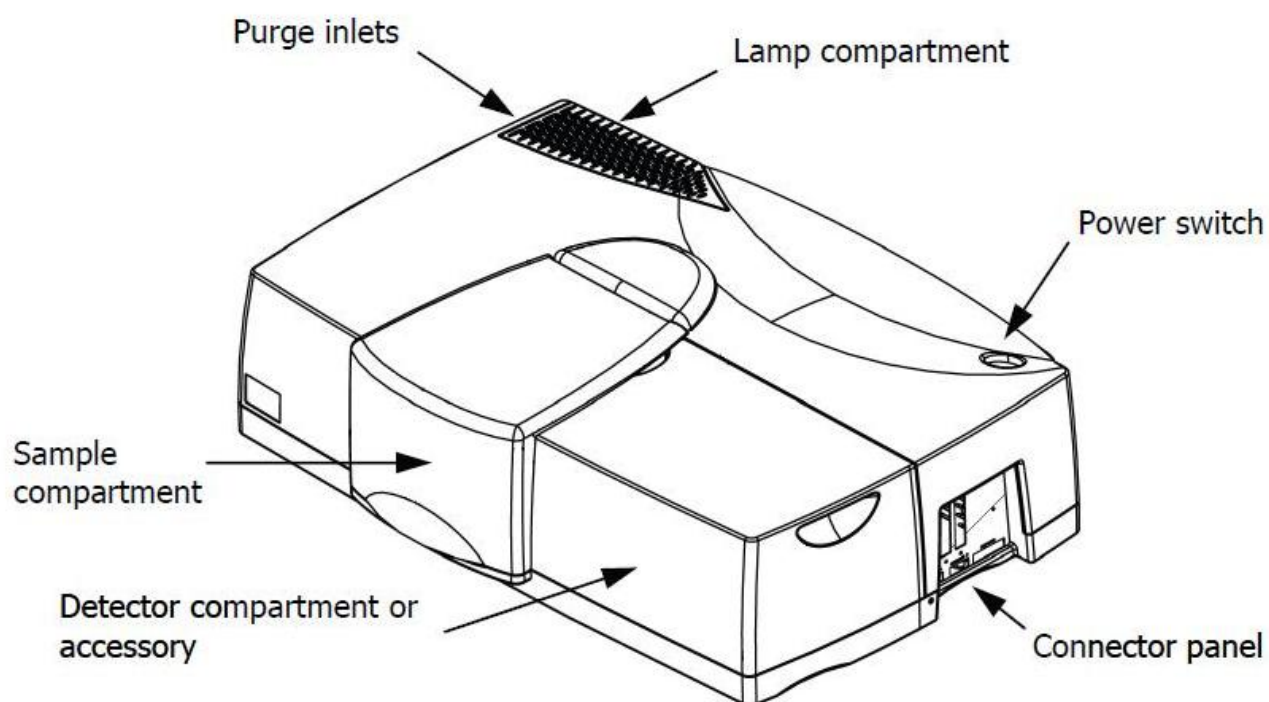


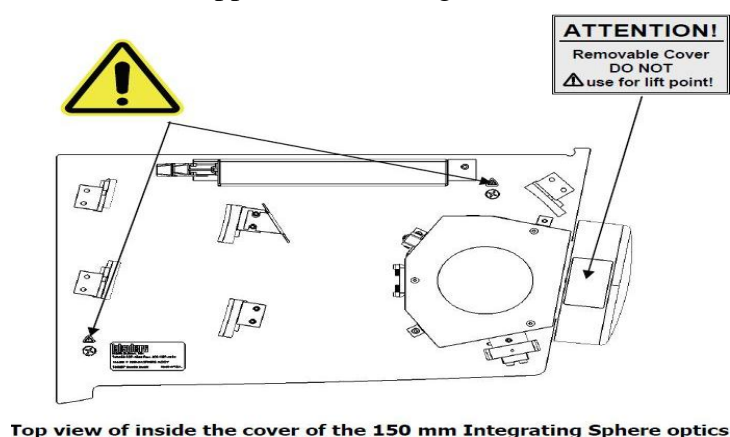
**Operating Procedure – PerkinElmer LAMBDA 950**  
**(Integrating sphere Mode)**



**National Centre for Photovoltaic Research and Education (NCPRE)**  
**Indian Institute of Technology- Bombay**  
**Powai, Mumbai-400076**  
**INDIA**

