Progress in Erlangen

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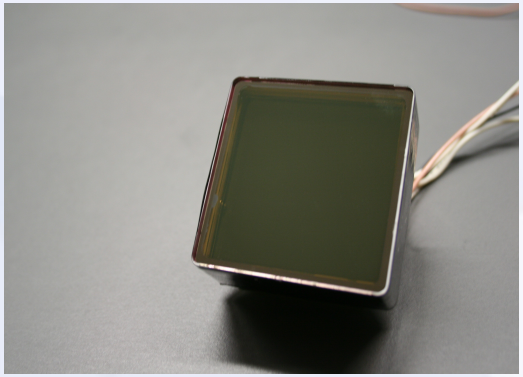
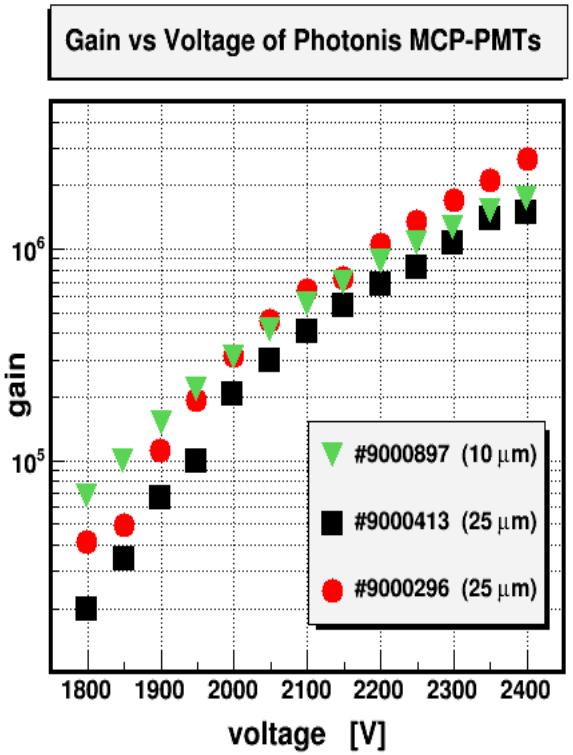
Measurements on Photonis MCP-PMTs

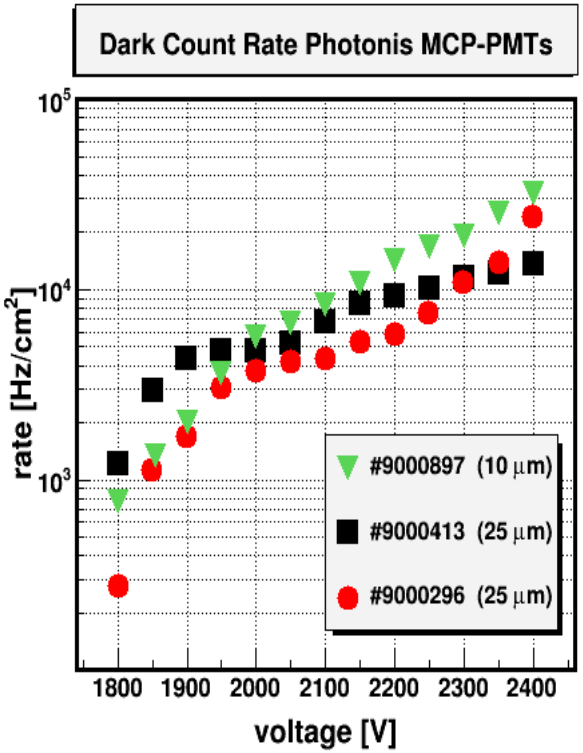
- Several measurements for XP85012 (25µm) and XP85112 (10µm)
- Magnetic field measurements in Juelich (July)
  - XP85012 and XP85112

