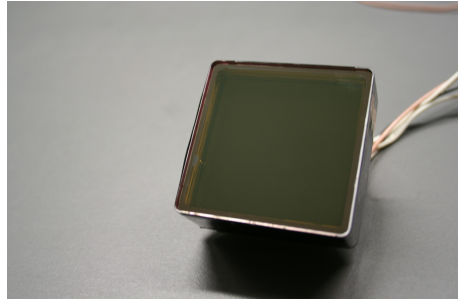


Studies of Photonis XP85013 MCP-PMT

A. Britting, W. Eyrich, A. Lehmann, F. Uhlig
Universität Erlangen-Nürnberg

Photonis XP85013 MCP-PMT

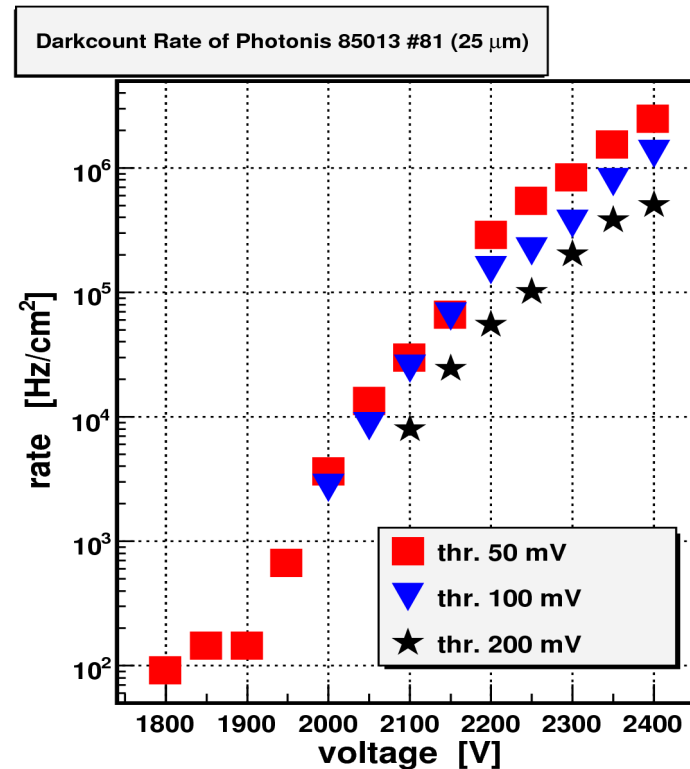
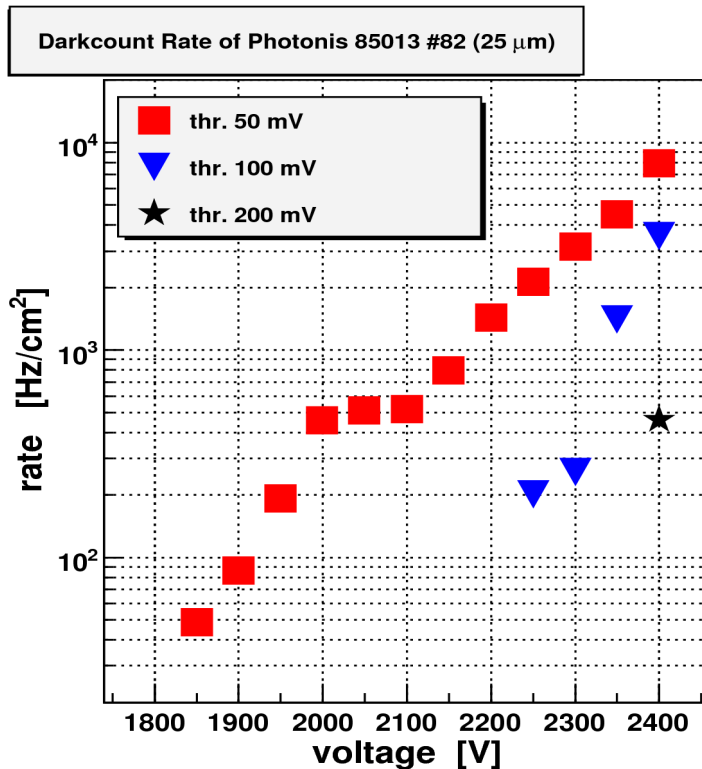


