



الهيئة السعودية للمواصفات والمقاييس والجودة
Saudi Standards, Metrology and Quality Org.

PHOTOMETRY & RADIOMETRY in SASO

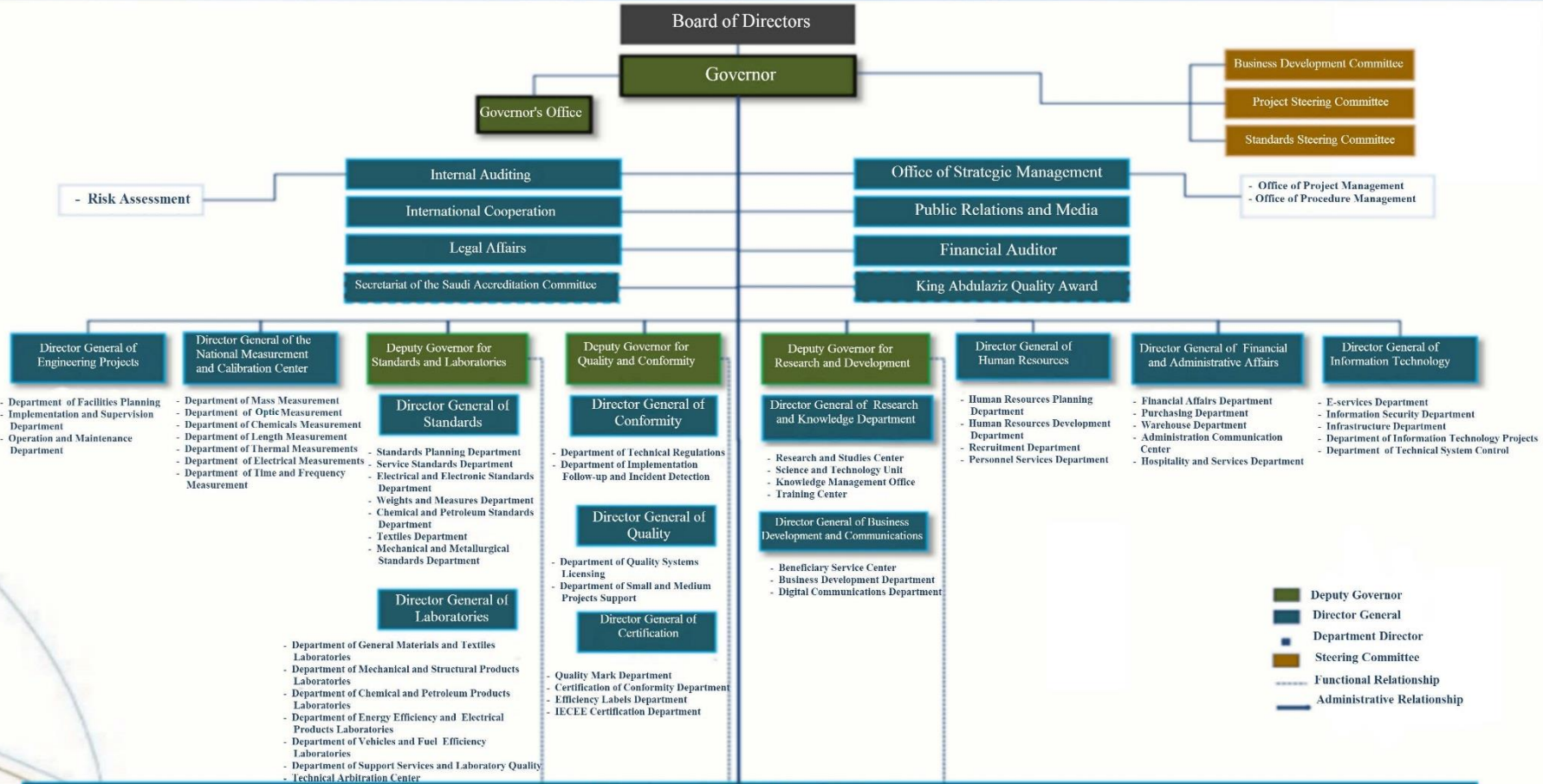
SASO/NMCC OPTICS MEASUREMENT DEPT.

