

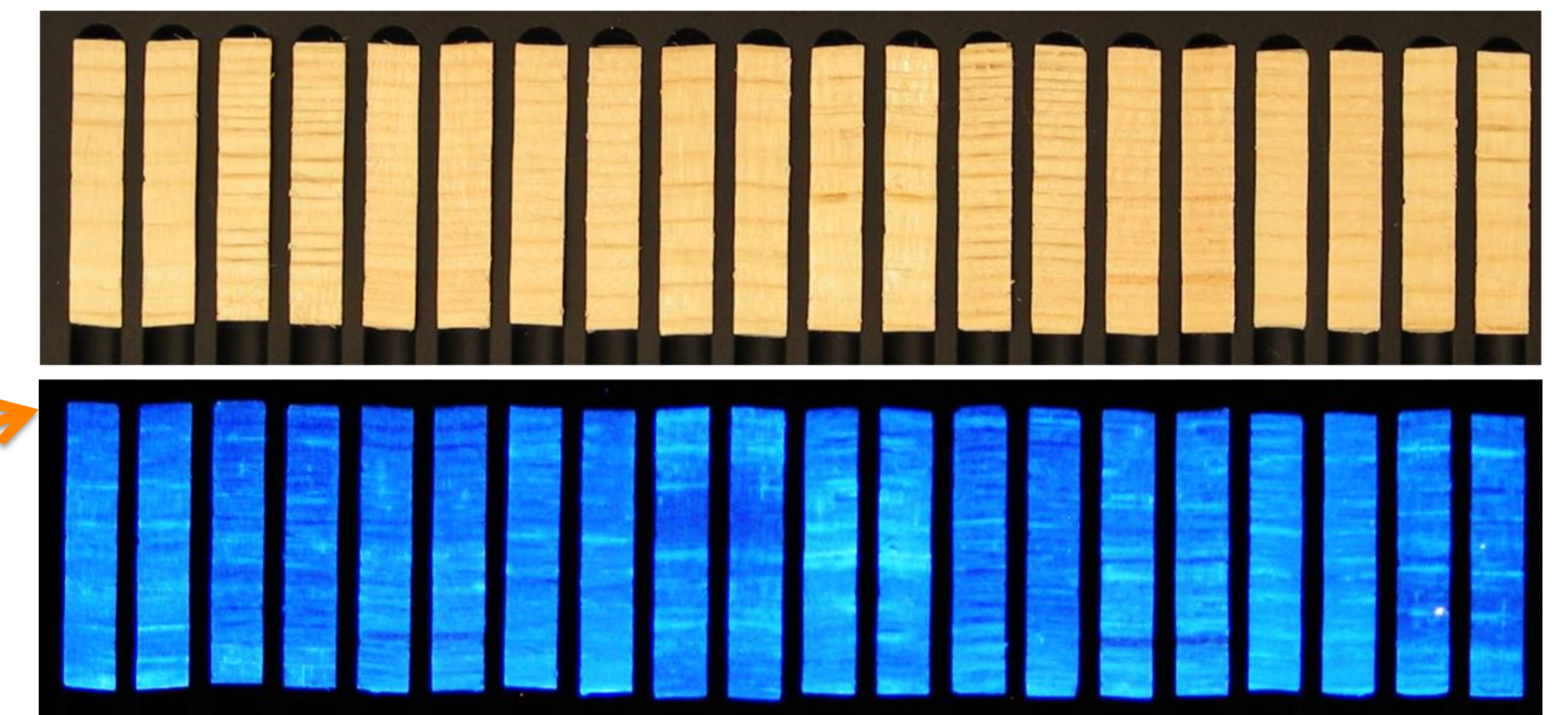
Automated stilbene UV fluorescence measurement

Pulkka, S., Antikainen, J., Bernhardt, E., Montonen, H., Leinonen, H., Venäläinen, M. & Harju, A.