pore size (μm)	25
number of pixels	8x8
pixelsize (mm^2)	5.9 x 5.9
active area (mm^2)	53 x 53
total area (mm^2)	59 x 59
geometrical efficiency	80%
peak Q.E.	@ 400 nm
protection layer	none

Performed Tests

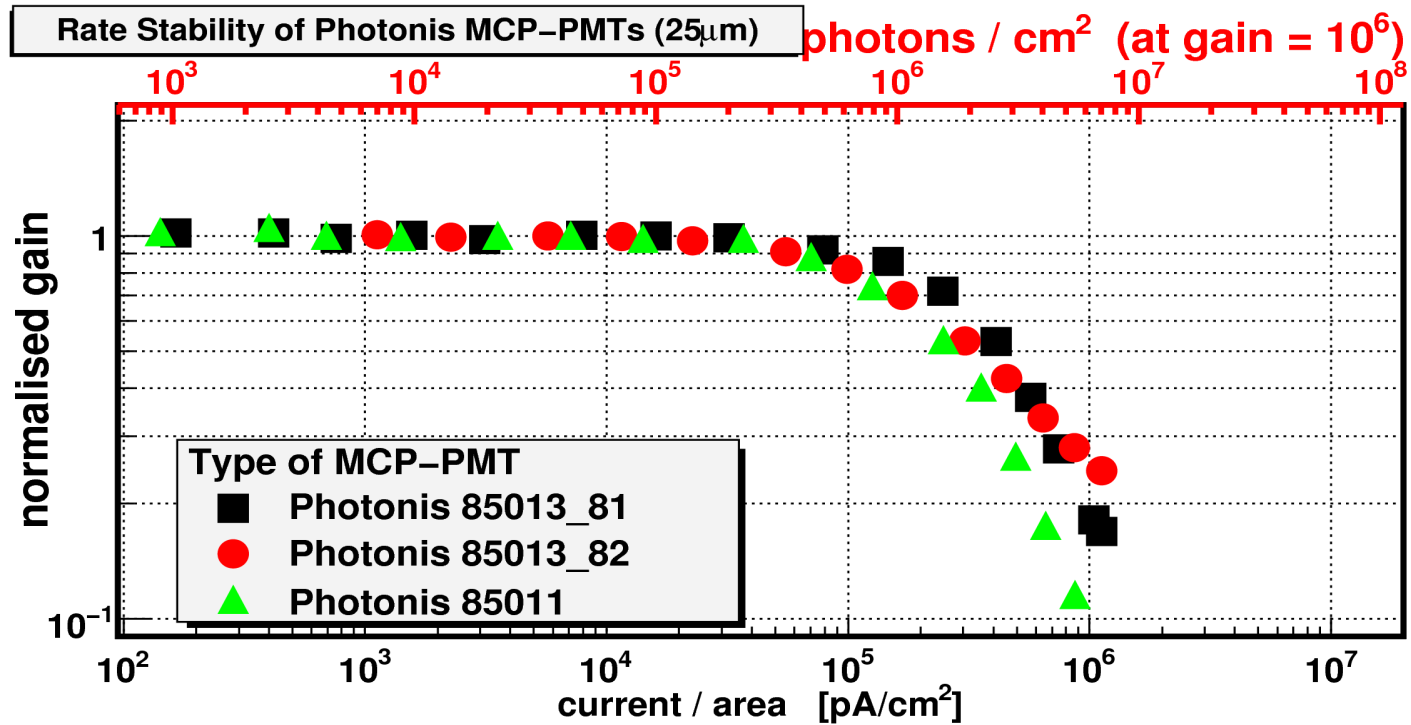
- darkcount rate
- rate stability
- gain
- time resolution
- uniformity
 - count rates
 - gain
- crosstalk

