

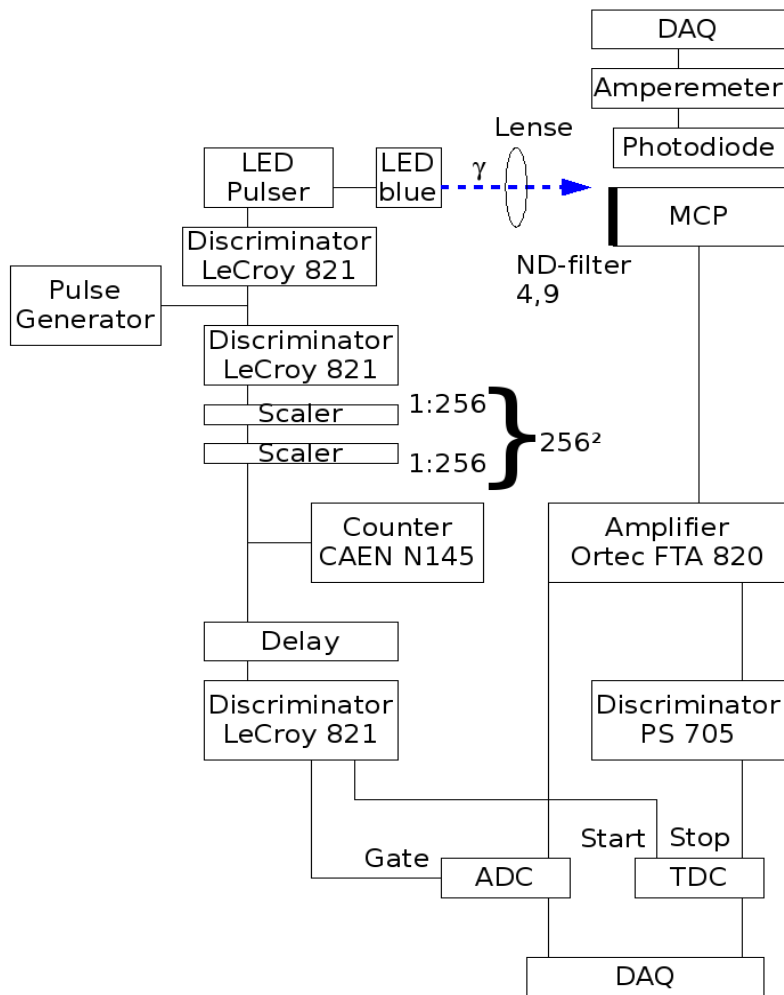
Progress of Lifetime measurement of MCP-PMT BINP #82

