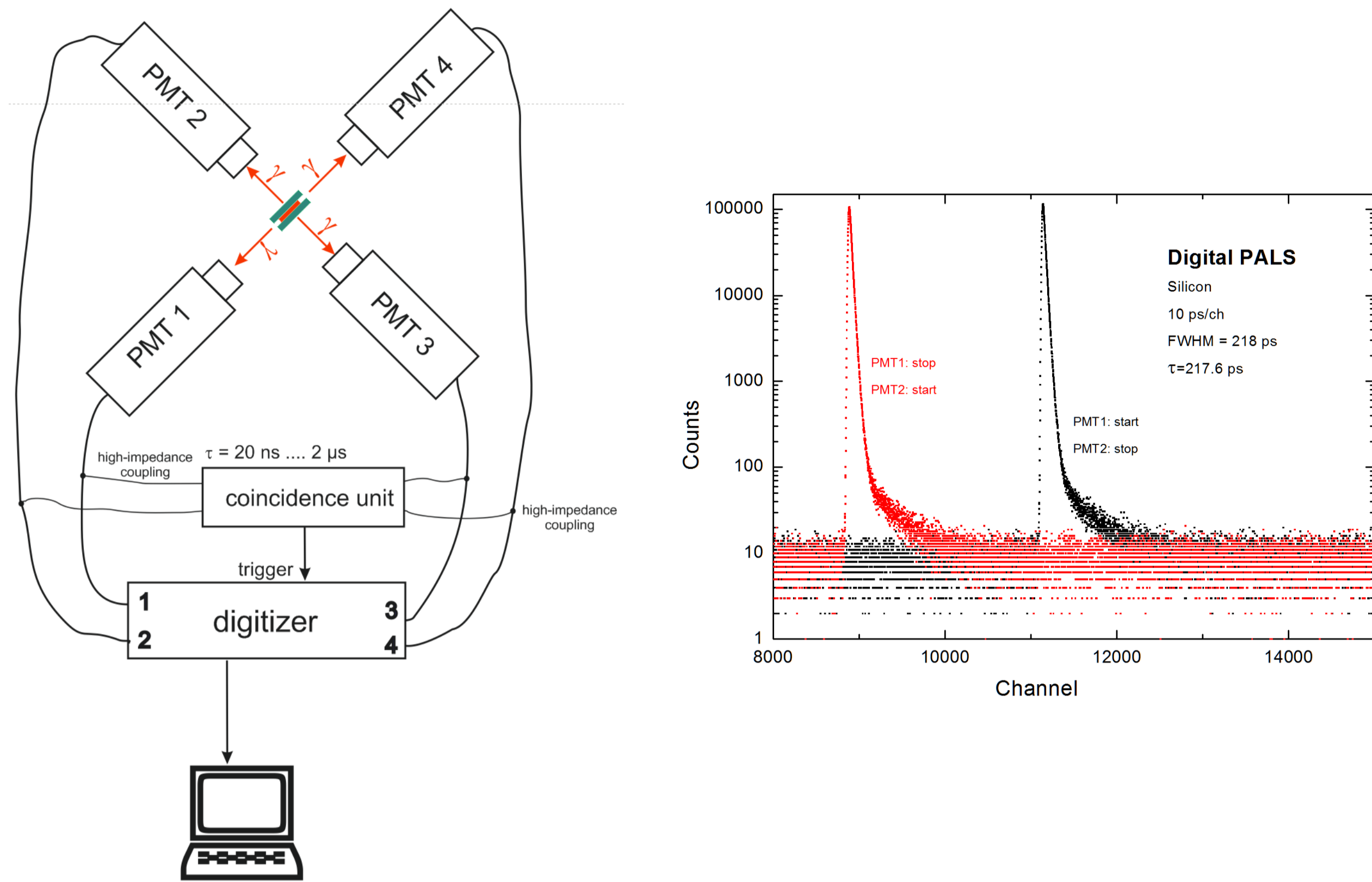


A 4-fold Coincidence Unit for Digital Positron Lifetime Spectrometers

University Halle-Wittenberg, Inst. of Physics, 06099 Halle/Germany

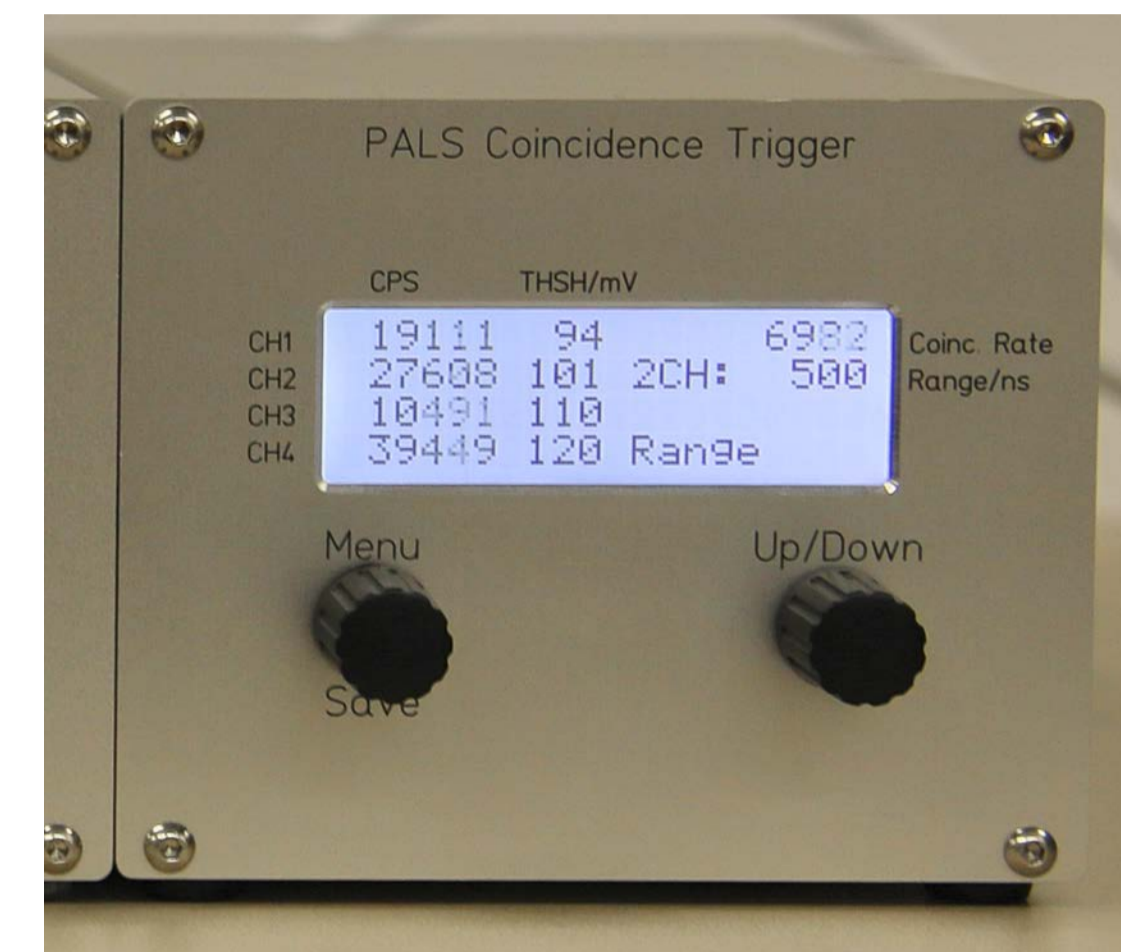
In this poster we show a newly developed 4-fold coincidence unit and also a 2-fold PMT high voltage unit for positron lifetime spectroscopy. These units allow a very simple and small setup of a positron lifetime spectrometer with 4 PMT's delivering 12 individual spectra simultaneously.