Darkcount Rates



- rates of #82 < 10 kHz
- rates of #81 reach the MHz regime

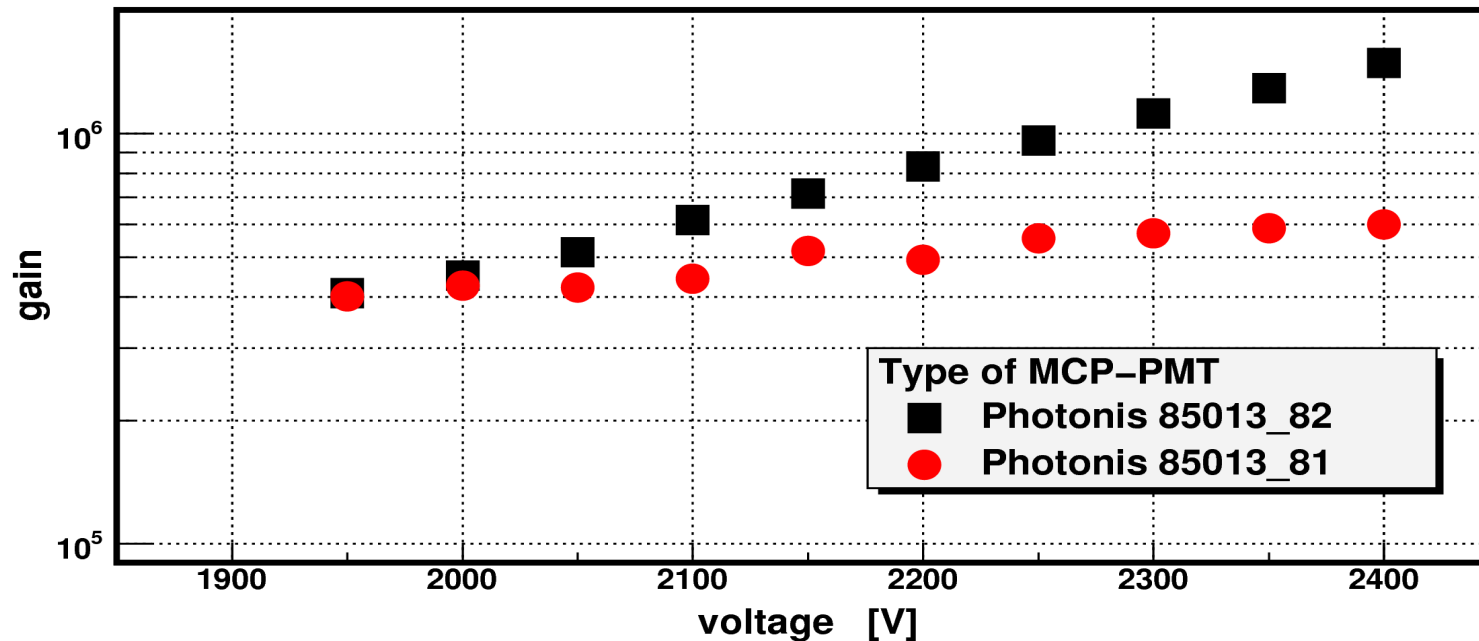
Rate Stability



- different models of Photonis MCP-PMTs (25 μ m) stable up to \sim 400kHz photons/cm² \rightarrow most likely same material of MCPs

