam ID: 0 Bin: 4

Sample: Gold Coated Prism

Current Parameters

Incidence Angle [°]	49.8
Detection Angle [°]	49.8
Input Pol Angle [°]	-45
Output Pol Angle [°]	45
Phase Shift [°]	-11.937

Experimental Data Plot

Fields Window Shows a simulation of the electromagnetic field illuminating the sample (after the LCR cell)



GUI – Graphical User Interface

GUI – Graphical User Interface

Language: English | **Server:** -1

Execute Experiment | **Stop Experiment**

Malus Law | **Phase retardation** | **Reflectance** | **Transmittance** | **Ellipsometry**

Poincaré Sphere | **Scattering**

Fixed Parameters: Incidence Angle [°] 30, Detection Angle [°] 150

Control Parameters: Input Pol Angle [°] 45, Output Pol Angle [°] 90, Phase [°] 180

Sample: Empty

Current Parameters: Incidence Angle [°] 30, Detection Angle [°] 150, Input Pol Angle [°] 45, Output Pol Angle [°] 90, Phase Shift [°] 180.039

Input EM Field: Ey, Prop Direction z

Poincaré Sphere: y, z, x

Diagram: Laser, Polarizer (Pol_In), LCR, Sample, Polarizer (Pol_Out), Detector

Image (more bandwidth): Cam ID 0, Bin 4

Experimental Data Plot: Intensity [arb.un.] vs Point n°

L-45P - Linear - 45 deg Polarization: Output Polarizer, Input Polarizer, Polarization after Phase Shift

Point n°	Intensity [arb.un.]
0	0.0
1	0.05
2	0.1
3	0.2
4	0.45
5	0.7
6	0.7
7	0.7
8	0.7
9	0.7
10	0.7
11	0.7
12	0.7
13	0.9
14	1.2
15	1.5
16	1.8
17	1.8
18	1.8
19	1.8
20	1.8
21	1.8
22	1.8

Poncaré Window Shows projections of the Poincaré sphere and the state after the **input polarizer**, after the LCR cell and after the **analyzer**



GUI – Graphical User Interface

Status: Wait Residual Time: Queued Users
Language: English Server: -1

Execute Experiment Stop Experiment

Poincaré Sphere Scattering
Malus Law Phase retardation Reflectance Transmittance Ellipsometry

Fixed Parameters

Input Pol Angle [°]	45
Output Pol Angle [°]	-45

Sample: Gold Coated Prism

Control Parameters

Start Inc / Det Angle [°]	30
Final Inc / Det Angle [°]	60
Number of Steps	300
Start Phase Shift [°]	0
End Phase Shift [°]	360
Number of Steps	120

Current Parameters

Incidence Angle [°]	49.8
Detection Angle [°]	49.8
Input Pol Angle [°]	-45
Output Pol Angle [°]	45
Phase Shift [°]	-11.937

Download the experimental data at
<https://remotelab.ing2.uniroma1.it/~ellipsometer/>

Video - Decrease BIN for a better image (more bandwidth) Cam ID: 0 Bin: 4

Sample: Gold Coated Prism

Input EM Field

Experimental Data Plot

2D Map

GEP - Generic Elliptical Polarization

Output Polarizer (red arrow)
Input Polarizer (green arrow)
Polarization after Phase Shift (blue arrow)

Map Window Shows a map of the experimental values for those experiments in which two control parameters are changed