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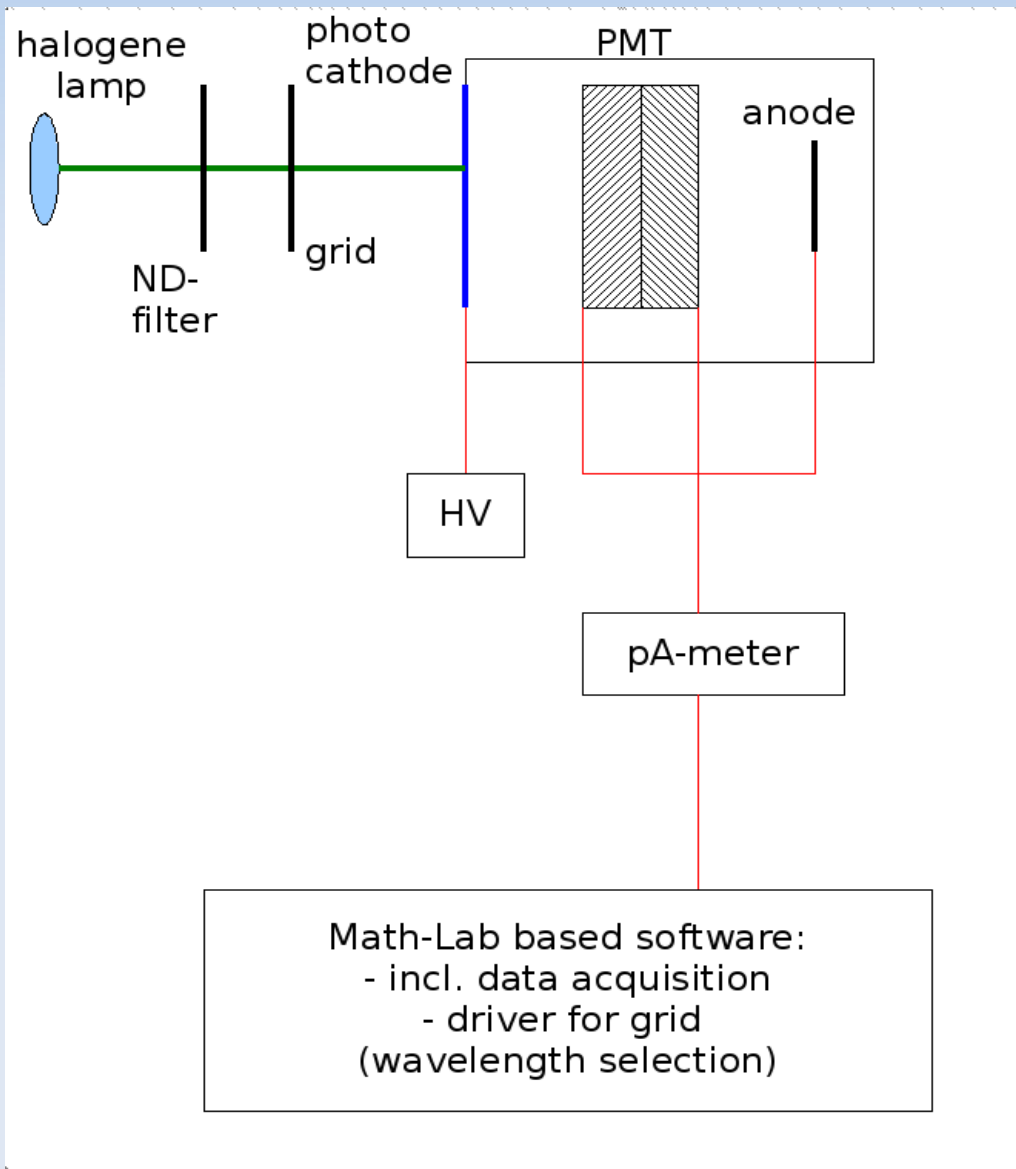
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sponsored by BmBF and GSI

Setup of the Illumination and Gain measurement



- Photodiode for monitoring of LED stability
- 2. Scaler for reduction to 'monitoring mode'