Progress Report to CCPR

by

Mohammad Z. AlFohaid

23rd meeting, 22~23rd September 2016



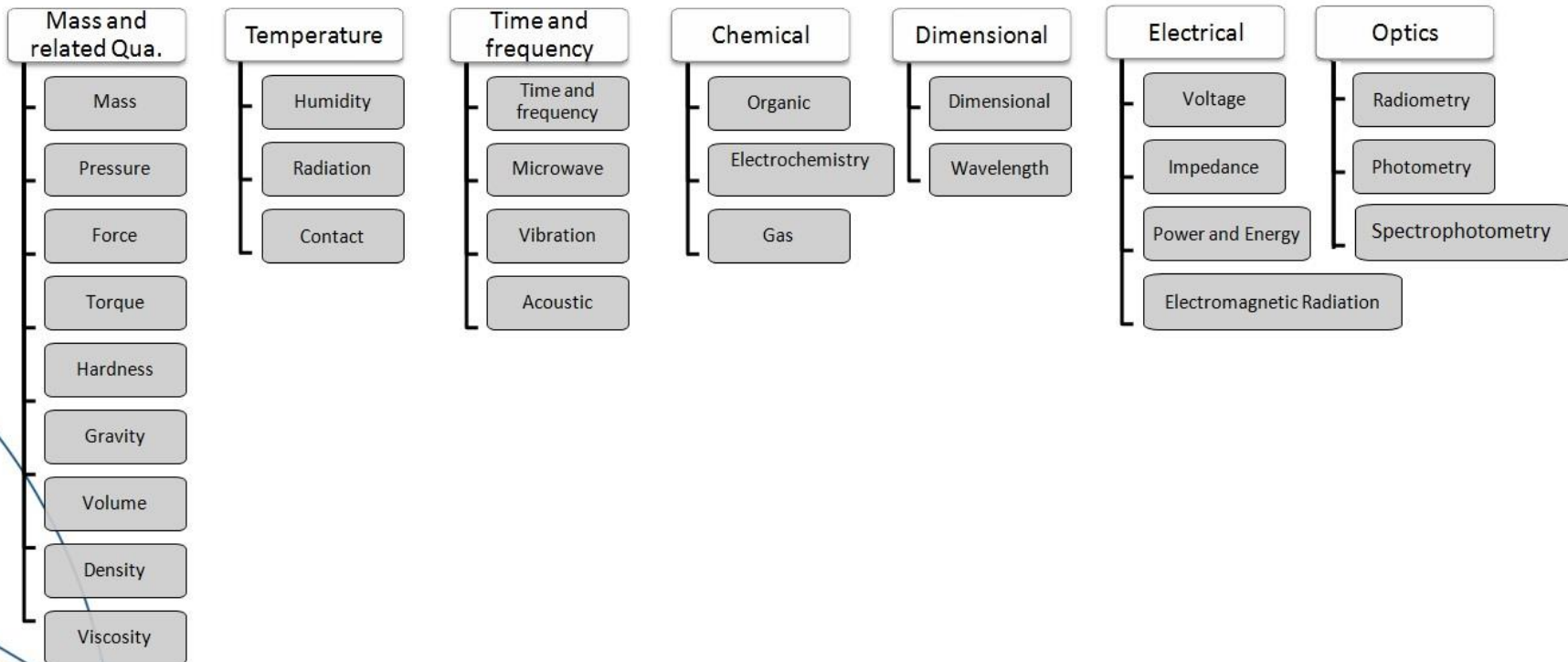
Main Branches (Makkah and the Eastern Province)
follow the Governor administratively and follow his deputies in their activities

National Measurement and Calibration Center (NMCC)



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Departments of NMCC



SASO/NMCC

Organization:

7 Departments
28 Laboratories

Optics Measurements Dept.