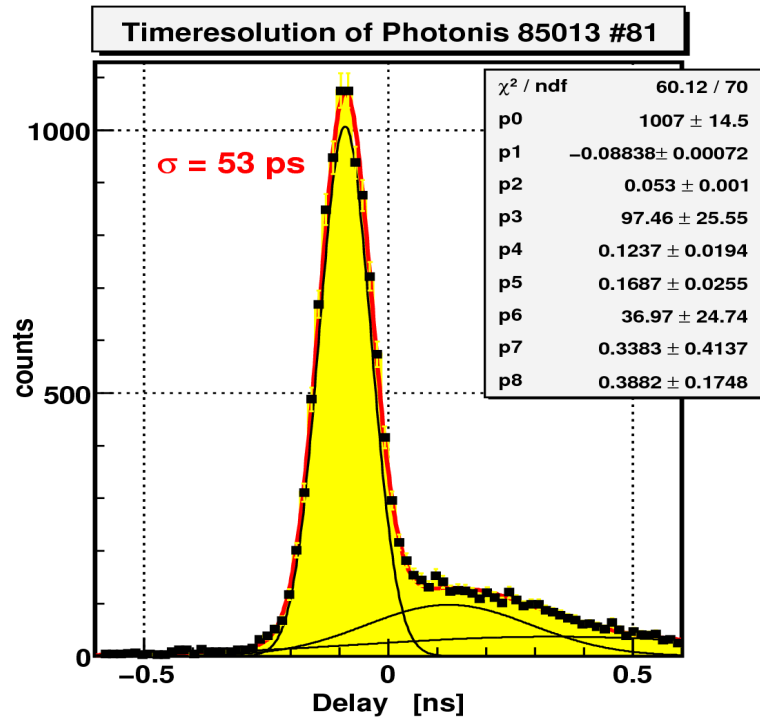
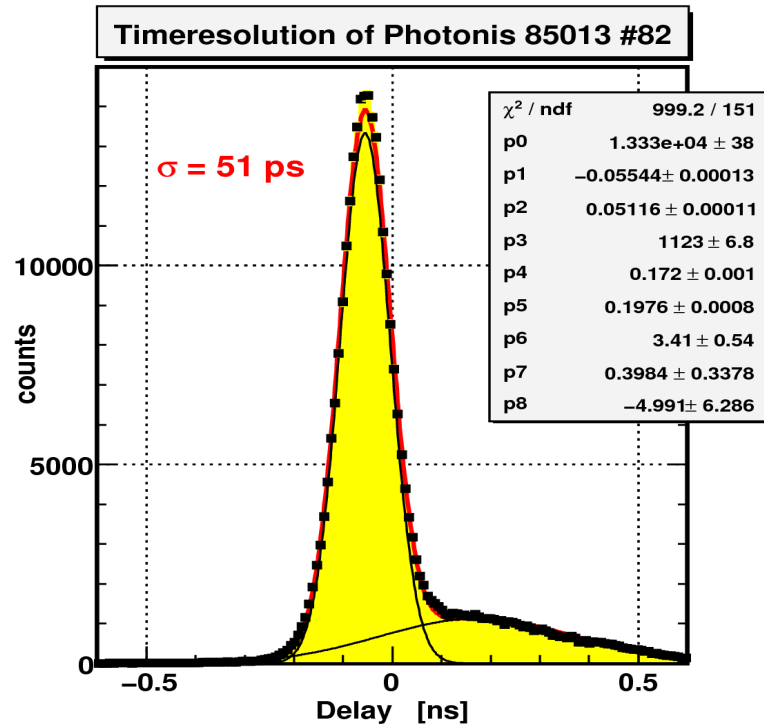
Gain

Gain vs Voltage of Photonis MCP-PMTs (25 μ m)



- Gain of #81 does not increase that much due to high darkcount rates at higher voltages