Quantum efficiency measurement

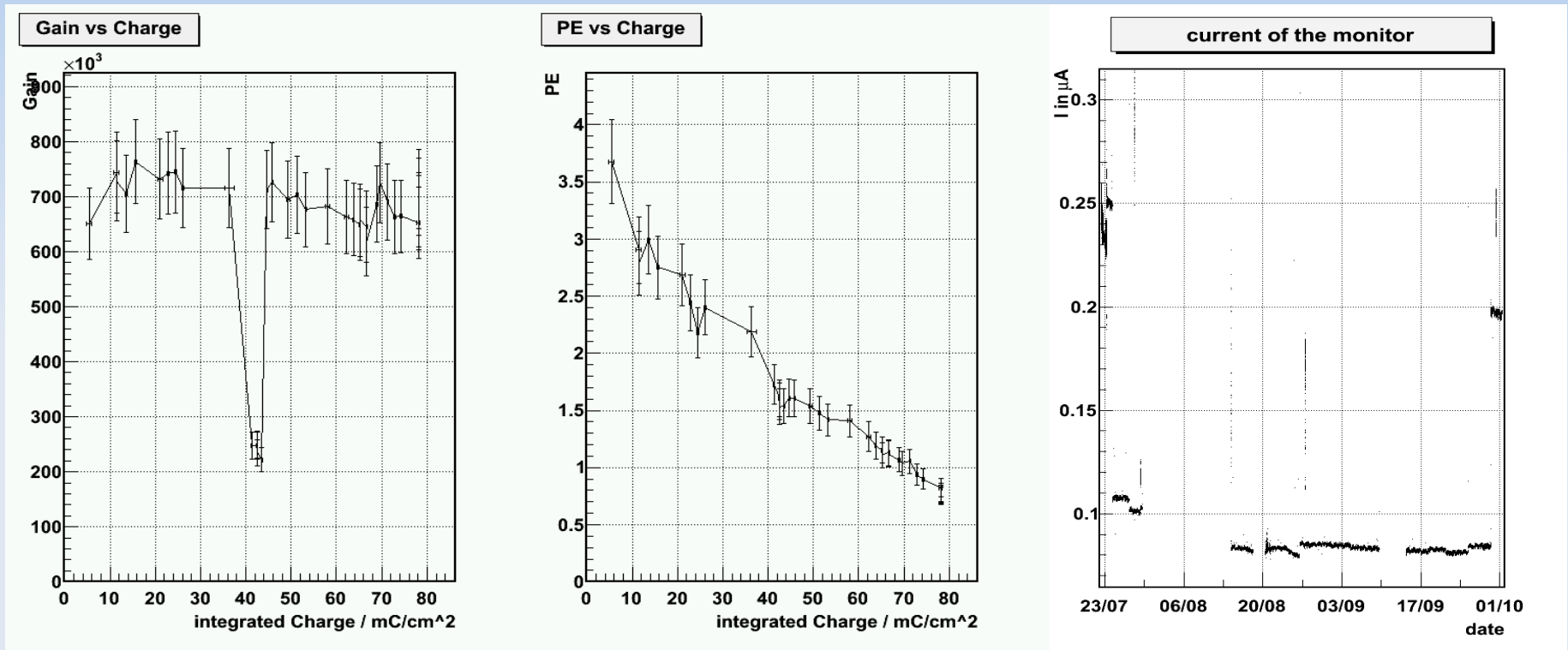


- wavelength selection by grid
- anode and PMT are shorted and current measured

How do we measure?

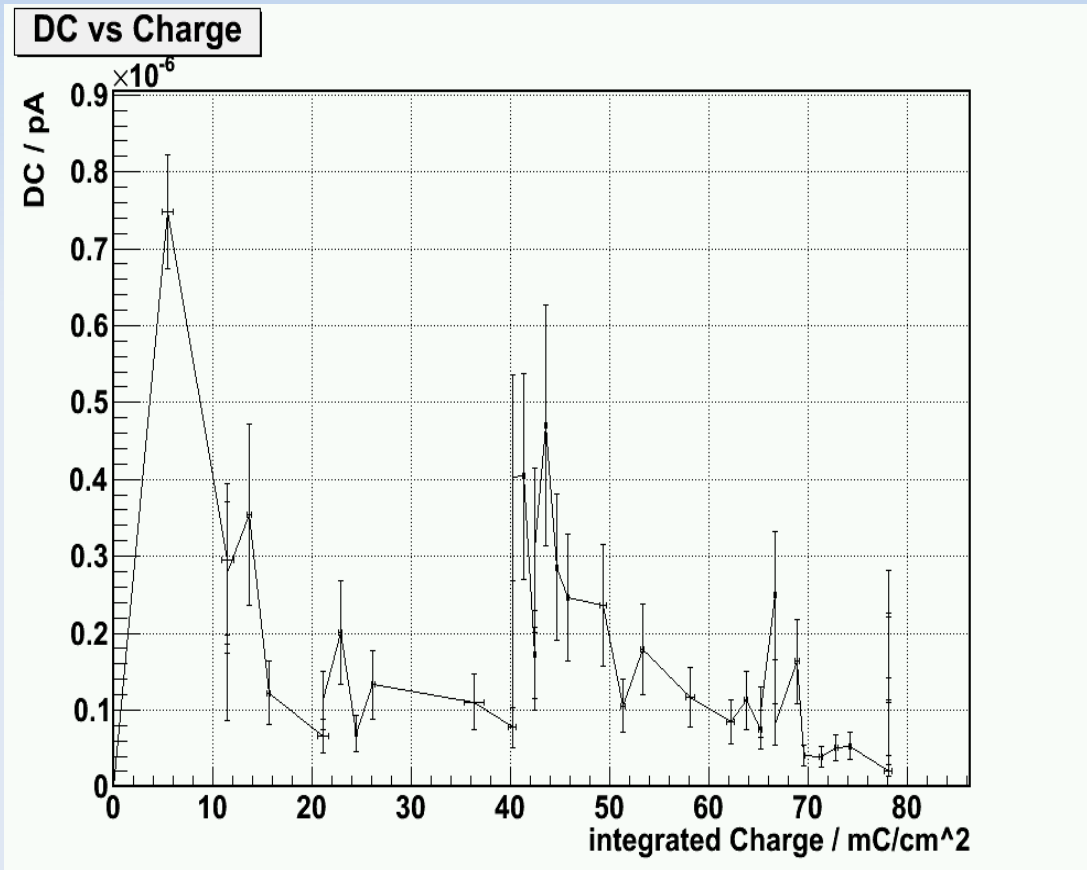
- Measurement of the ADC-spectra (1 Scaler active)
- Illumination, Measurement of the ADC-spectra in 'monitoring mode' = reduced event rate (few Hz) with both Scalers active
- 2. Measurement of the ADC-spectra (1 Scaler active)
- QE-Measurement