3 Labs (Photometry lab, Radiometry lab
& Spectrophotometry lab)

PR Team:

4 regular staff
1 visiting expert/consultant, PhD



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Overview



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- **Current Activities**
 - Spectral responsivity scale (broadband detectors)
 - Laser power calibration facility (power meters)
 - Spectral reflectance (regular/diffused) scale
 - Spectral transmittance (regular/diffused) scale
 - Luminous flux measurement facility (light sources)
 - Luminous responsivity measurement facility (photometers/illuminance meters/ luminance meters)
- **Improvements**
 - Extension of spectral responsivity scale up to 1650 nm
- **International Collaboration**
 - Interlaboratory comparisons (future plan)

➤ Radiometry

➤ Photometry

➤ Spectrophotometry

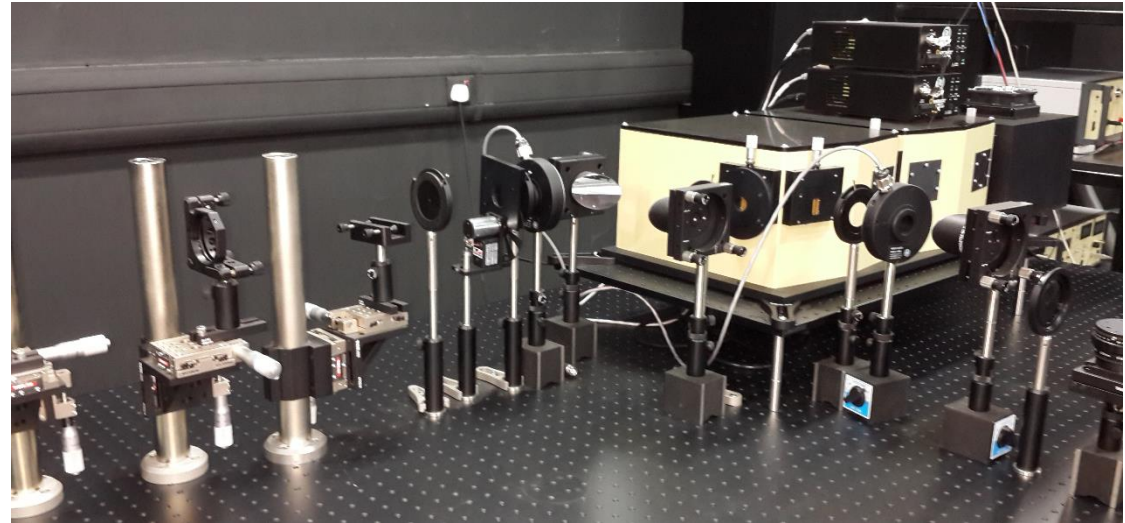


➤ Radiometry Lab.



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Spectral responsivity measurement facility

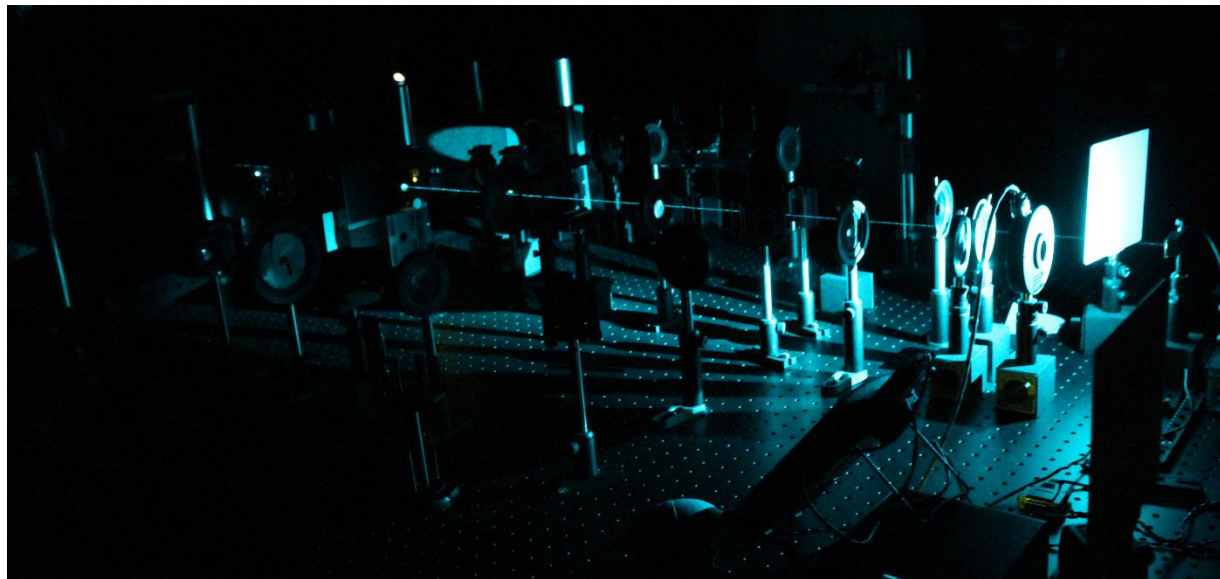


➤ Radiometry Lab. (cont.)