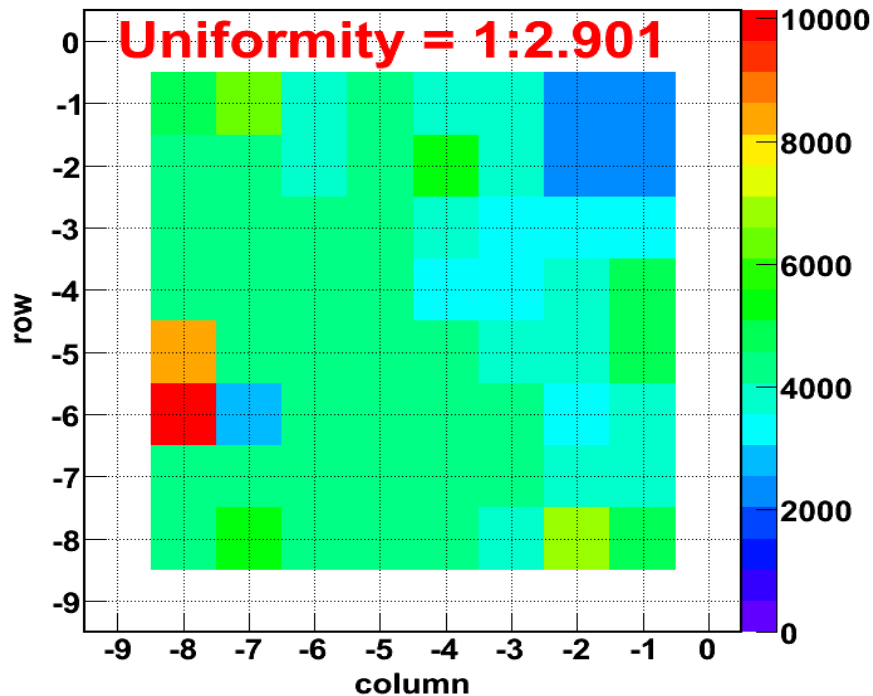
Time Resolution



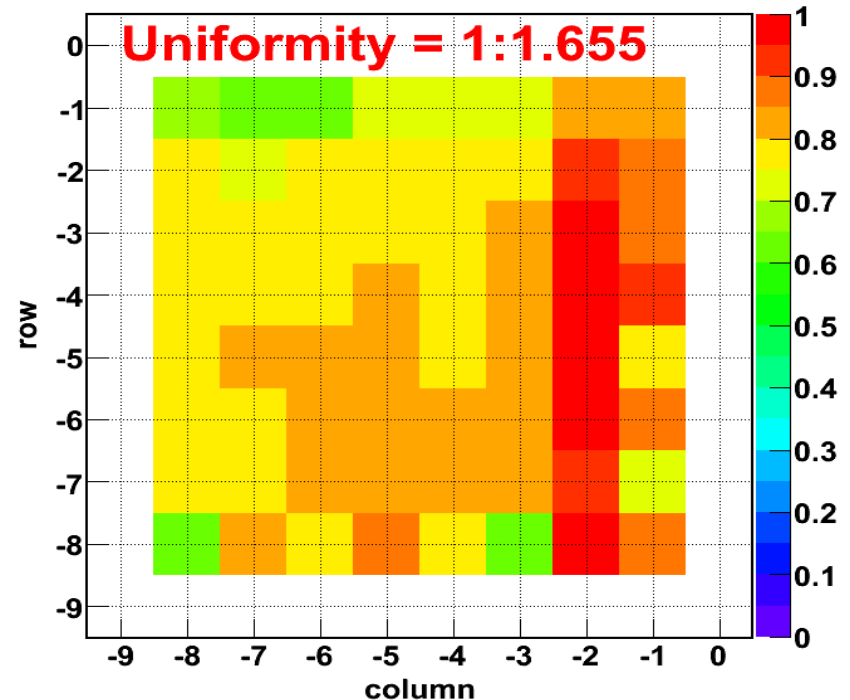
- measured with fast oscilloscope LeCroy WavePro 7300A
- time resolution for both dectectors around 50 ps