Gain and Number of PE



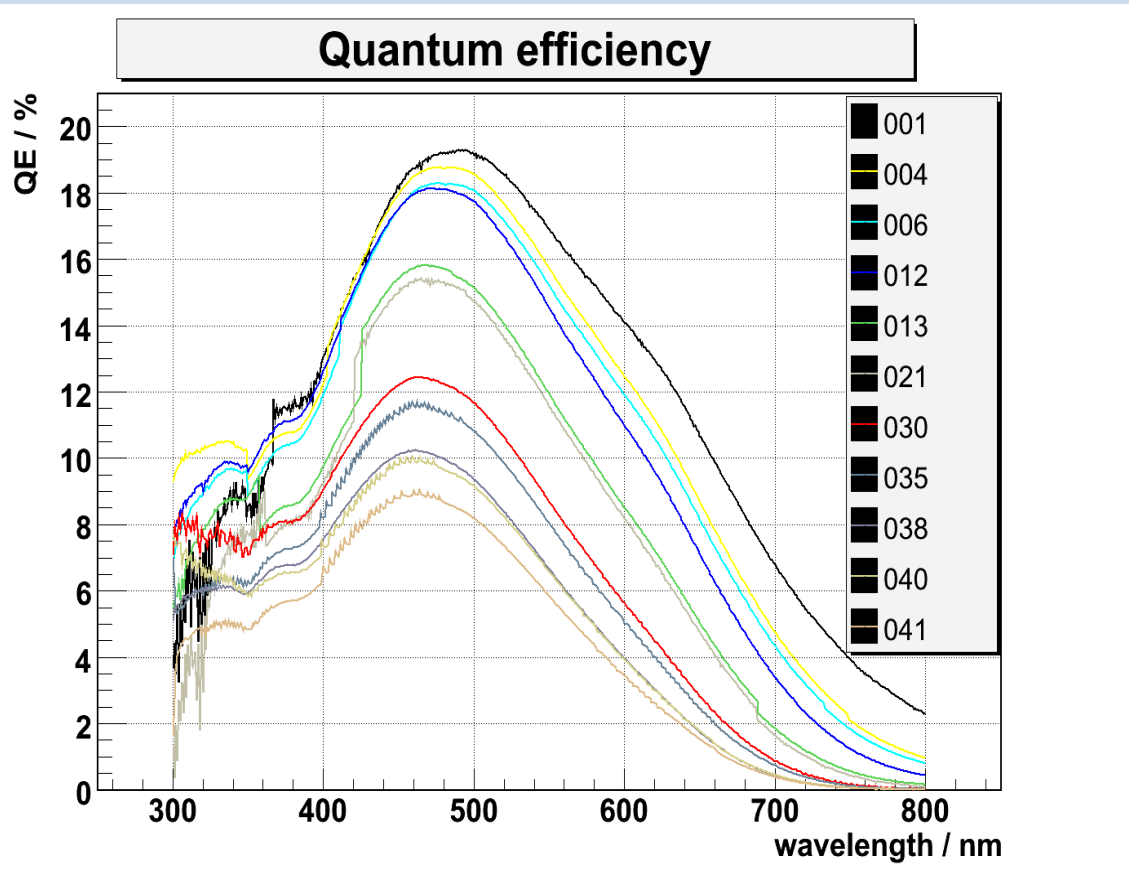
- Gain remains constant, PE decreases by factor ~ 5
- Blackout destroyed +60V channel of HV, resulting in Gain 'gap'