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Laser-based optical power-meter calibration facility



➤ Radiometry Lab. (cont.)

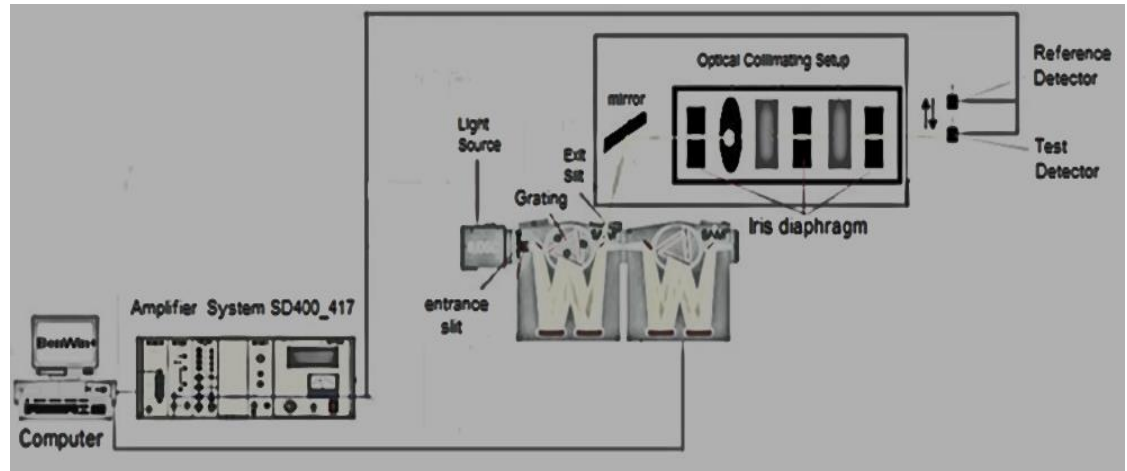


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❑ Measurements of spectral responsivity of detectors (broadband detectors)

Range:

- $0,0001 \text{ A/W} \leq R \leq 1,500 \text{ A/W}$
- $250 \text{ nm} \leq \lambda \leq 1650 \text{ nm}$



➤ Radiometry Lab. (cont.)

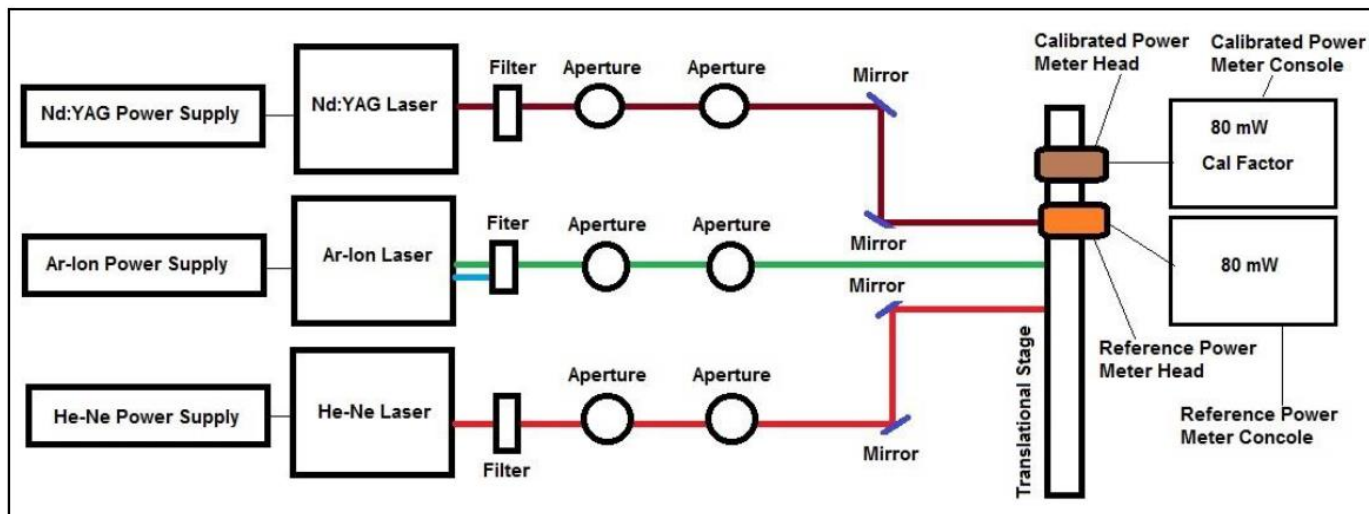


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❑ Calibrations of laser power meters (laser power responsivity; general detectors)