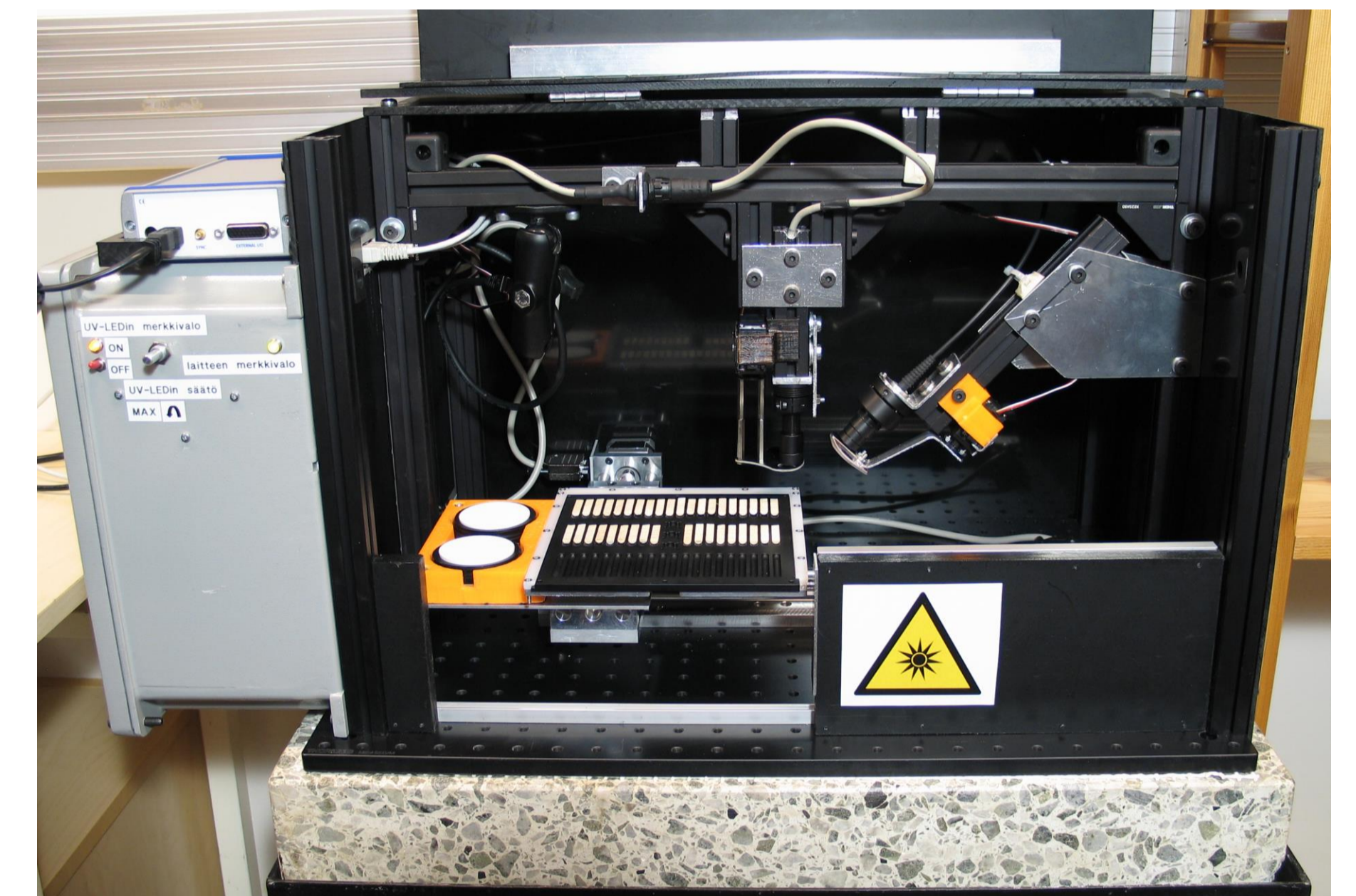
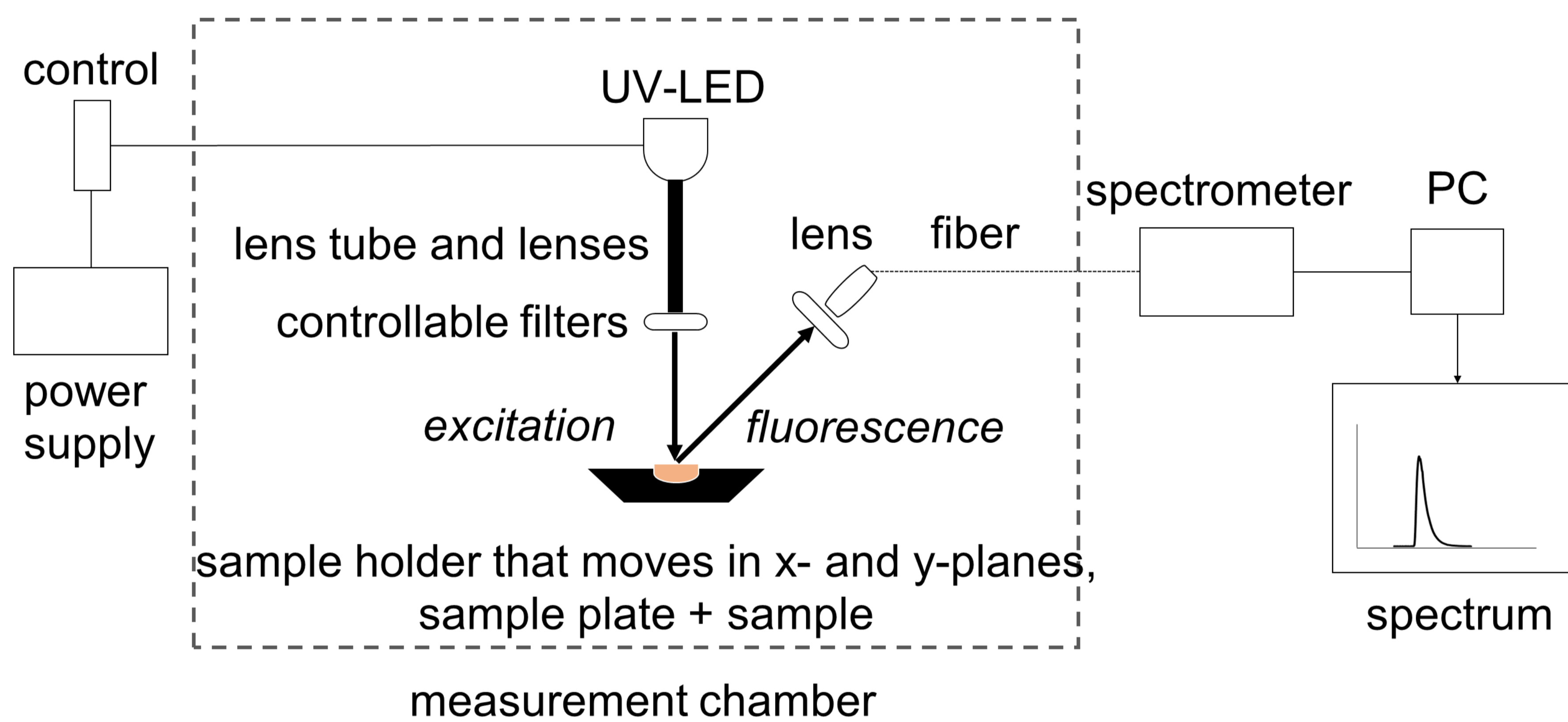
In the TUIKEPUU project an automated optical method was developed for detecting differences in stilbene content between Scots pine trunks using increment cores.