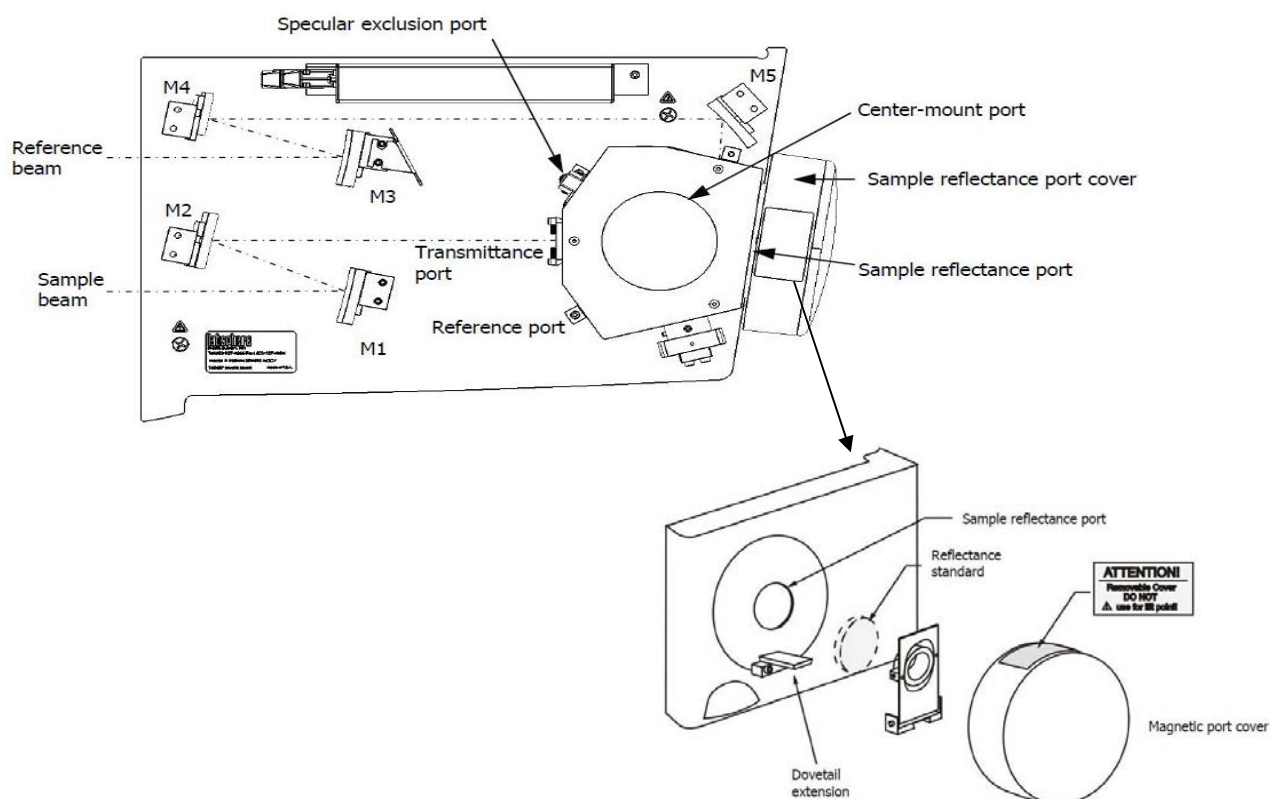
## Operating Procedure

1. First Check if the AC (Air Conditioner) unit and lights in the lab is on, if not switch ON.
2. Before switching on the UV/Vis system, open the sample compartment cover and make sure that the beam paths are free from obstruction. This means that no objects project in to the beam paths, no samples are in the sample compartment, and accessories are properly installed.
3. Check if the suitable detector (Integrating mode detector) is placed in the detector compartment. If not follow the Appendix I to change the detector.



Top view of inside the cover of the 150 mm Integrating Sphere optics

4. Check if **reflectance standard** is placed in sample reflectance port, if not place it.



5. Switch ON the power supply for the system.
6. Switch ON the lamp of the UV/VIS which is located on the top-right of the system.

7. **Wait for 20 to 30 minutes** after switching on the lamp of the system as stated in step 6.
8. Switch on the PC monitor and CPU
9. Enter the login ID and password disclosed during the training session.
10. Once the desktop is up, click the software icon “PerkinElmer UV WinLab” to get the page <UV WinLab Explorer>

### For absorption/Transmission measurement:

Keep the transmission port open during auto zero process and during your sample measurement put your samples one by one at transmission port without disturbing the sample reflectance port as set earlier and for this follow from Step 11.

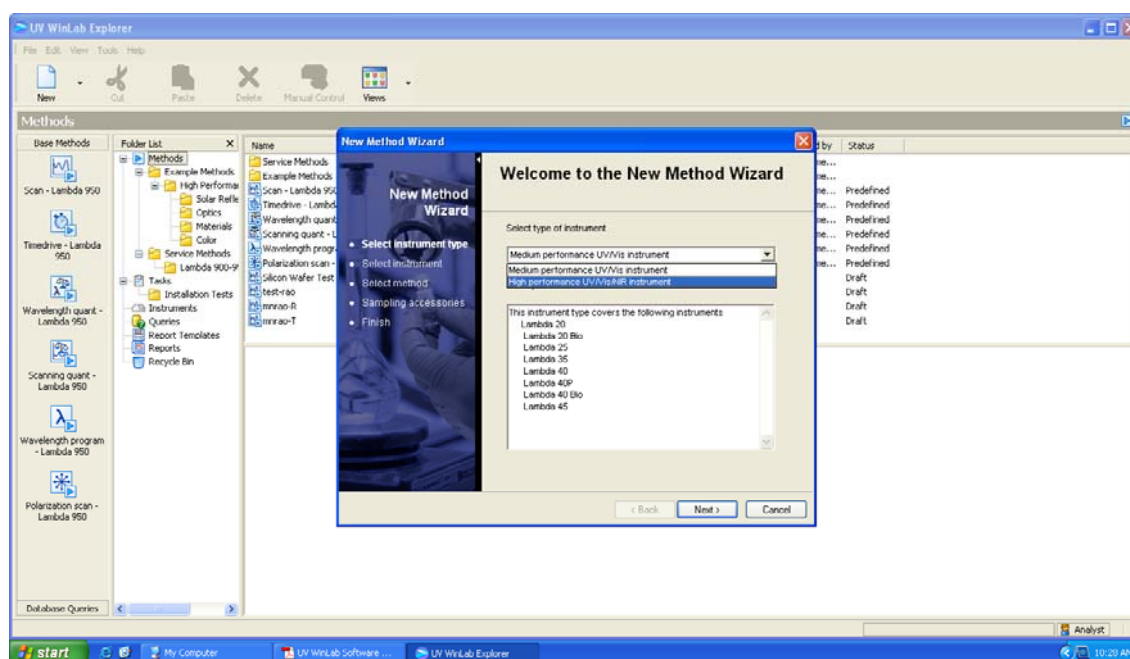
### For Total Reflectance measurement:

Keep the transmission port open during auto zero process and also during your sample measurement and put your samples one by one at sample reflectance port by replacing **Reflectance standard** from sample reflectance port after auto zero process is complete and for this follow from Step 11.

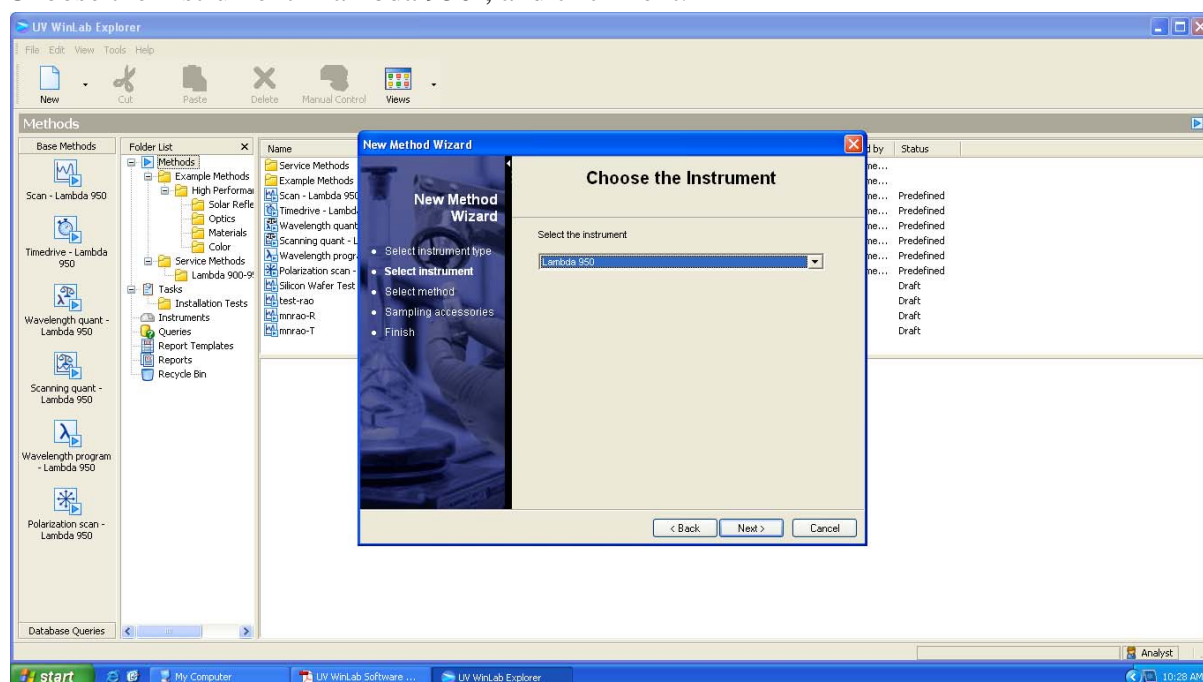
### For Diffused Reflectance measurement:

Keep the transmission port open and also the **specular exclusion port** open by removing the specular port plug during auto zero process and also during your sample measurement, put your samples one by one at sample reflectance port by replacing **Reflectance standard** from sample reflectance port after auto zero process is complete and for this follow from Step 11.

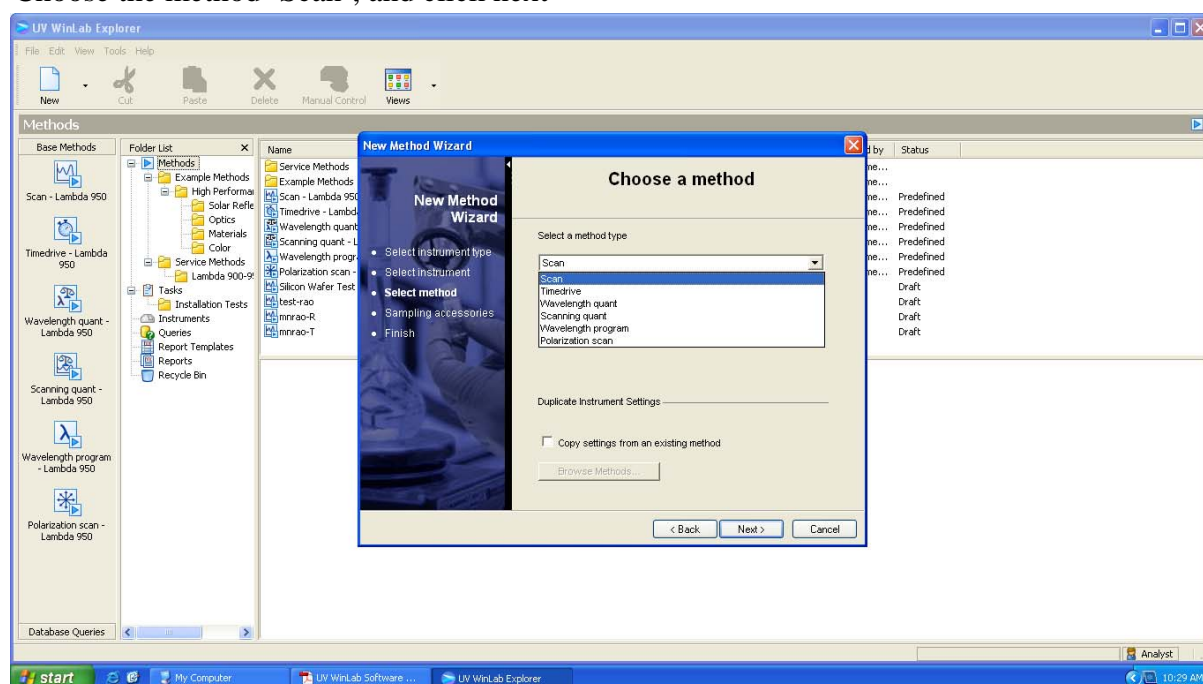
11. Goto FILE→NEW→METHOD to create a new method (if method is not already saved),  
(**Note:** if method already available then load your saved method & go to step-18 directly).



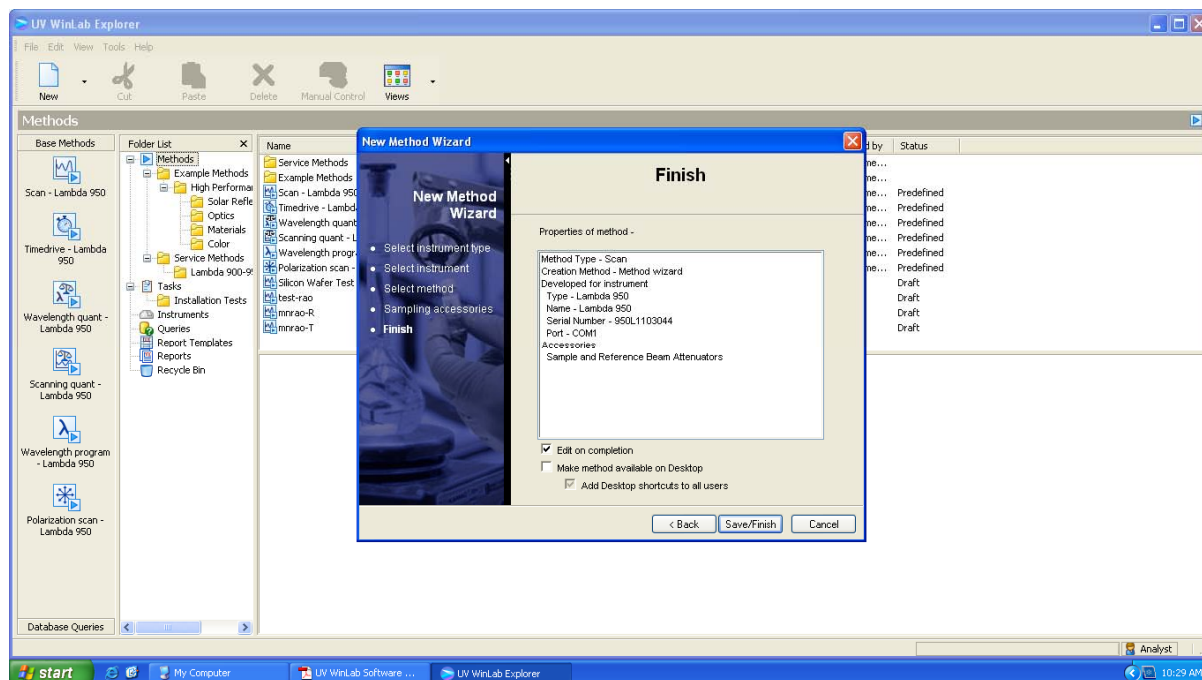
12. Once you are in the “New Method Wizard”, select ‘High Performance UV/VIS NIR Instrument’, and click next as shown in above snap shot.
13. Choose the instrument ‘Lambda 950’, and click next.