Darkcurrent



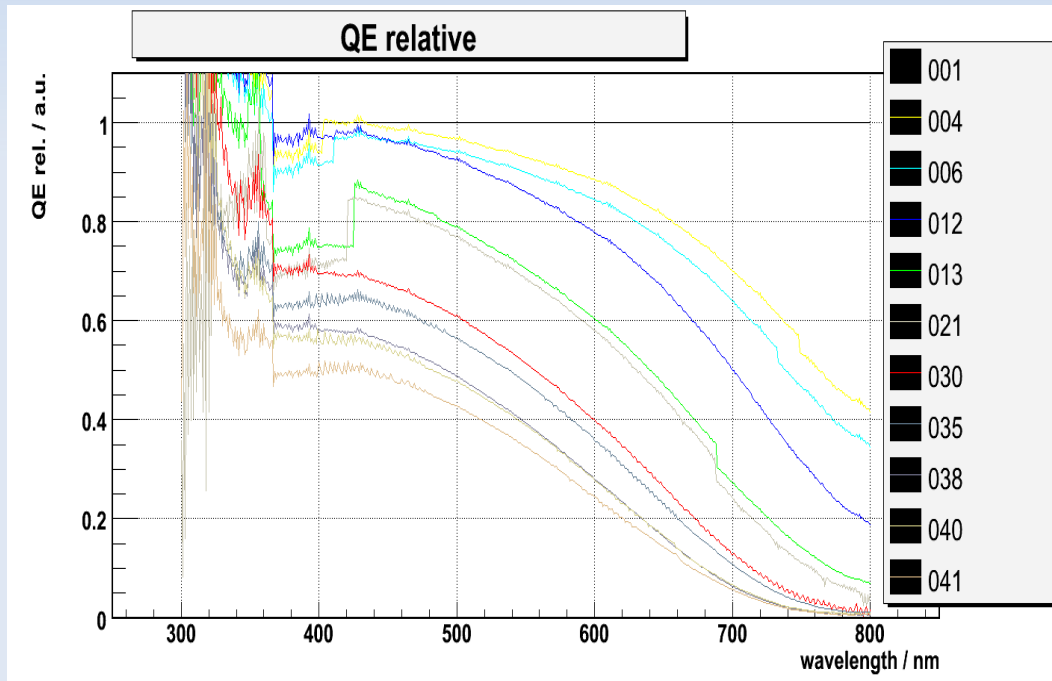
- Measurement error for 5mC/cm²
- strong darkcurrent while 'blackout-measurements'