There is wide natural variation in stilbene content between Scots pine trunks. There are more stilbenes in the decay-resistant than in decay-susceptible pine heartwood.



Scots pine heartwood samples in sample plate grooves. In the upper picture the samples are shown in visible light. In the lower picture the samples have been exposed to UV excitation, making stilbenes fluoresce.

Equipment description



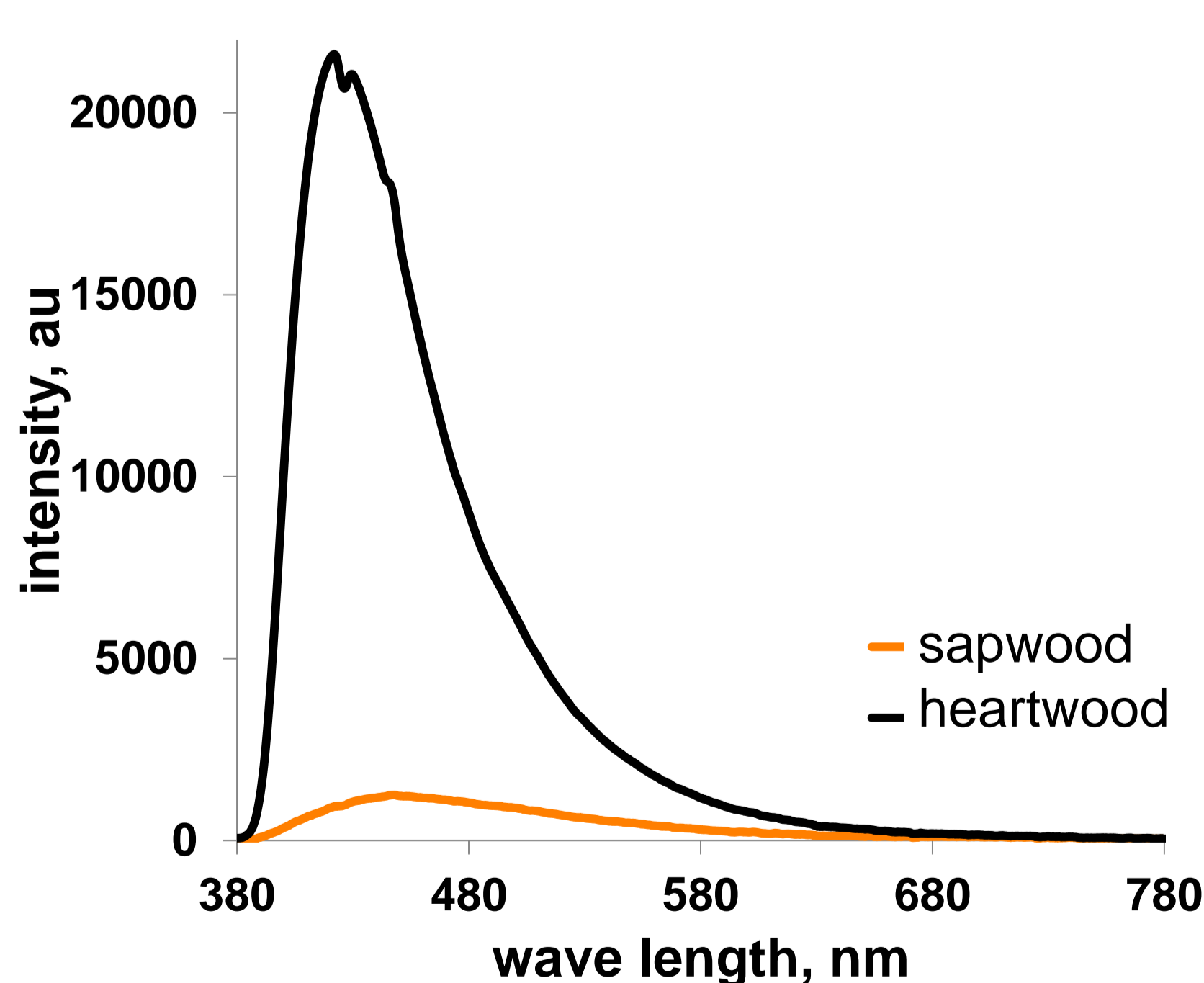
A front view of TUIKEPUU equipment with the measurement chamber door open. On the left side of the sample plate are the reference standards used for calibrating the equipment.

Fluorescence excitation (315 ± 5 nm) is directed perpendicularly to the sample. Interfering wavelengths of visible light are filtered from the excitation. The stability of the excitation source (UV-LED) and the spectrometer are monitored by measuring the reference standards.

The sample plate holds 58 samples at a time. The matte black sample plate does not reflect excitation. The measurement chamber ensures safe use of the equipment and isolates the measurement from surrounding light.

The movement of the sample plate and sample measuring are automated. The spectrometer measures sample fluorescence through a UV filter, lens and optical fibre set at a 45° angle. Measuring 58 samples takes less than 15 minutes.