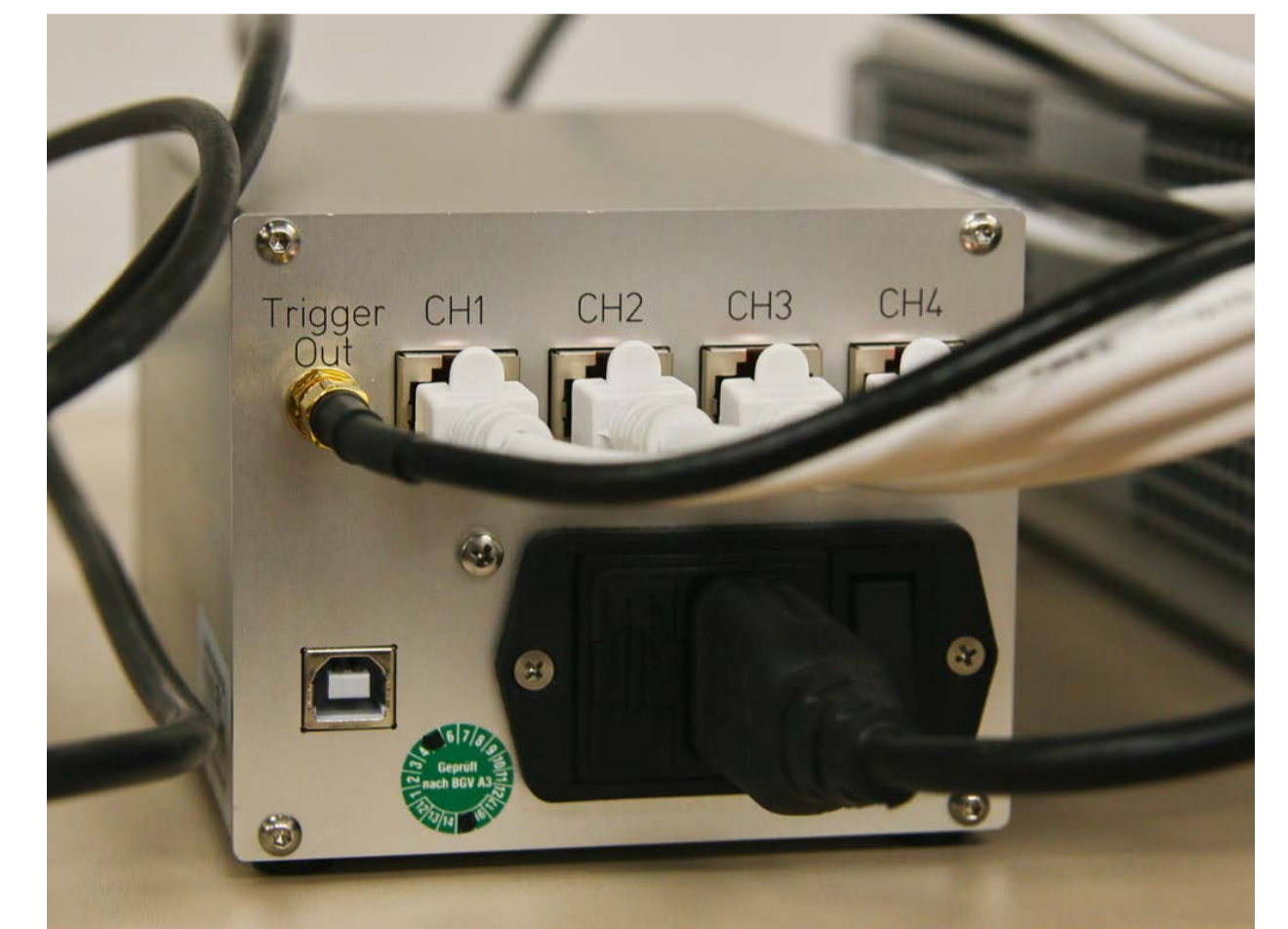
Hamamatsu PMTs H-3370 are combined with plastic scintillators EJ-232. The anode pulses are digitized by Acqiris DC211, DC252 or DC282 digitizers. All PMT's act as start and stop detectors, thus 2, 6 or 12 spectra are collected with 2, 3 or 4 PMT's simultaneously.

Coincidence Unit

A self-constructed coincidence unit triggers the digitizer when PMT signals are detected above a selectable trigger level (8mV...5V, leading edge discrimination). This way, the data volume generated in the digitizer is drastically reduced. The high-impedance coupling to the PMT signals is done straight at the digitizer input. The coincidence time can be adjusted from 20 ns (defect research) to 2 μ s (porosimetry).