spectral QE



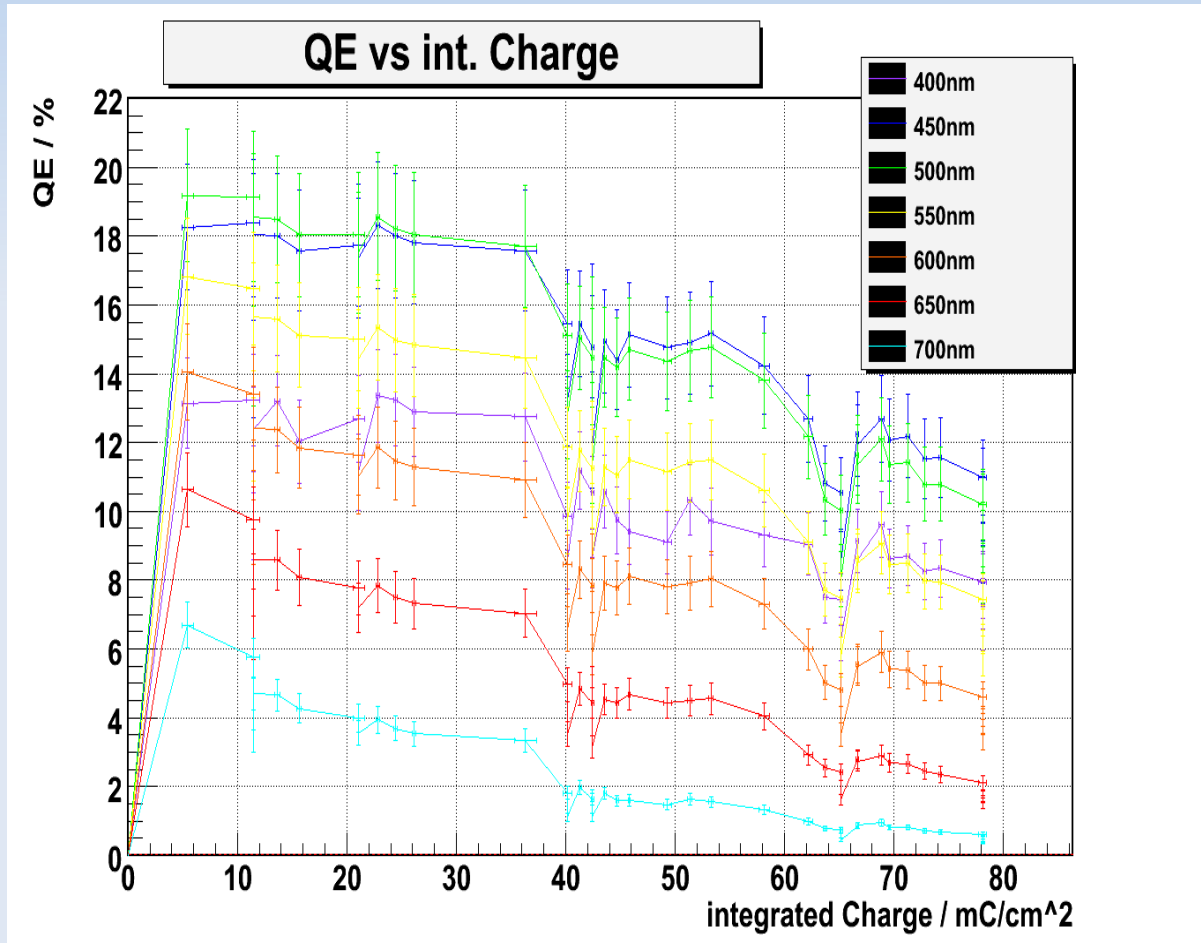
- decrease of QE with higher illumination
- for low wavelengths: darkcurrents dominates because of spectral distribution of the light source