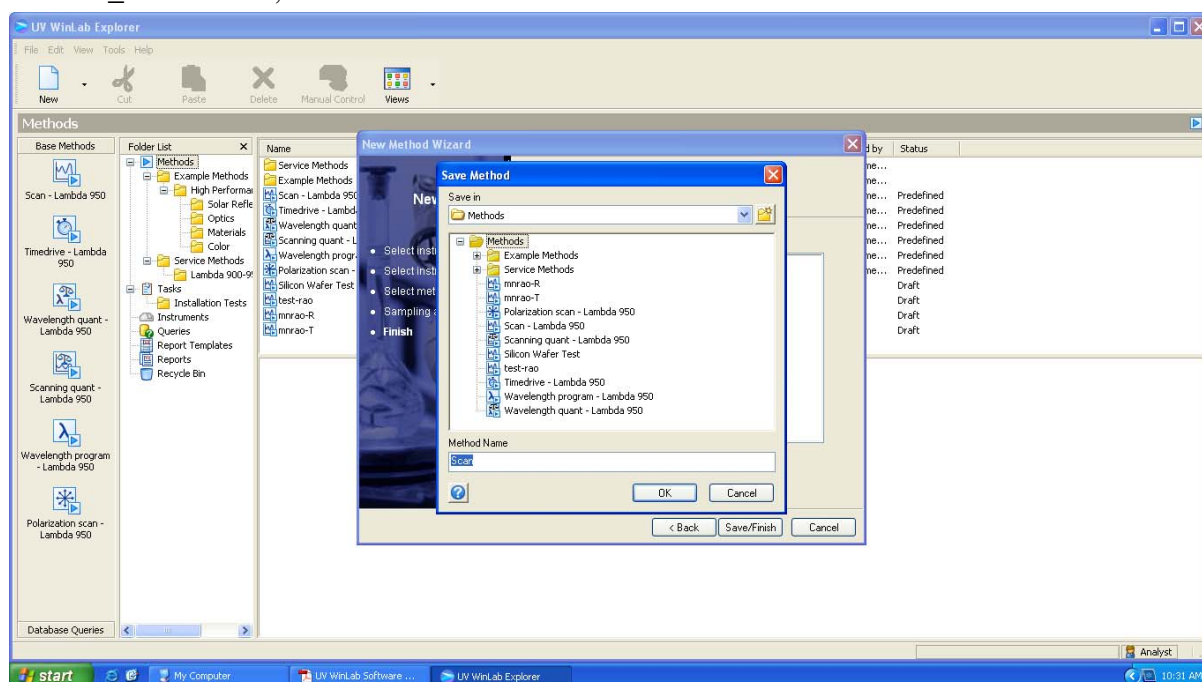
14. Choose the method ‘Scan’, and click next



15. Then you will be in the ‘Select Accessories’ page, click next (no changes to be made)
16. Then click ‘Save/Finish’, to get another pop-up page ‘Save Method’



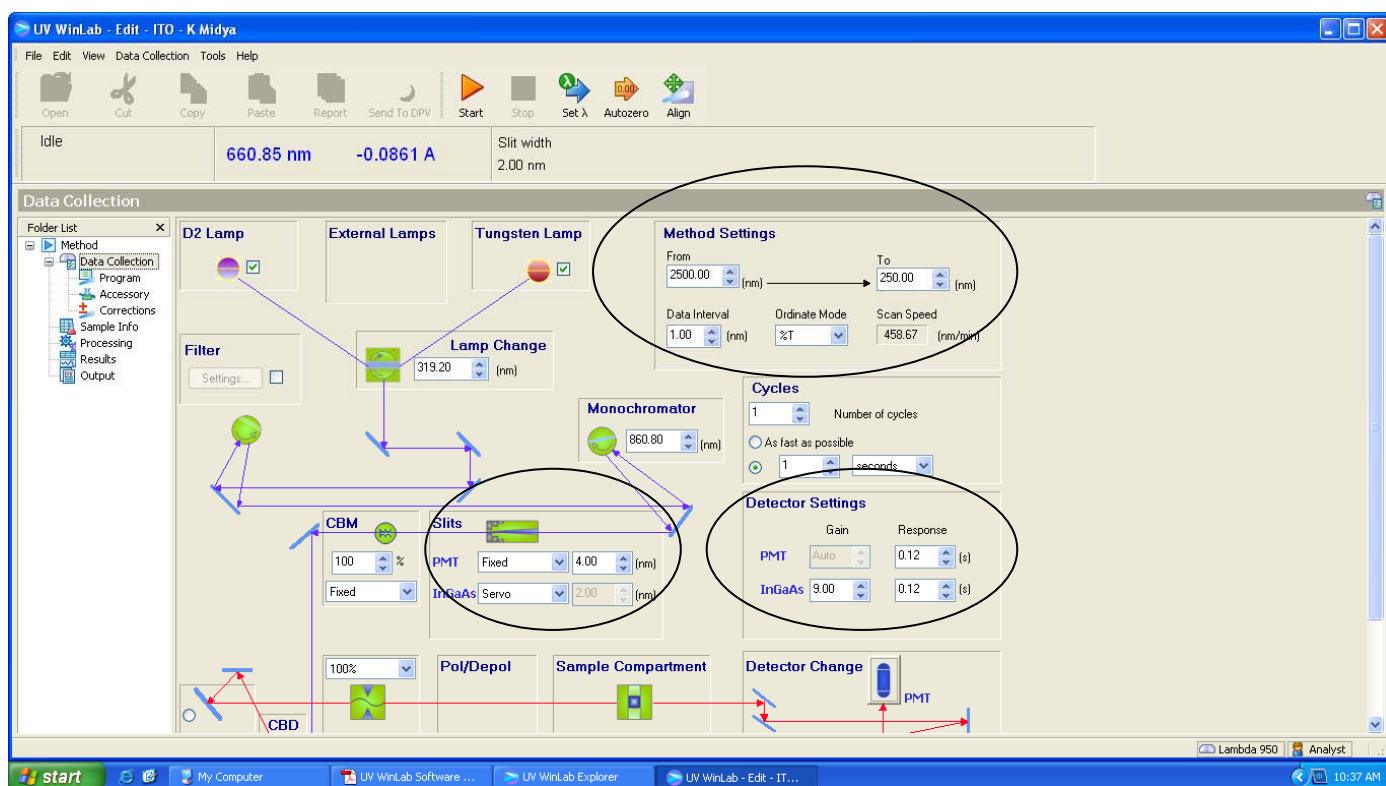
17. Enter your method name in the given format <NAME\_Sample Name> e.g. Ramesh\_SiN/Silicon, and click OK.