Uniformity Countrates

Rates Photonis 25 μm - 85013 #82



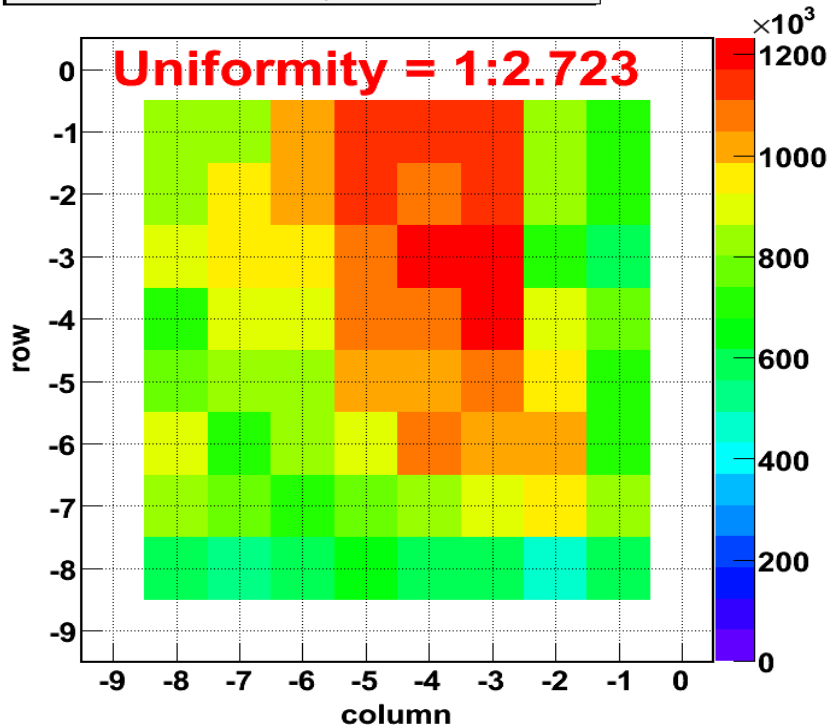
rel. Rates Photonis 25 μm - 85013 #81



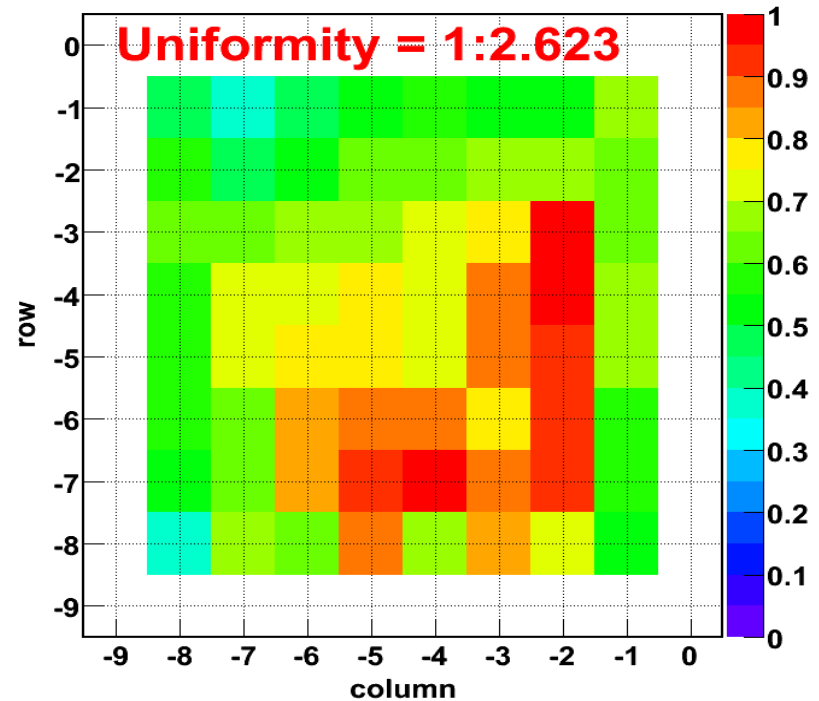
- Bad uniformity of #82 because of four pixels with low rates in the upper right
- #81 shows good uniformity