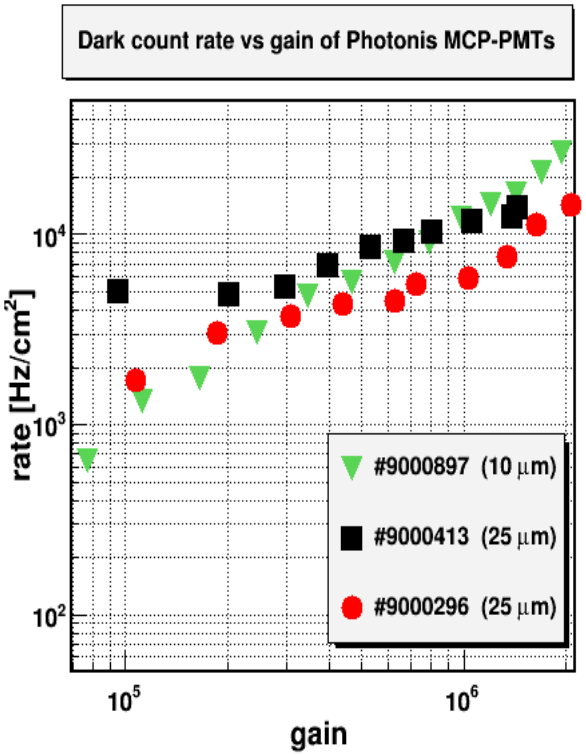
pore size (µm)	10 (85112) and 25 (85012)
number of pixels	8x8
pixelsize (mm^2)	5.9 x 5.9
active area (mm^2)	53 x 53
total area (mm^2)	59 x 59
geom. efficiency	80%
comments	improved vacuum