18. Now you will be in the 'UV WinLab – Edit- <METHOD NAME>' page. Expand all the Folder list and edit them in sequence.
19. Click 'Data Collection', and edit the **method settings** as follows:
- Range – Higher wavelength to lower wavelength, eg: From (2500 nm is max limit) to (250 nm is min limit)
  - Ordinate Mode – Select either A (Absorption) or %T (transmission) or %R (reflectance)

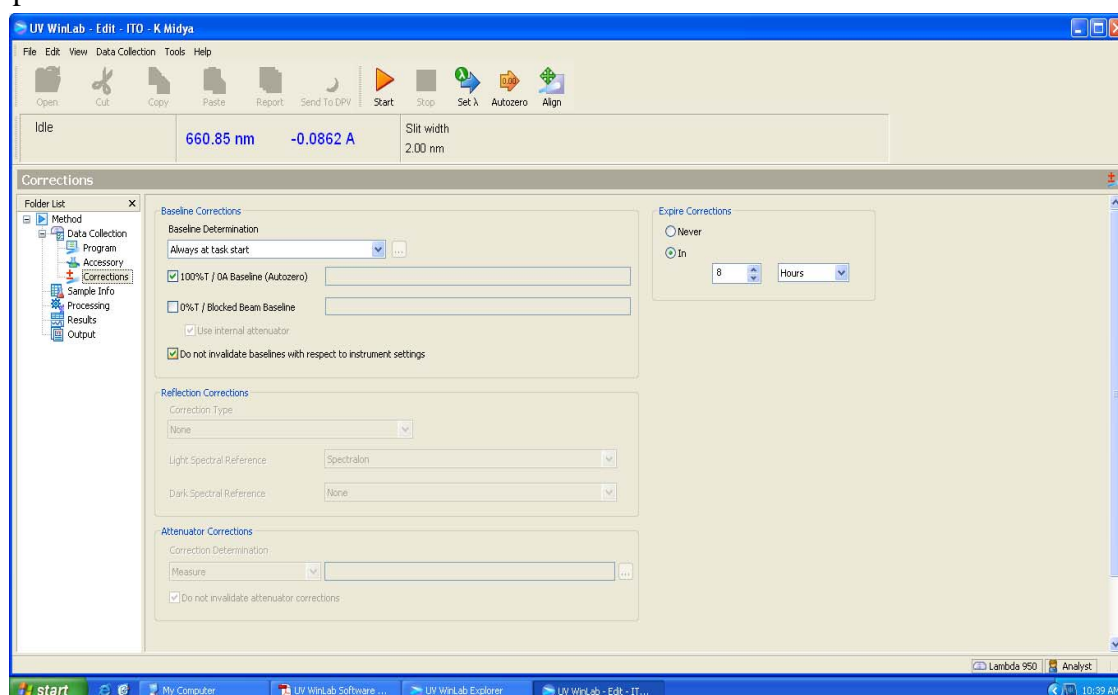


(Here note that for Integrating sphere mode the preferred parameters for **Slits**, *PMT is fixed and slit width 4 nm* and also the *InGaAs in servo mode*. Also in **detector setting** the preferred gain for *InGaAs is 9* and response time *0.12 or 0.2 (s)*). The typical window snap is shown below:)

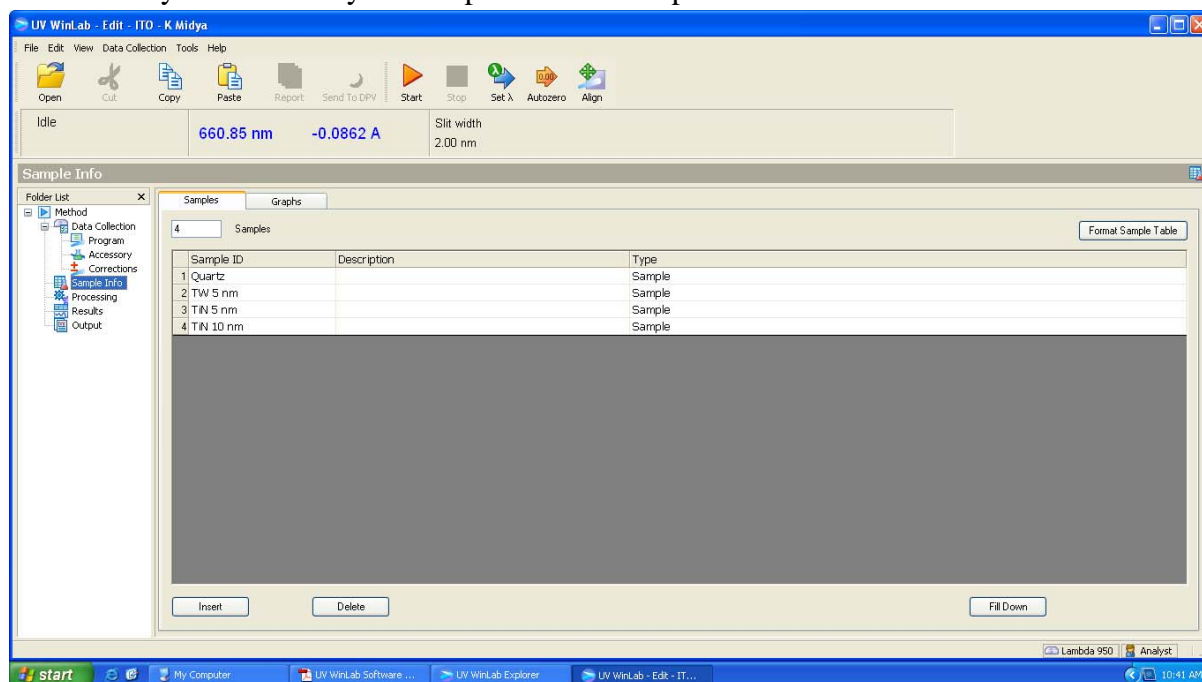


**(N.B. Do not change any other parameter without permission except the rounded regions in the snapshot shown above as suggested above).**