Uniformity Gain

Gain Photonis 25 μm - 85013 #82

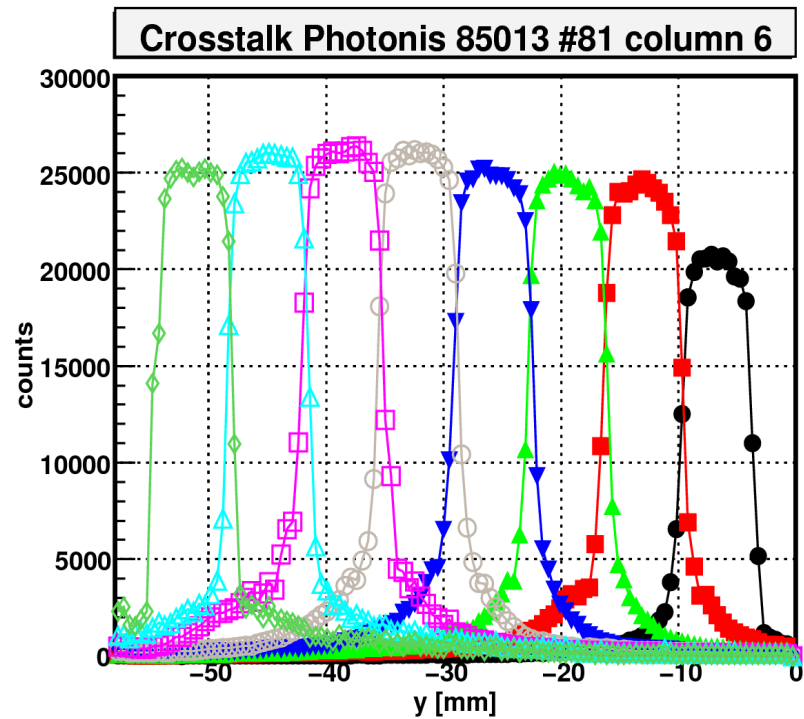
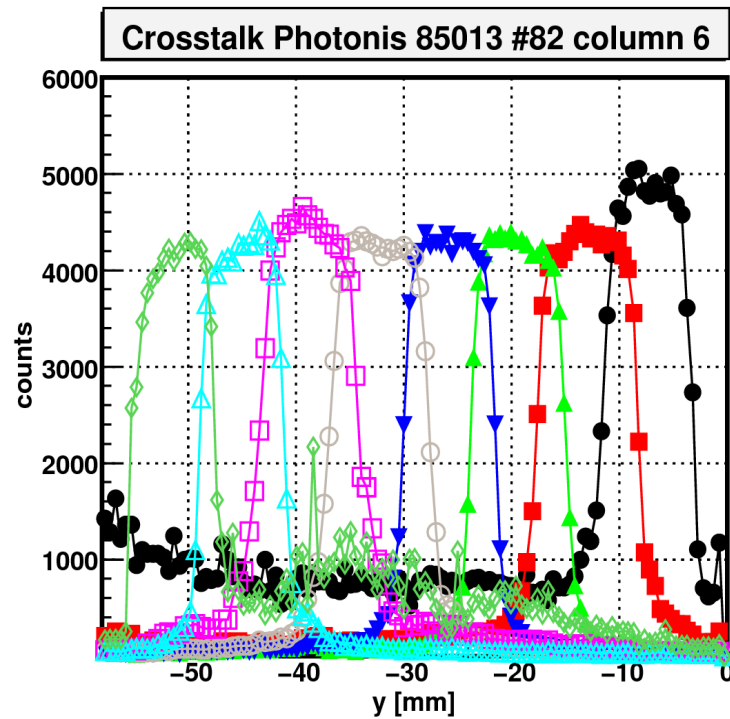


rel. Gain Photonis 25 μm - 85013 #81



- similar uniformity
- both detectors with gain "hotspots"