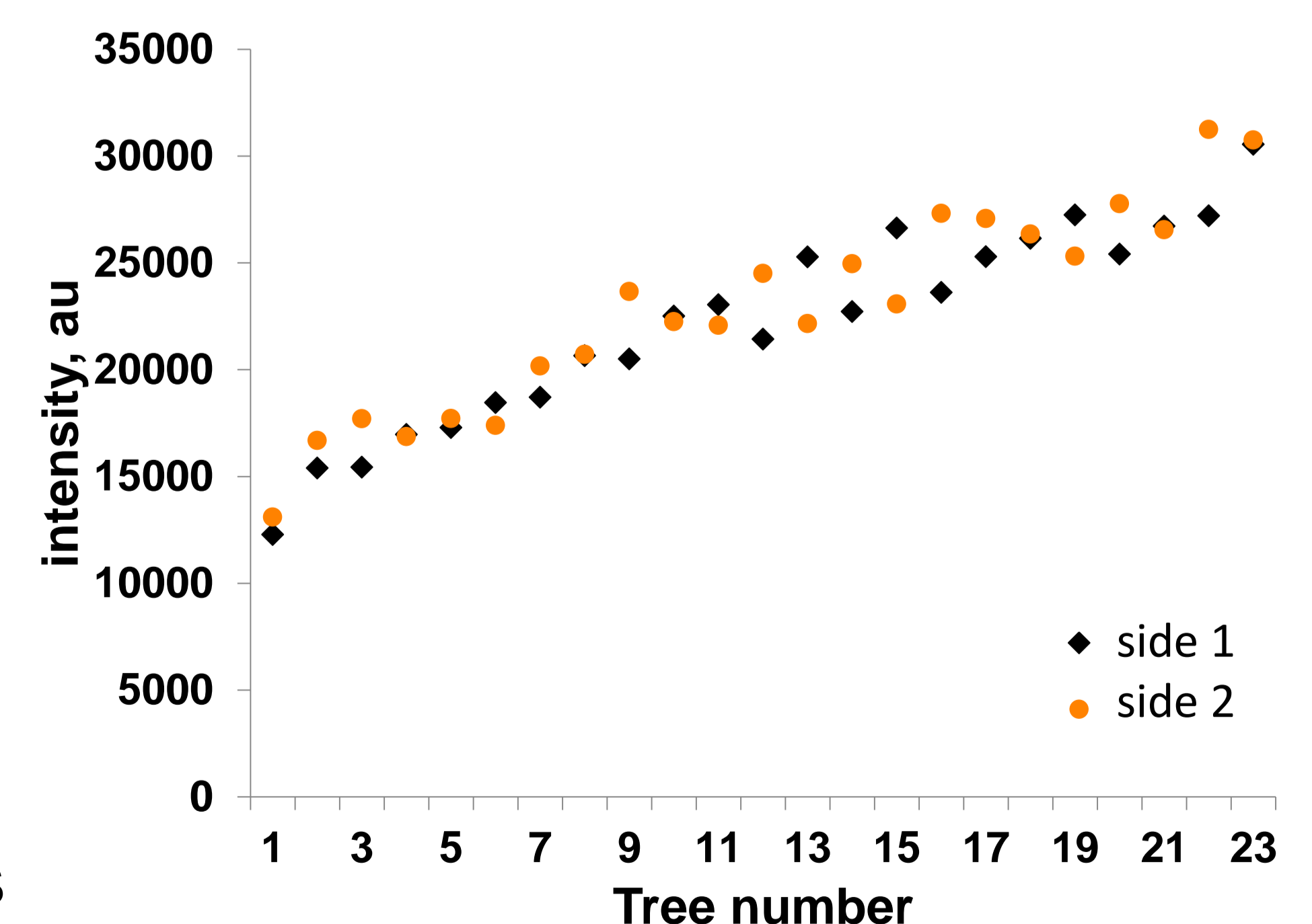
Measuring wood samples



Fluorescence spectra measured from two samples.

A heartwood sample drilled from a pine's trunk or a log is split lengthwise right before measuring. Fluorescence is measured from the split surface step by step for the length of the sample. A mean value spectrum is calculated for each sample.

Repeatability of the measurement has been proven with, for example, repeated measurements and by comparing results from corresponding split samples.



Fluorescence intensity of split heartwood samples measured from both split halves.