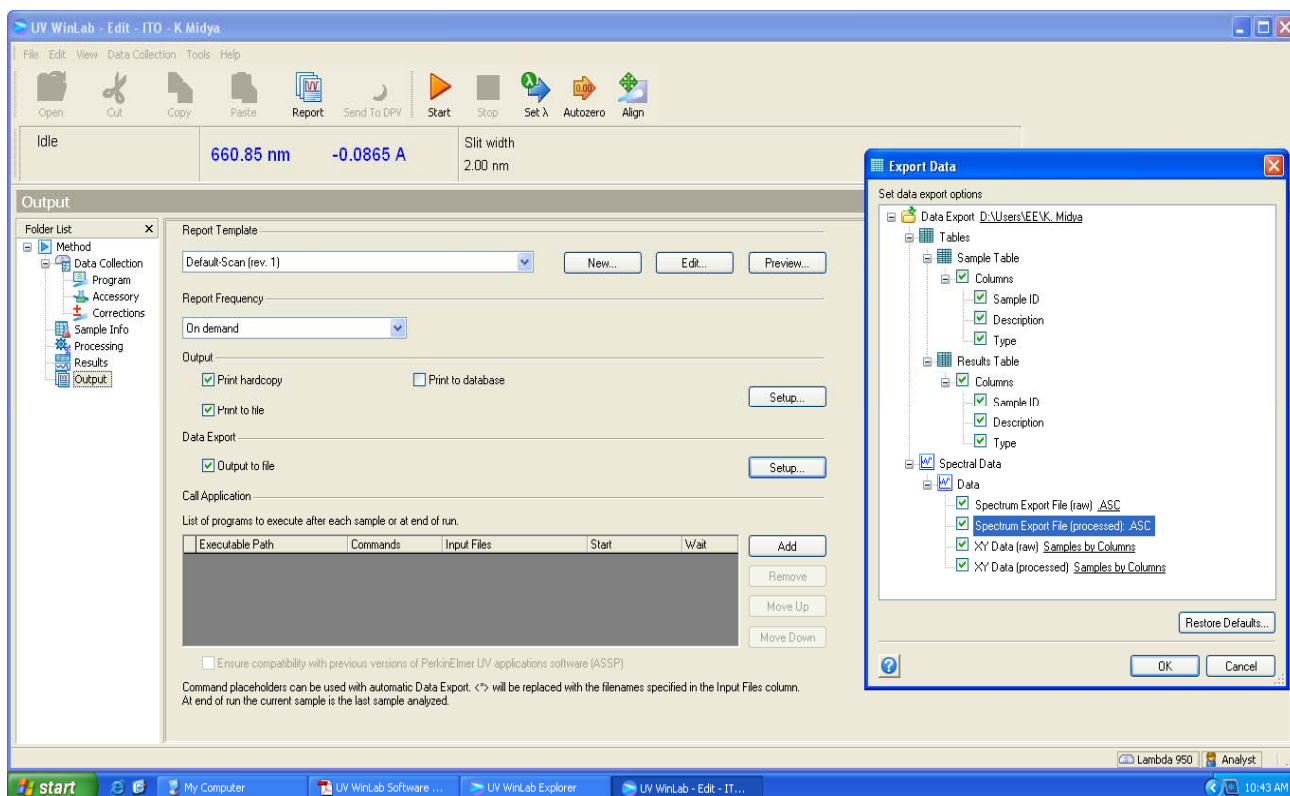
20. Goto 'Correction', edit as per your requirement. The preferred selection is shown in the snap shot below:



21. Goto 'Sample Info', put the number of samples you have for measurement and press Enter. Now you can name your samples in the 'Sample ID' column.



22. Now Goto 'Output', Tick the 'Print to file' and 'Output to file'. Here click the setup option next to the 'Output to File'. You will now get a pop-up page 'Export Data'. Please tick all the boxes as shown. Please change the 'Spectrum Export File(Raw)' and 'Spectrum Export File (Processed)' from .SP to .ASC  
*Now browse the 'Data Export' file to your destination folder. Your destination folder will usually be My Computer/USER's Documents/<Folder with your name> and press OK.*



Also, in report frequency select “when task is complete instead of ‘on demand’ option.

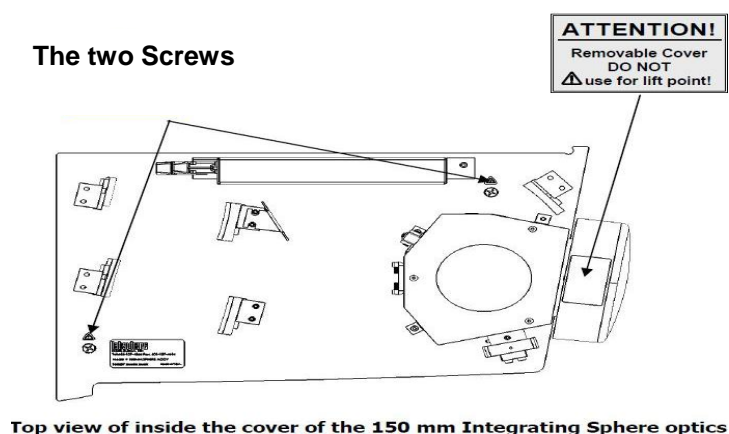
23. Your software is now ready.
24. Load your samples in the compartments as mentioned above whether you want transmittance, reflectance or diffused reflectance measurement. Make sure your sample is fully covering the slit window.
25. Now click **Start**, which is located on the top- middle of the software window. You will now get a pop-up message “Remove Sample and press OK to perform a 100% T/OA correction (Autozero)”. Click OK to proceed with the experiment. Once the Auto correction is done, replace the samples in the SAMPLE compartment one by one as per asked by popup window. Please do not remove your sample from the compartment unless prompted by the software. After running all your sample, there will be a pop-up message saying “All sample have been run”, then press OK.
26. Close this page by click the ‘X’ (located on top-right corner). Now you will be prompted to save your method. Press YES, and then click save in the following Pop-up. Your page will now close.
27. Take your data by writing the data from computer on your CD.
28. Now switch off the PC monitor and CPU, followed by switching OFF the system by pressing the button located on the top-right corner of the system.
29. Now switch off power supply button for your system, and the AC (AC if no other person is in the lab using any other instrument) before you leave.
30. Maintain the cleanliness/tidiness of the area near the instrument.



