



**Ministry of Higher Education & Scientific
Research of Libya**

**Brief on:
The Libyan Center for Solar Energy
research and Studies**

Contents

- About the CSERS
- Laboratories and Facility
 - Solar Thermal
 - Photovoltaic
 - Other calibration facilities

About the CSERS

- Established in 1978, as an affiliation to the Ministry of Higher Education & Scientific Research.
- Main Departments:
 - Thermal Conversion Dept.
 - Photovoltaics Conversion Dept.
 - Energy Recourses Dept.
 - Energy Efficiency Office
- No. of Employee: 186
- The total area of the CSERS : 7 Hectares



Main Goals

- **Transfer RE research from abstract research to applications.**
- to keep close contact with international scientific research pace in RE field.
- Adaptation of RE technologies for the local environment, resources and improve their performance.
- **Develop and implement positive plans for the utilization of RE technologies in a wide scope.**
- Participation in establishing industrial base for local manufacturing of RE systems.
- **create qualified technical personnel in the field of RE.**
- provide technical consultancy in the field of RE systems utilization.

Laboratories and Facilities



About the CSERS

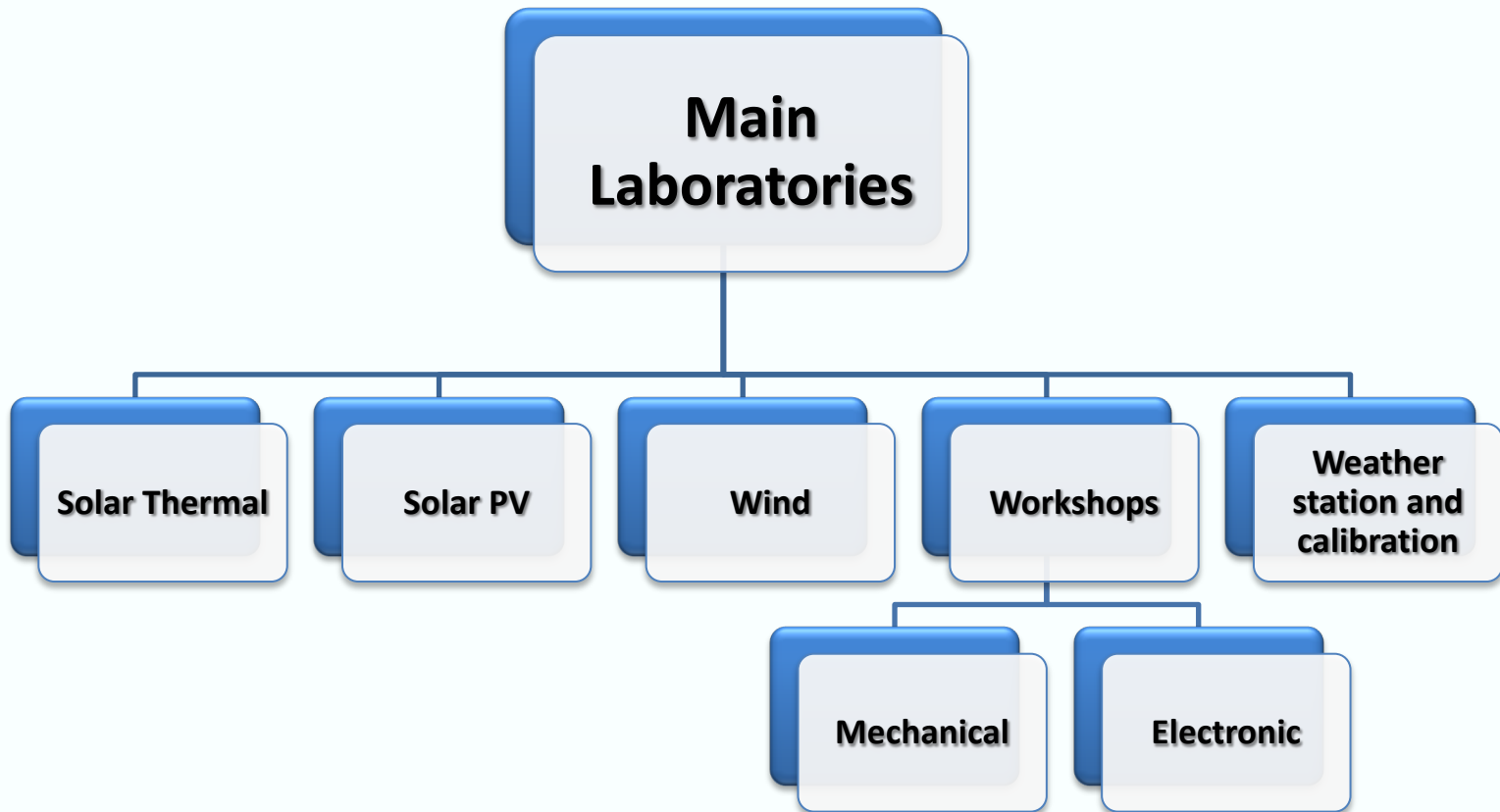
CSERS Facilities

Applications

Projects

Cooperation

Research Capabilities:



Thermal Conversion Capabilities:

TCD Test facility

Collector performance

- **Thermal performance**
- **Incident Angle Modifier (IAM)**
- **Pressure drop**
(indoor outdoor Testes)

Storage Tank Test Facility

- **Overall heat loss**
- **Heat-exchange heat transfer rate**
- **Pressure test**
- **Nominal size**

Collector Qualifications Tests

- **Internal-external thermal shock**
- **Internal pressure**
- **Rain penetration**
- **Impact test**

SWH Test Facility

- **Performance test**

Thermal Energy Systems Test Facilities



← Sun Simulator



← Infra-Red Camera



← Collector rain penetration Test



Temperature Calibration Facility

Thermal Energy Systems Test Facilities

Thermal Storage Tank Test Facility



Solar Water heating Systems Test Facility

Other Testing Facilities

Climatic Chamber



Wind tunnel



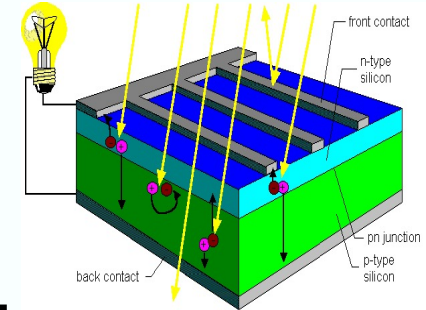
UV Radiation Chamber



PV Capabilities:



**PV
Lab s.**



**PV System &
Components
(Mod. Inv. Batt,...)**

**Silicon-based Solar
cells, wafers, ...**

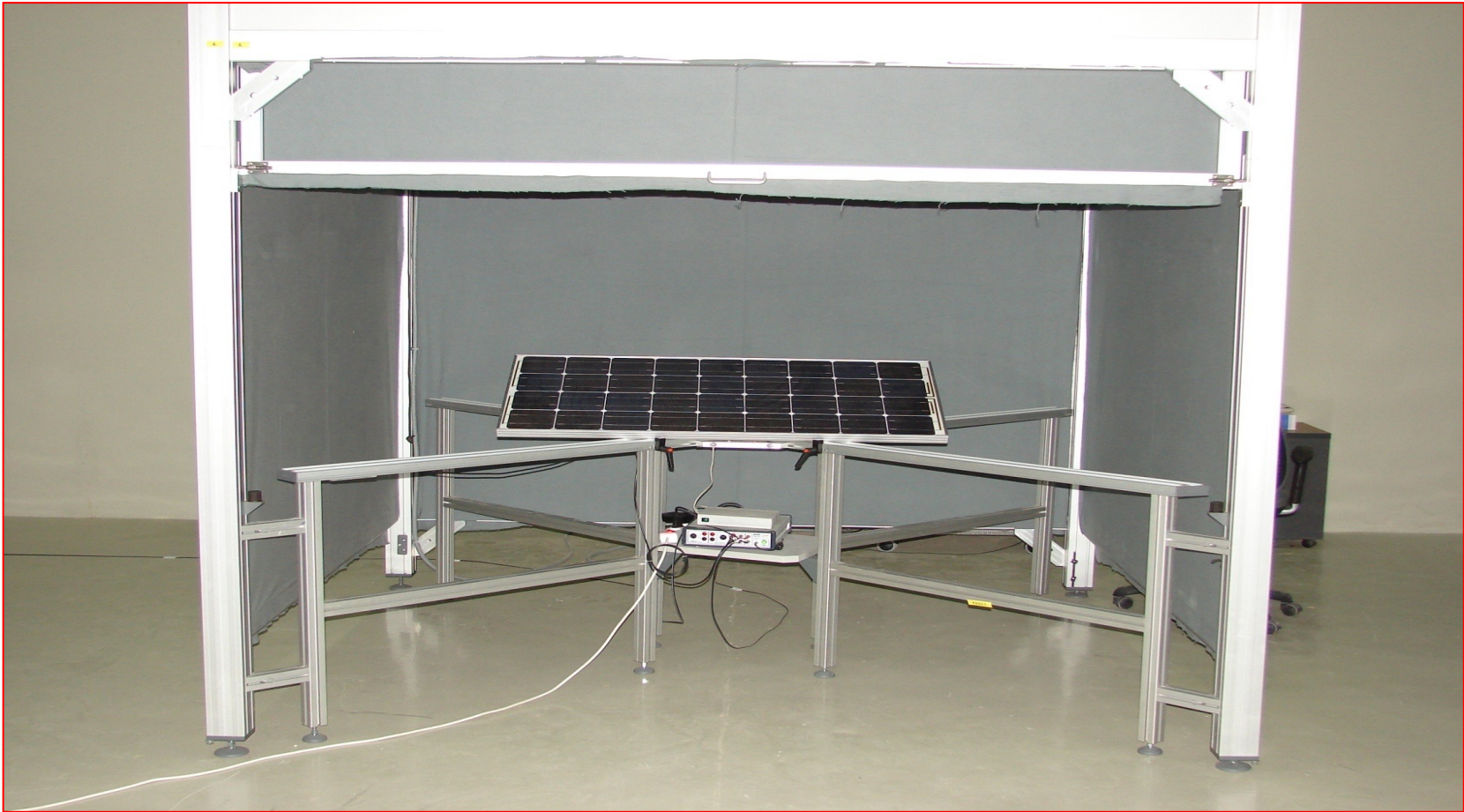
**Indoor
Testing**

**Outdoor
Testing**

**Optical
Parameters
testing
Laboratory**

**Electrical
& Physical
Parameters
Testing**

PV module testing



About the CSERS

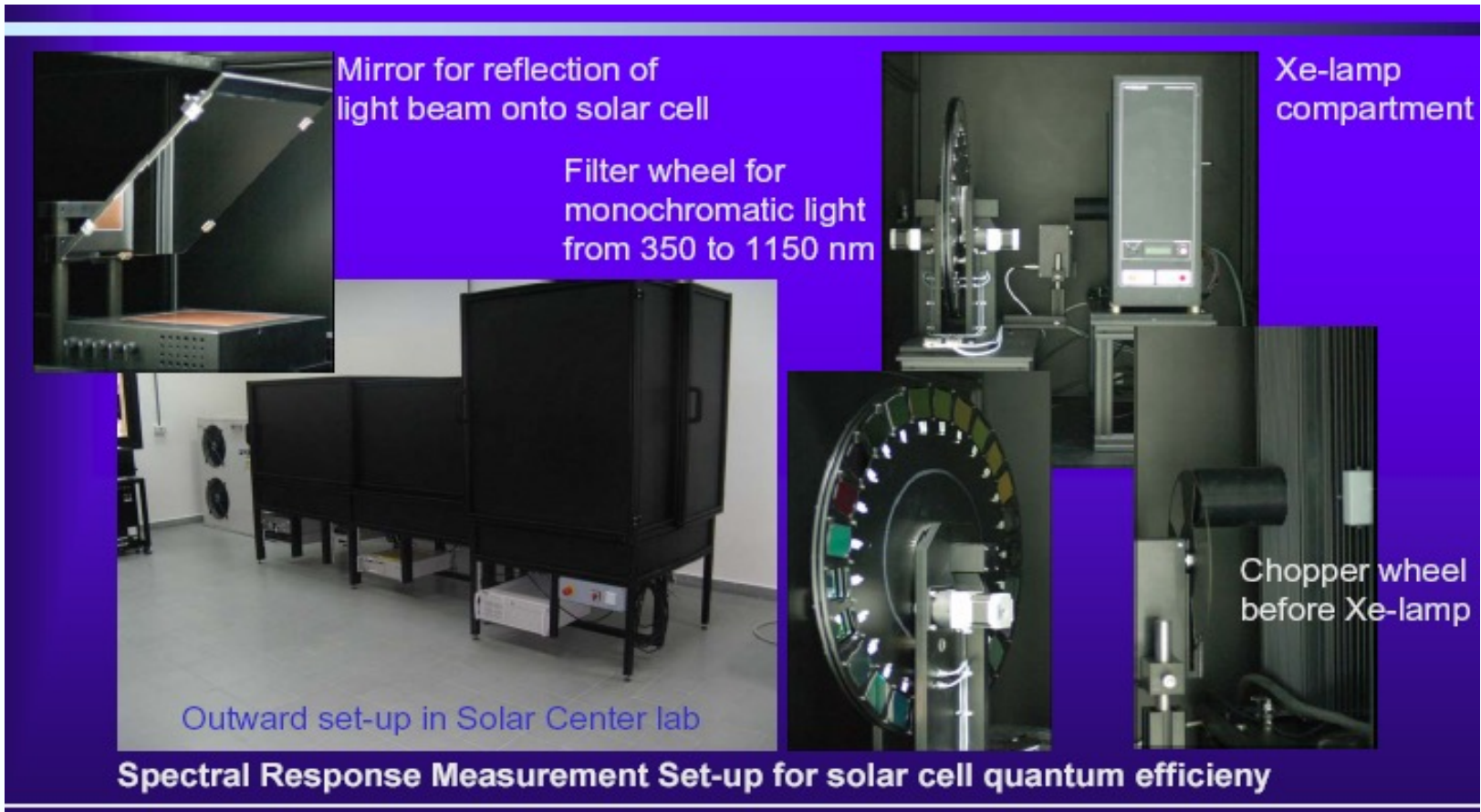
CSERS Facilities

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Spectral response meas. Set-up to measure quantum efficiency for silicon based solar cells



PV capabilities

semiconductors and solar cell characterization



Combined Ellipsometer &
Reflectometer

X-Ray Diffractometer

Hall Effect Measurement
Set-up

Multi-position Four-point
Resistivity Probe

Alpha-step system

C-V measurement system

Microscopes (optical ,
fringe)

SAMPLES

Outdoor testing for PV modules



Thank You for your attention

Introduction

Solar Water Heating
Tech

Solar Water Heating
Application

CSERS Facilities

CSERS Projects