relative QE



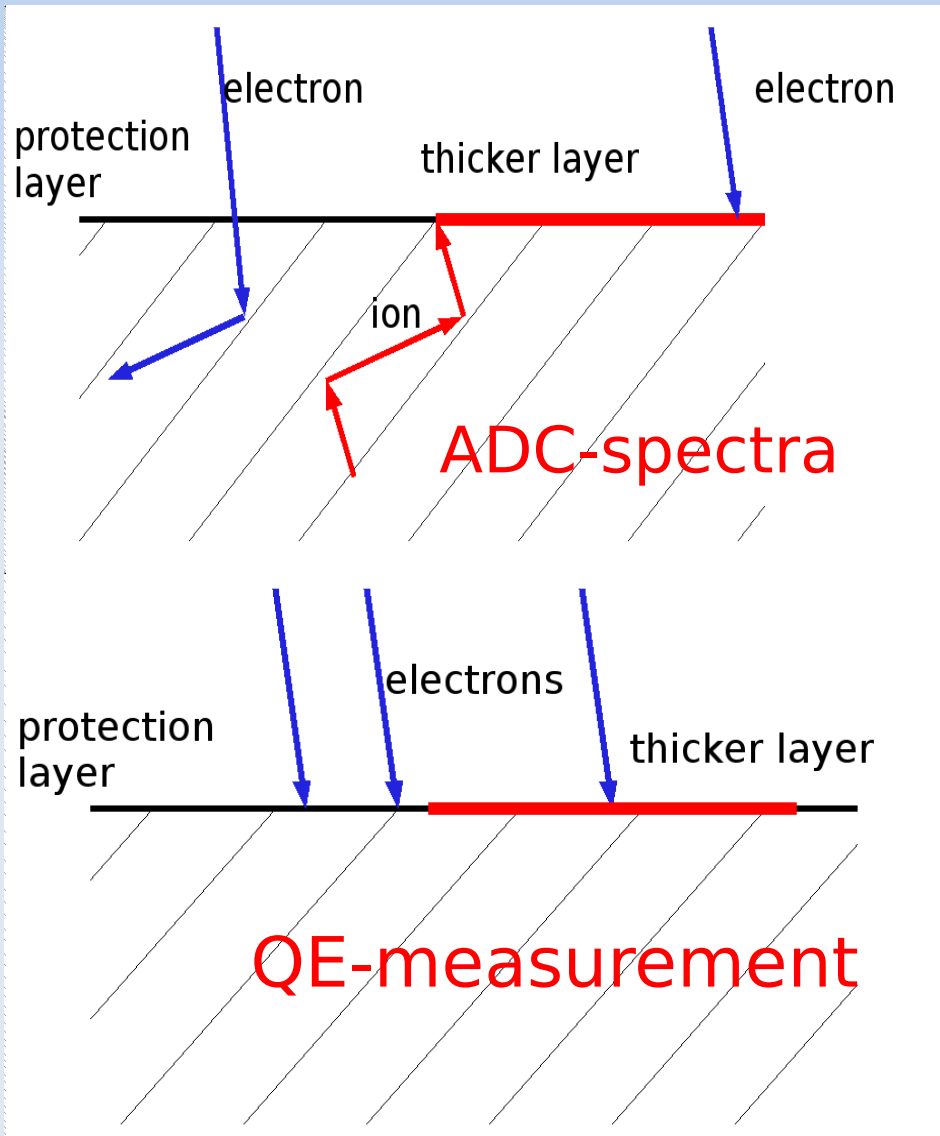
- QE drops significantly faster for higher wavelengths

QE(3)



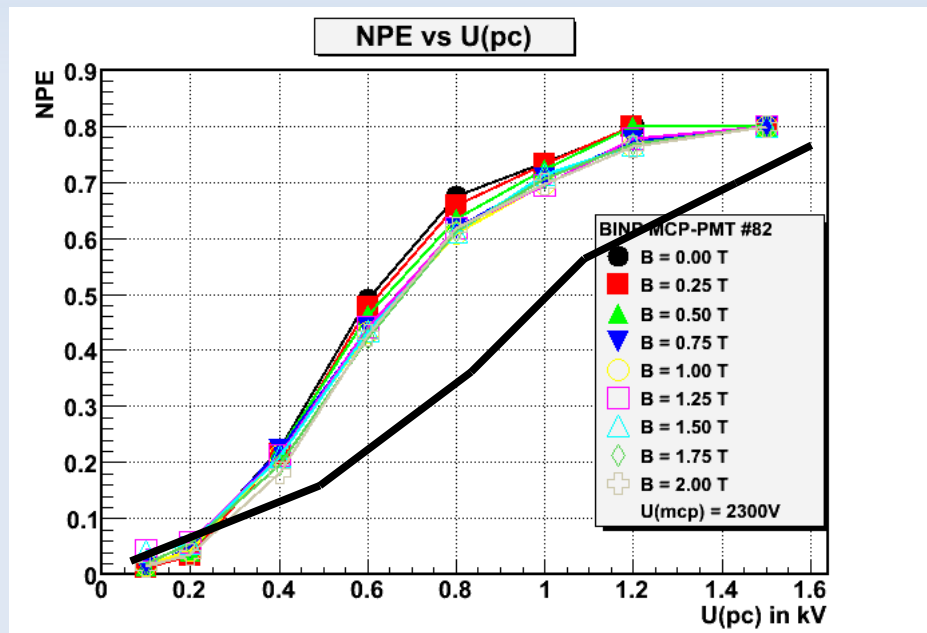
- QE drops by 62%(400nm) to 360%(600nm)
- decrease slower than PE in ADC spectra