Crosstalk

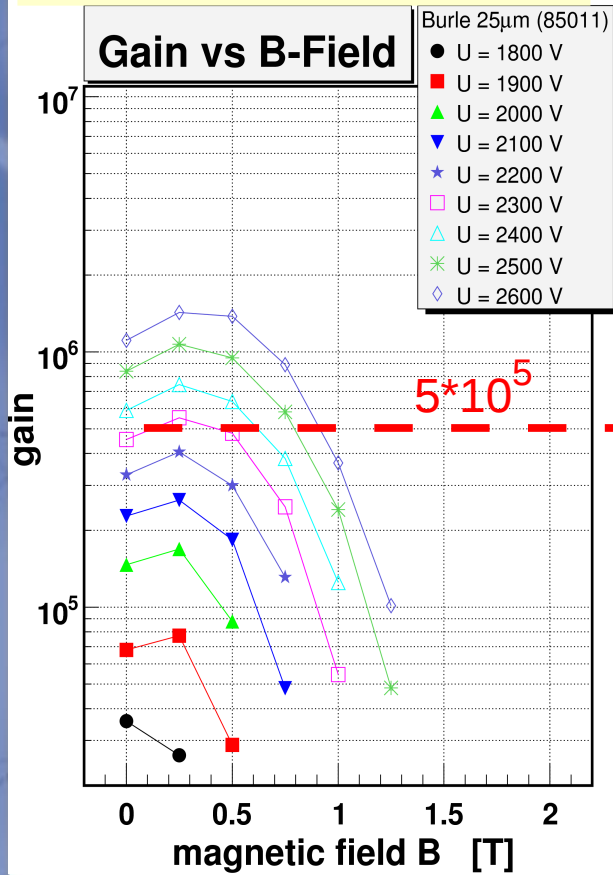


- First and last pixel of #82 show rates all over the column
- Pixels of both detectors get response when neighbourpixel is illuminated in the center

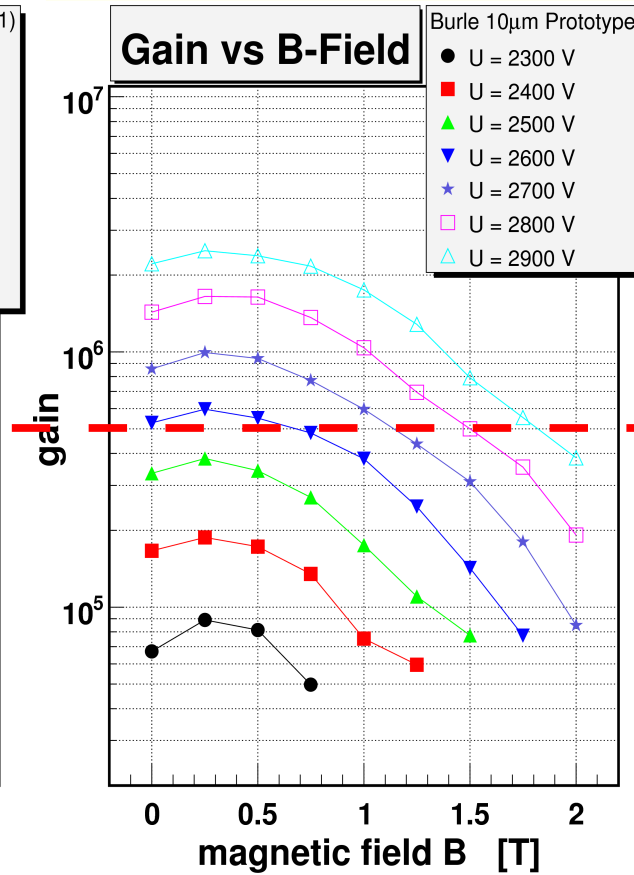
Summary and Outlook

- Photonis XP85013 MCP-PMT fulfills most requirements of photosensors for use at Barrel-DIRC
- Lifetime measurements on Photonis XP85012 (better vacuum and smoother surface)

Burle 85011 (25 μ m)



Burle Prototype (10 μ m)



BINP #73 (6 μ m)