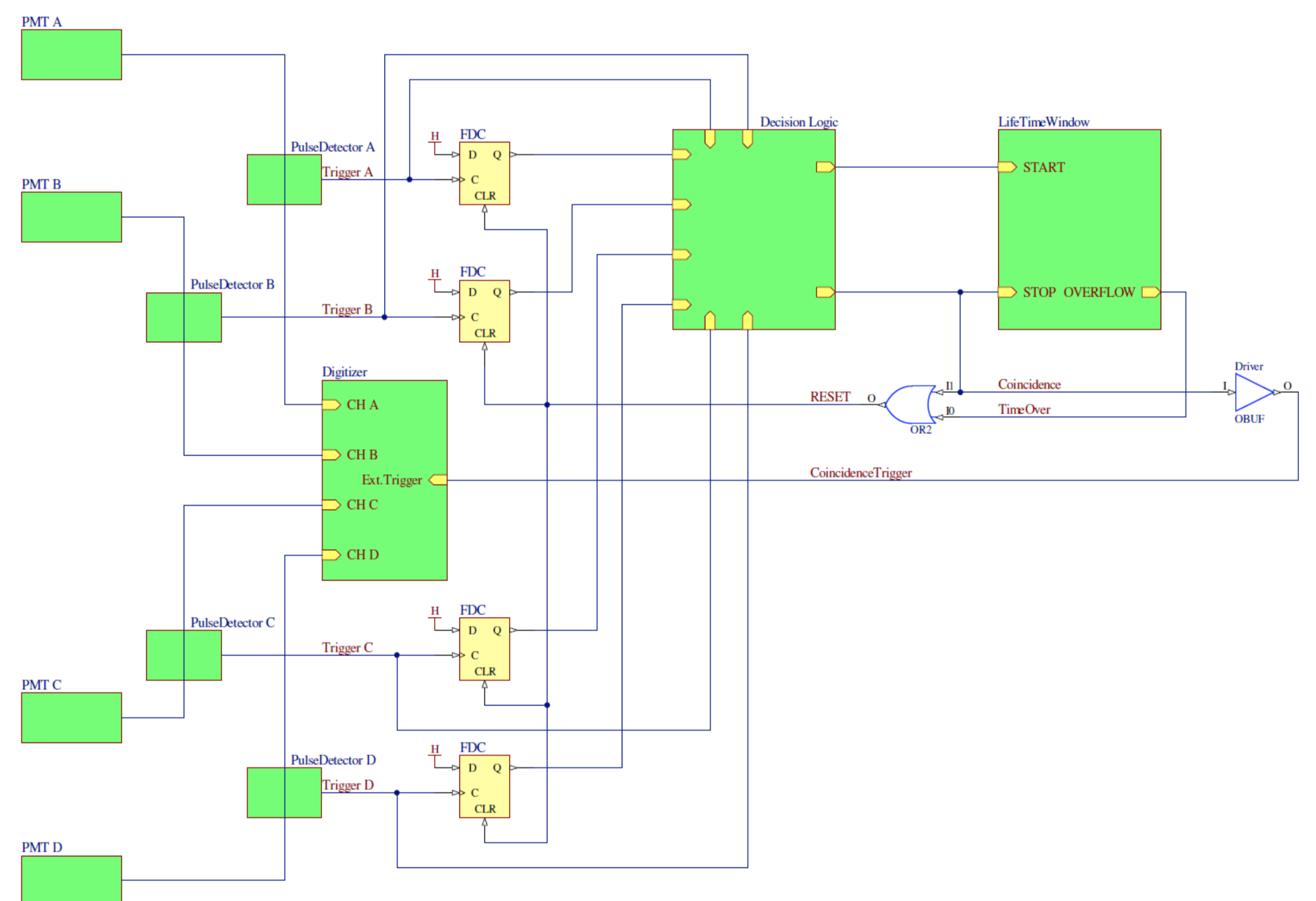
front panel



rear panel

All relevant data are displayed: individual count rates in all channels, coincidence rate, operation mode (2 or 3 channel coincidence – see below), and coincidence time (20ns ... 2 μ s).