Range:

- Power: $10 \mu\text{W} \leq P \leq 1000 \text{ mW}$
- Laser wavelengths: At He-Ne (633nm), Ar-Ion (488 nm, 515 nm), Nd:YAG (532 nm, 1064 nm)



➤ Photometry Lab.



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Luminous Flux Measurement Facility



Luminous Intensity and Illuminance Measurement Facility



Luminance Measurement Facility



➤ Photometry Lab. (cont.)



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❑ Calibrations of Luminous Intensity (Tungsten lamp)

Range: $1 \text{ cd} \leq I_v \leq 10\,000 \text{ cd}$ @ 2856 K

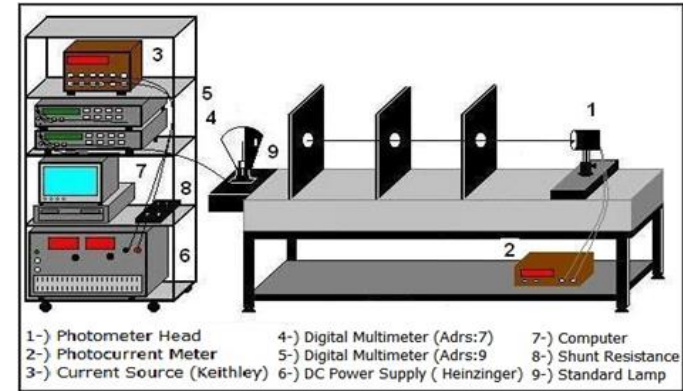
❑ Calibrations of Illuminance; illuminance meters (Tungsten lamp)

Range: $0,1 \text{ lx} \leq E_v \leq 5000 \text{ lx}$ @ 2856 K

❑ Calibrations of Luminance; luminance meters (Tungsten based source)

Range: Luminance Source $15 \text{ cd/m}^2 \leq L_v \leq 5000 \text{ cd/m}^2$ @ 2856 K

Range: Luminance Meter $15 \text{ cd/m}^2 \leq L_v < 2800 \text{ cd/m}^2$ @ 2856 K



➤ Photometry Lab. (cont.)



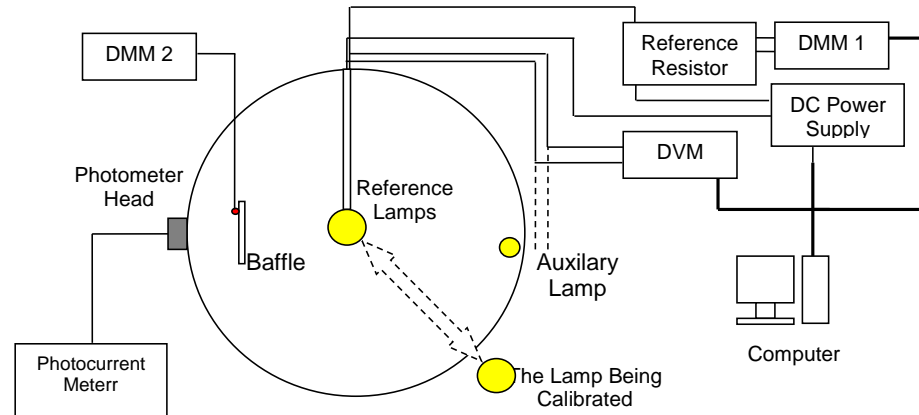
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❑ Calibrations of Luminous Flux (Tungsten lamps)

Range: $5 \text{ lm} \leq \Phi_v \leq 5000 \text{ lm}$

❑ Calibrations of Luminous Responsivity (Photometers)