Darkcount of Photonis MCP-PMTs

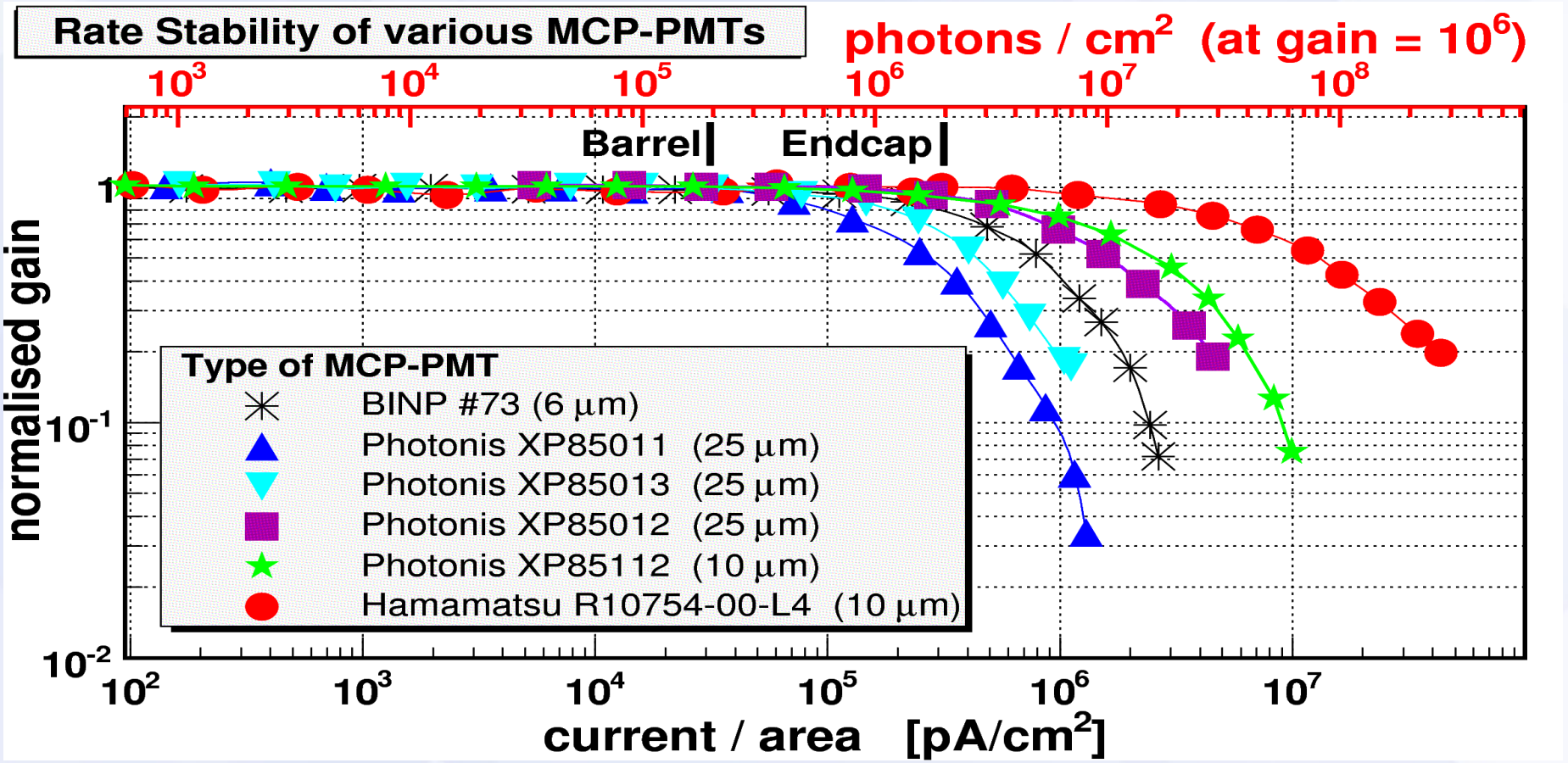






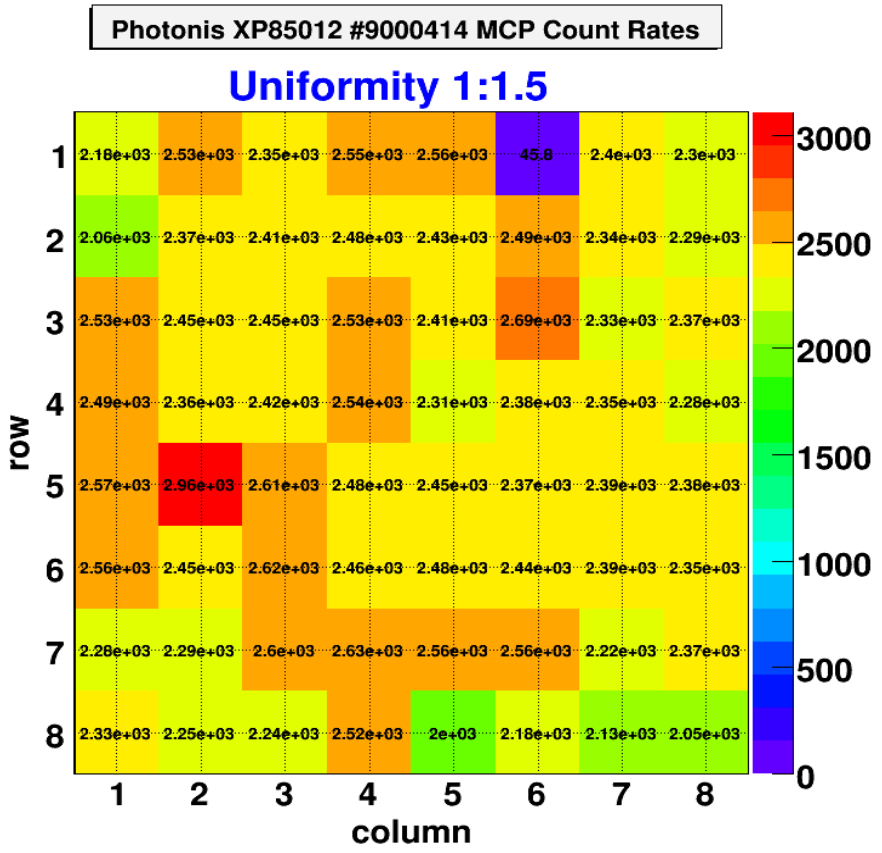
- Darkcount rate (gain 10^6; thresh. 50 mV; ampl. x200): 5-15 kHz/cm^2
- Similar slope for both XP85012 models and XP85112
- Voltage supply for XP85112 500V higher (2.3 - 2.9kV)

