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Standard Operating Procedure for measuring the Line-Spread Function of an array spectroradiometer
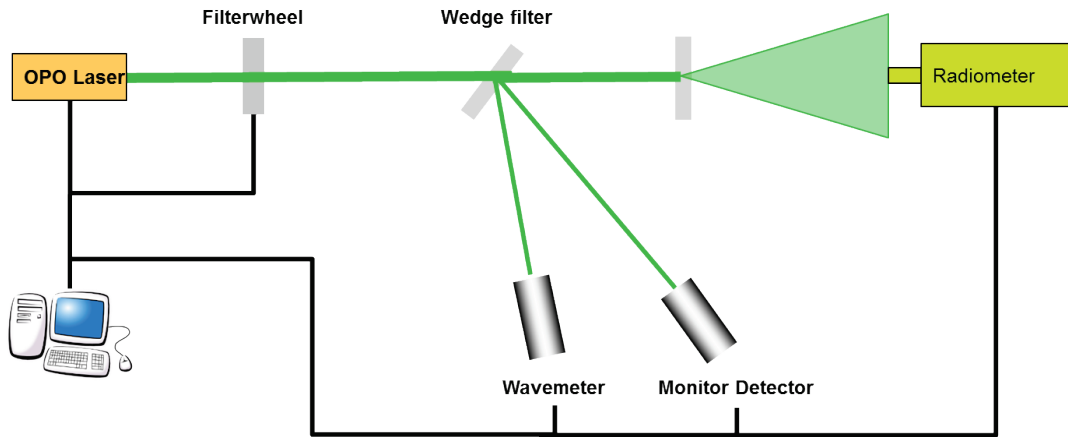
1 Introduction

The following instructions describe how the line-spread functions are measured with the tuneable laser facility ATLAS in the optical laboratory of PMOD/WRC.

2 Instrument installation

The optical setup of ATLAS is the following:
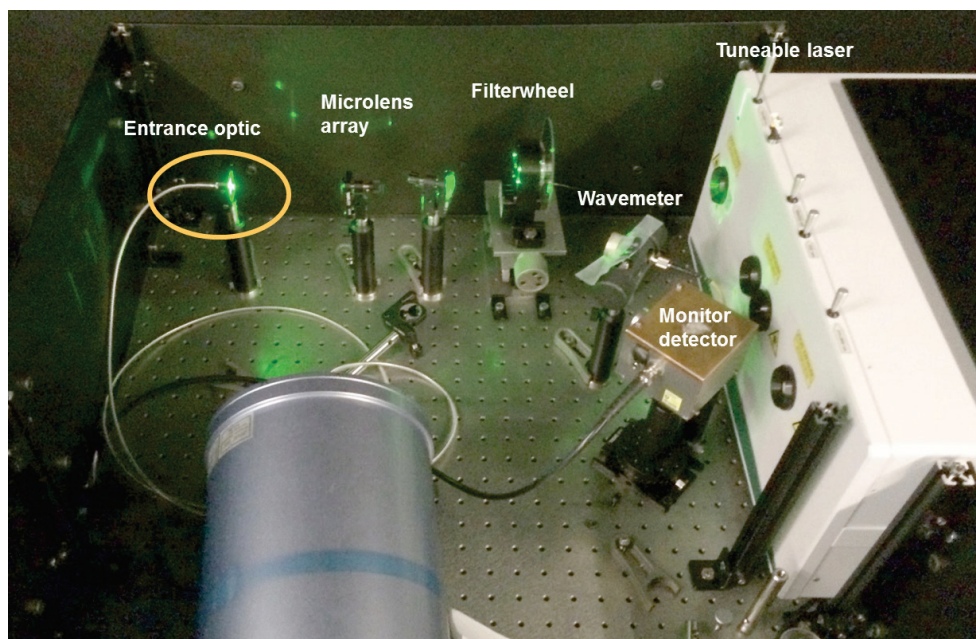
The Schematic of the measurement setup is shown below:

The Spectroradiometer entrance optic is placed in the center of the homogeneous radiation field produced by the microlens array, at a distance of about 20 cm to 30 cm. To select the best position, it is best to turn on the laser, set it a visible wavelength, e.g. 550 nm, and adjust the entrance optic of the Device Under Test (DUT) until it is fully illuminated.