possible explanation for difference QE/PE



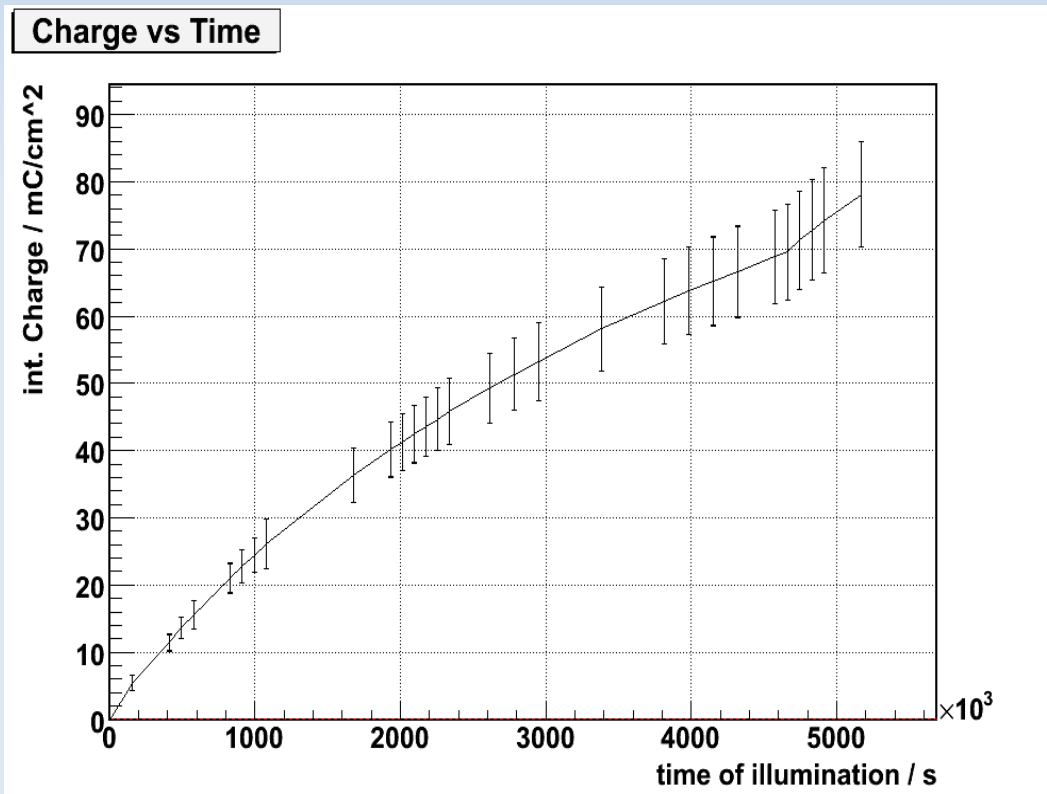
- ions drift back to the protection layer => thickness of layer increases
- increasing thickness of the protection layer results in a decrease of the probability for electrons passing the layer => CE decreases
- QE measurement unchanged

CE measurement



- CE drop should be measureable by varying Cathode-MCP-Voltage
- Higher Voltage needed to collect all electrons

Illumination time



- Charge consumption decreases with increasing time, because of decreasing PE
- jump at $4,65 \cdot 10^6$ s: increase of the illumination rate (500kHz instead of 200kHz)

Outlook

- Measurement of CE drop
- For further lifetime measurements a higher accuracy should be achievable by:
 - better stabilised positioning for QE-measurement
- Lifetime measurement planned for Photonis 85012