## Appendix – I

### How to change the Detector Module

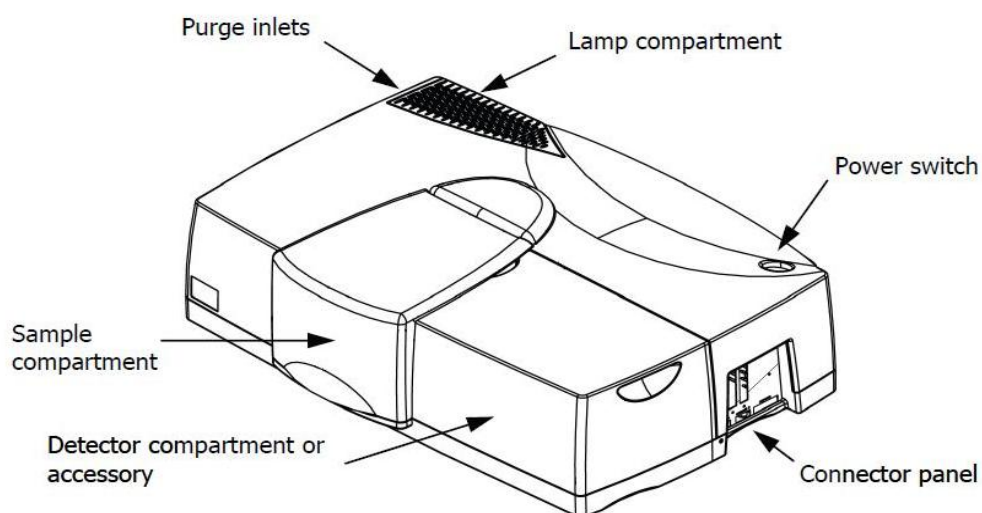
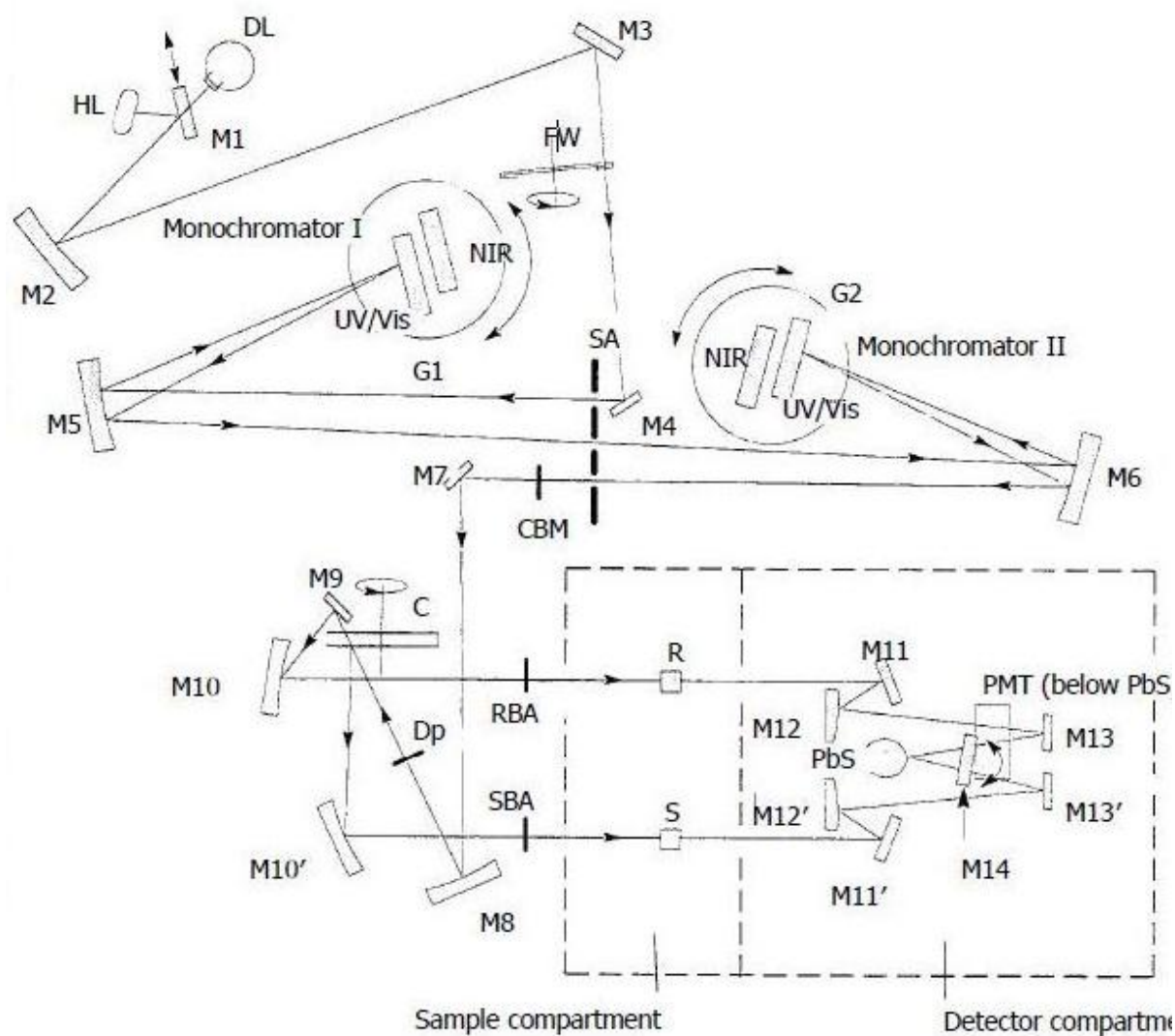
1. Switch the Lambda spectrometer OFF and disconnect the line power chord.
2. Open the sample and current fixed detector module compartment cover.
3. To remove the current detector, undo the two retaining screw located under the blanking caps on the top of the detector. (The screws are accessible using the long positive screwdriver)