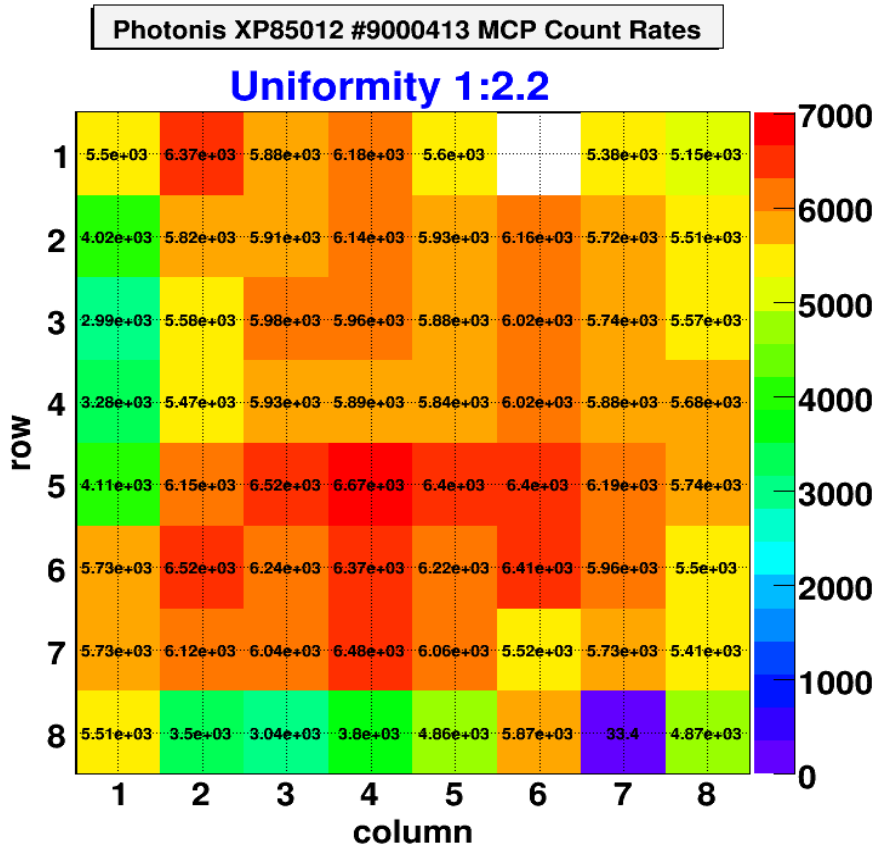
Rate Stability of various MCP-PMTs



- rate stability of 85112 (10μm) slightly better than 85012 (25μm)
- XP85112 stable up to ~2 MHz/cm² s.ph. → okay for both barrel and disc DIRC