Range: $0,0100 \text{ nA/lx} \leq s_v \leq 20,00 \text{ nA/lx} @ 2856 \text{ K}$

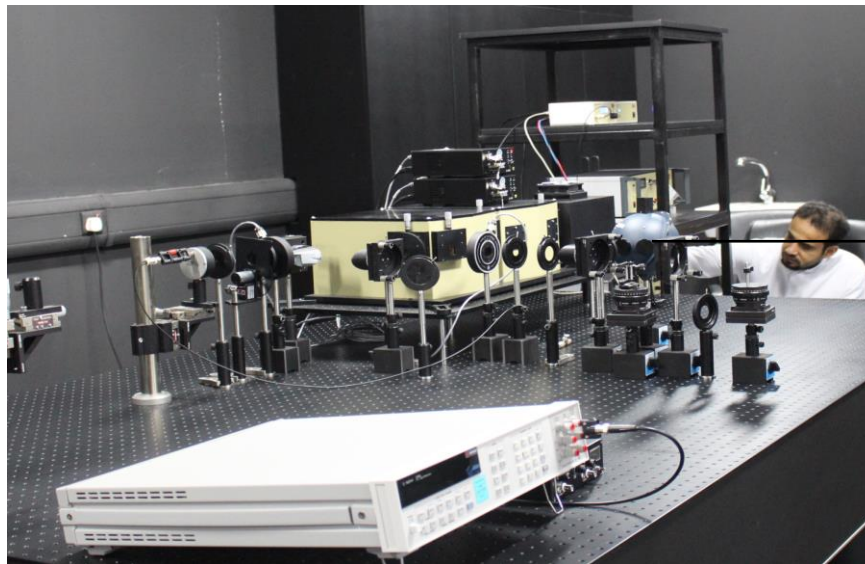


➤ Spectrophotometry Lab.



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Spectrophotometric Measurements Facility



➤ Spectrophotometry Lab. (cont.)

❑ Specular and diffuse transmittance (spectrally neutral materials)

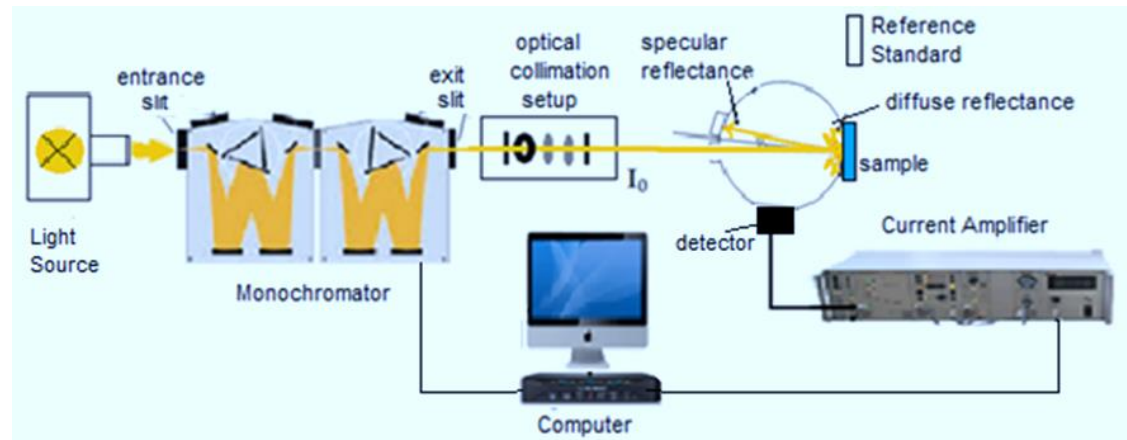
Range: $0,001 \leq T(\lambda) \leq 1,000$

Wavelength: $250 \text{ nm} \leq \lambda \leq 1800 \text{ nm}$

❑ Specular and diffuse reflectance (spectrally neutral materials)

Range: $0,001 \leq \rho(\lambda) \leq 1,000$

Wavelength: $250 \text{ nm} \leq \lambda \leq 1800 \text{ nm}$



Future plan



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- In Lab
 - Establishment of Gloss scale (address needs of Saudi industry)
 - Color measurement system
 - New spectrophotometer to measure optical properties of materials in boarder wavelength range (up to 3,000 nm)
 - Spectral Irradiance measurement Set-up

- International collaborations & Interlaboratory comparisons
 - KCs in P&R (key & supplementary; multi-lateral & bi-lateral – OK)



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Thank you for your attention