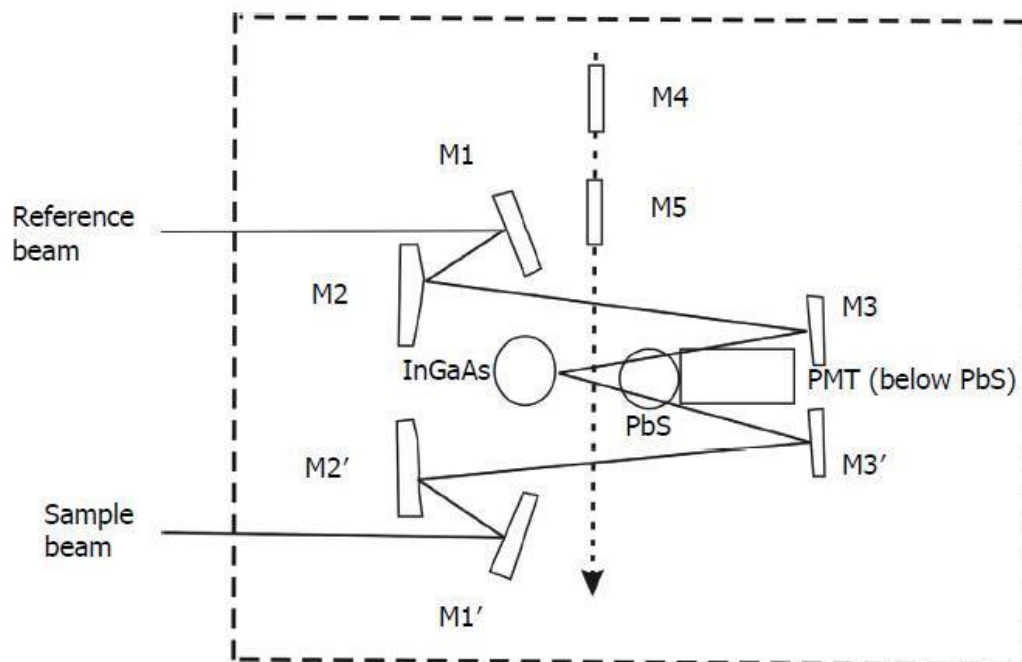
4. Remove the detector compartment cover by carefully lifting vertically using the two hand holds.
5. Lift the required detector module which you need by the handles and place the unit into the detector compartment so the positioning pins on the detector compartment floor connect with the corresponding holes in the bottom of the detector module base plate.
6. Secure the detector module to the instrument by tightening the thumb screws at front left and rear locations on the base plate.
7. Reconnect the line power chord.
8. Open the sample compartment cover and make sure that beam paths are free from obstruction.
9. Close the sample compartment and turn ON the spectrometer power switch located at the top right corner of the instrument.
- 10. Wait until all the instrument initialization is complete before starting the UV Winlab software. (Wait for 20 to 30 minutes after switching on the lamp of the system)**
11. Switch on the PC monitor and CPU
12. Enter the login ID and password disclosed during the training session.
13. Once the desktop is up, click the software icon “PerkinElmer UV WinLab” to get the page <UV WinLab Explorer>

## Appendix – II

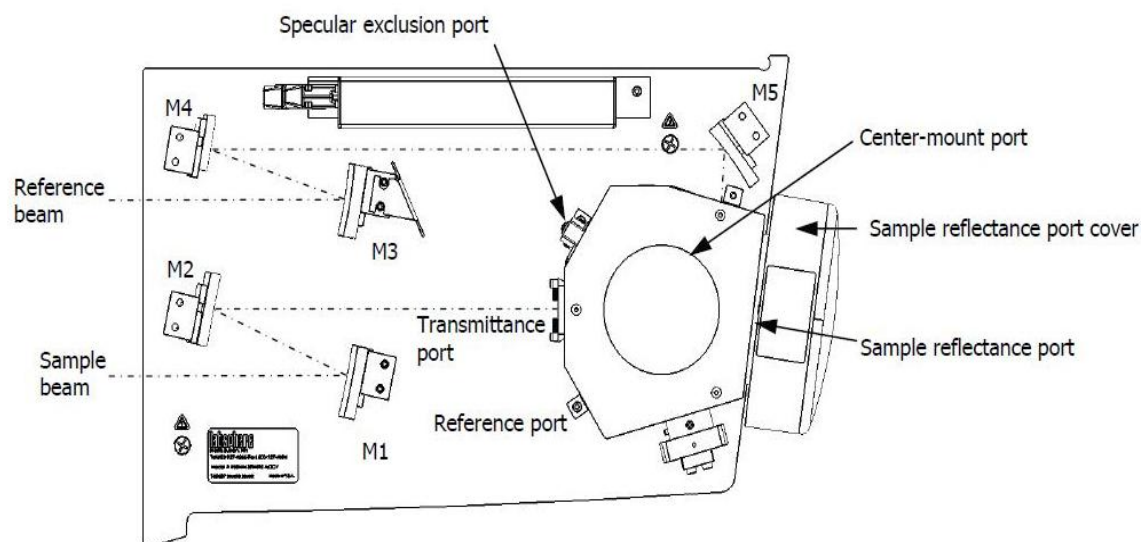
### The optical system of the lambda 950 spectrometer



### Three detector module:



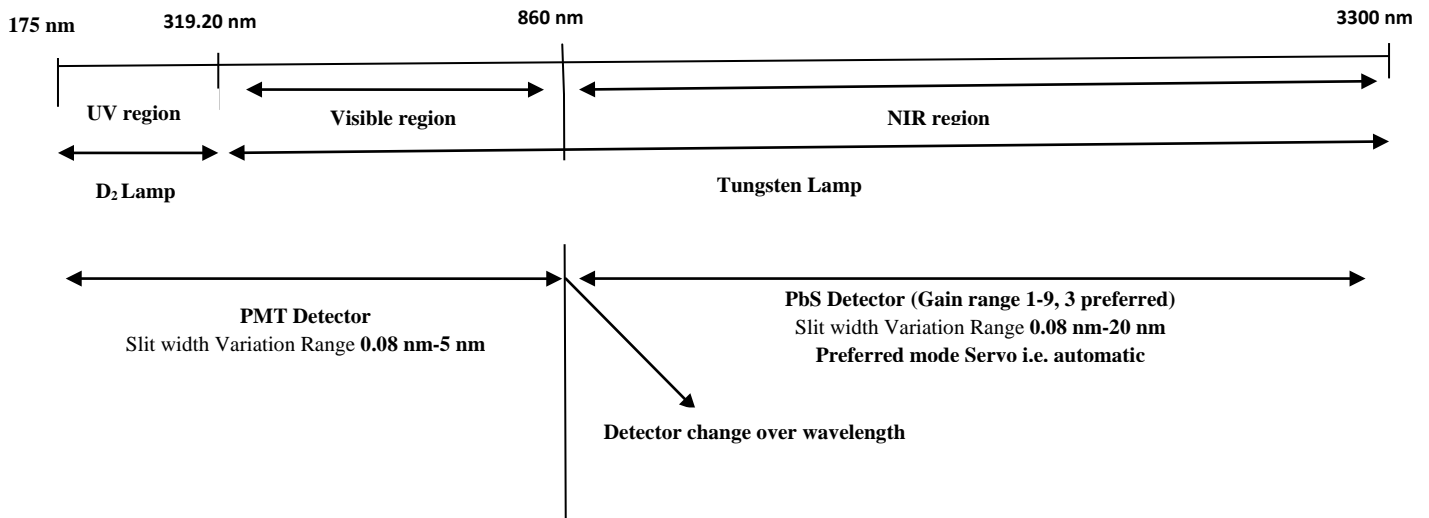
### Integrating Sphere detector module:



## Appendix - III

### UV-Visible Lambda 950 Quick Summary

#### For STD Detector



#### For Integrating Sphere mode