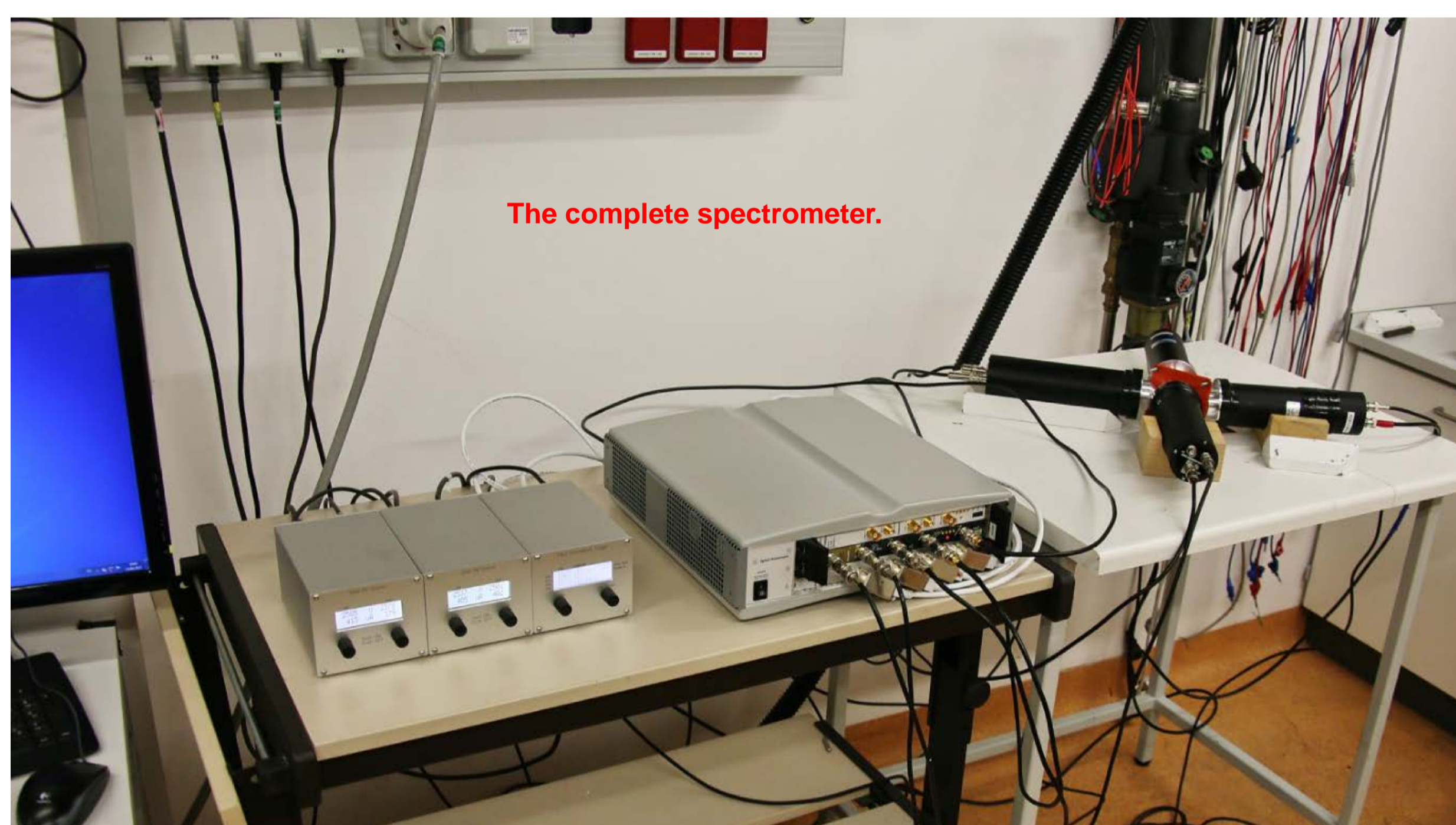
Two different modes are possible: coincidence in two channels (normal mode) and coincidence in 3 channels (two 511 keV quanta must be detected e.g. for radioactive samples). 2, 3 or 4 tubes can be used giving 2, 6 or 12 spectra simultaneously.



Signal "Sniffer"