The DUT, the filterwheel, the wavemeter and the monitor detector are controlled with the ATLAS software described in the next section.

1) The current of the monitor detector is either measured with an electrometer Keithley 6517, or a current meter Keithley 6485. The choice depends on the type of diode which is used: In case of the PMOD trap detector (default), the current meter is used. For all other diodes the use of either electrometer or current meter needs to be selected based on a comparison to the trap detector. This selection procedure is described in another document.

2) The wavemeter LSA UV 2L from High Finesse is connected to the PC using a USB cable. The use of the wavemeter is fully controlled by the ATLAS software and is not described here. Please see the manual for further information.

3) Please refer to the operation manual of the NT242 Laser on the correct use of the system: First turn on the water circulation, then the laser power supply. Please verify the correct operation of the laser before starting the measurements.

3   ATLAS gui

The system is controlled through a software interface written in matlab. The use of the ATLAS gui is reserved to trained operators!
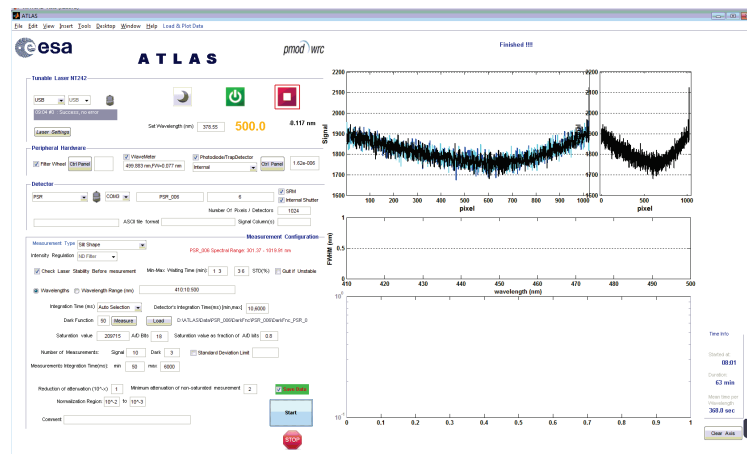
4   Measurement principle

The measurements of the slit functions depend primarily on the wavelength range of the DUT. The possible wavelength range covered can be from 200 nm to 1100 nm, limited by the sensitivity range of the silicon photodiode used as monitor detector, and the wavemeter (200 nm to 1100 nm). To obtain the required signal to noise over at least 4 orders of magnitude of the LSF, measurements at different count levels (one unsaturated and the other all saturated measurements) need to be combined to produce one LSF at a particular wavelength. The count levels can be changed either by varying the integration time (method A), or by varying the intensity using the filter wheel attenuation (method B). The choice of the method depends on the nonlinearity of the DUT and its saturation properties.

Method A (default)

1. The wavelength of the laser is set.

2. The filter wheel attenuation is selected so that the DUT is not saturated for a short integration time of the order of 50 ms (will also depend on the type of DUT).

3. Measurements are taken with the DUT at integration times between the shortest and the longest possible in order to have unsaturated and saturated measurements with a dynamic range of at least 100.

4. If the DUT has a shutter it is closed and the laser output is turned off. Measurements of dark counts are taken at the same integration times as for the measurements.

5. The wavelength reading of the wavemeter is measured.

Method B (alternative)

1. The wavelength of the laser is set.

2. The highest possible filter wheel attenuation is selected based on the signal to noise of the monitor detector. The integration time of the DUT is chosen in order to be at about 90% of the saturation level.

3. The attenuation of the filter wheel is varied from high to low in steps of $10^{0.3}$ to cover the required dynamic range. Measurements are taken for the fixed integration time selected in step 2.

4. If the DUT has a shutter it is closed and the laser output is turned off. Measurements of dark counts are taken at the same integration time as for the measurements.

5. The wavelength reading of the wavemeter is measured.

The above sequence is repeated for as many wavelengths as necessary.

5   Data archive

The measured data is archived on the PMOD/WRC server, at
\\ad.pmodwrc.ch\Institute\Projects\ATLAS\characterisations

In the appropriate directory for the DUT.

The Dokumenten History

Version	Freigabedatum	Freigabe	Änderungen
1.0	20.6.2016	JG	First Version of document