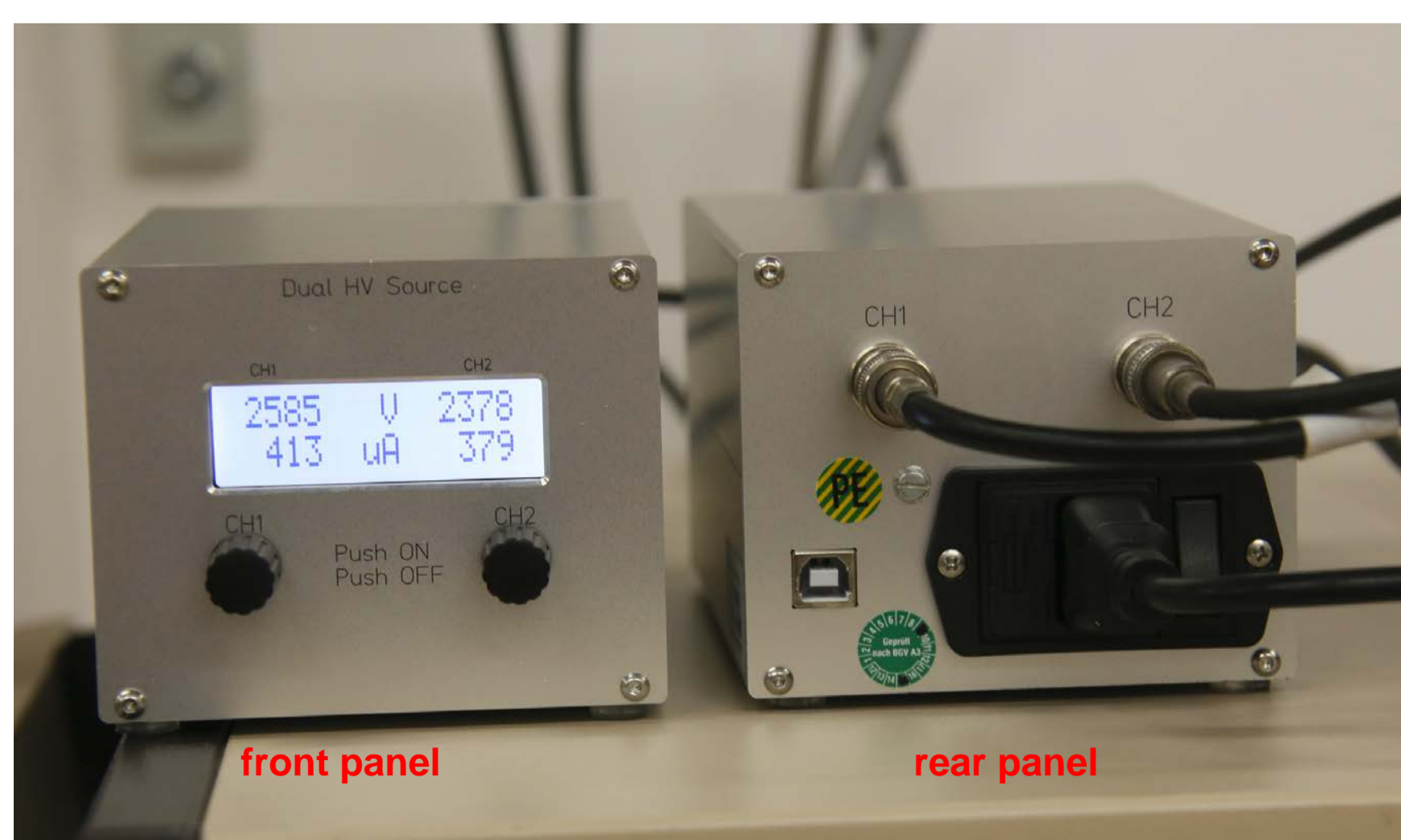


No signal splitter is used for the coincidence unit to avoid the 3dB signal loss. Instead, the signal is obtained by capacitive high-impedance "sniffer" units. An analog amplifier circuit is visible in the photo which elongates and amplifies the signal for further processing in the coincidence box.



The complete spectrometer.

A high voltage box was developed containing two 5 kV PMT HV supply units of ISEG GmbH, Dresden. The box has soft switch-on and -off function and shows the current through the HV divider of the PMT's. Via a rear panel USB port all functions can be controlled and all parameters can be read e.g. from a LabView spectrometer control program.



front panel

rear panel

Remote control

The coincidence unit can also be remote controlled by the rear panel USB connector. This can be done by a simple terminal program or from a spectrometer control program in e.g. LabView or C++. The program can read all settings and all count rates and all settings can be modified remote controlled.

Commercial Availability

We plan to make both units, the PMT HV box and the coincidence unit commercially available. In case of interest, please use the email contact given below. Both devices may be also of interest for perturbed angular correlation spectrometers.

Poster is available at <http://positron.physik.uni-halle.de>
Contact: reinhard.krause-rehberg@physik.uni-halle.de