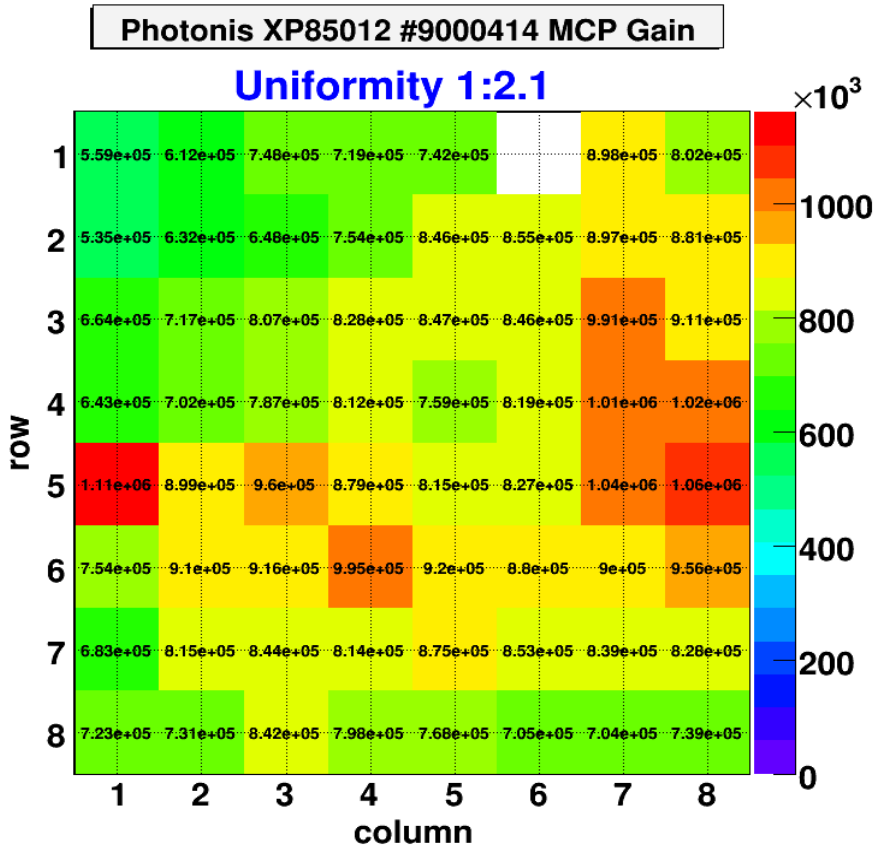
Uniformity Count Rates XP85012

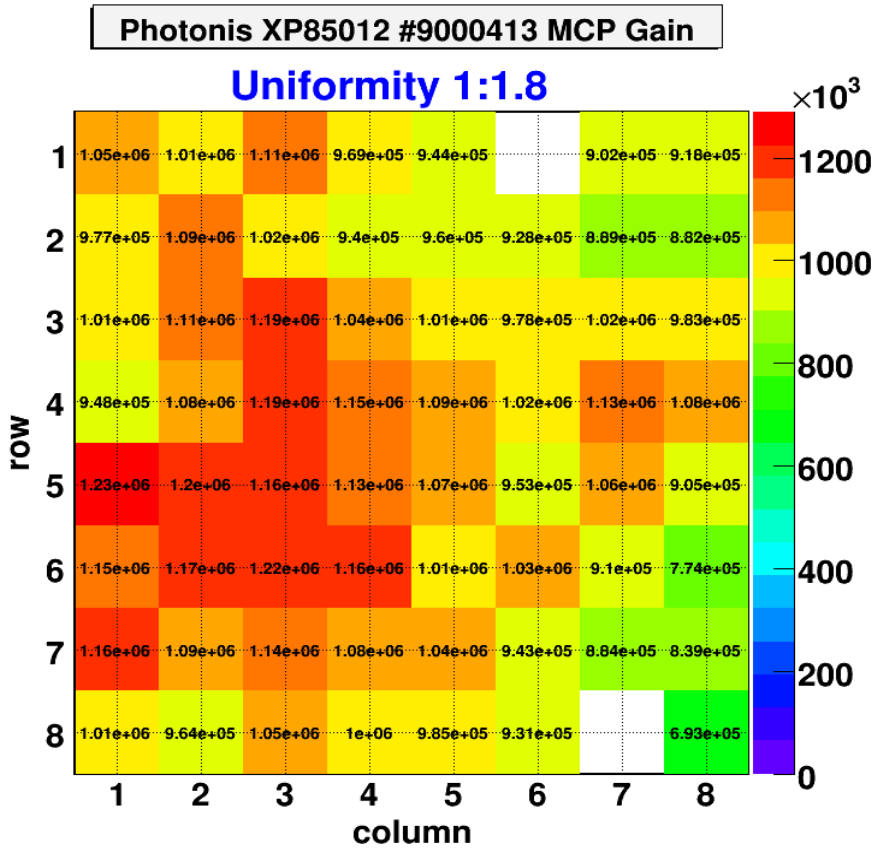




- count rates vary by factor ~ 2
- dead pixels due to electronic problems

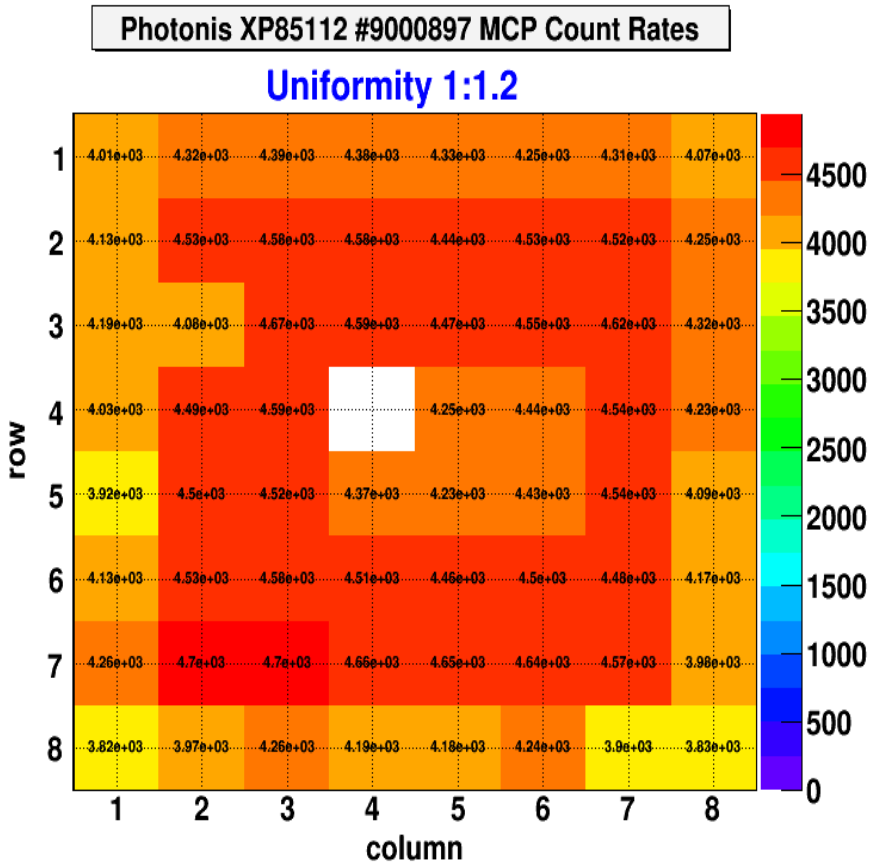
Uniformity Gain XP85012

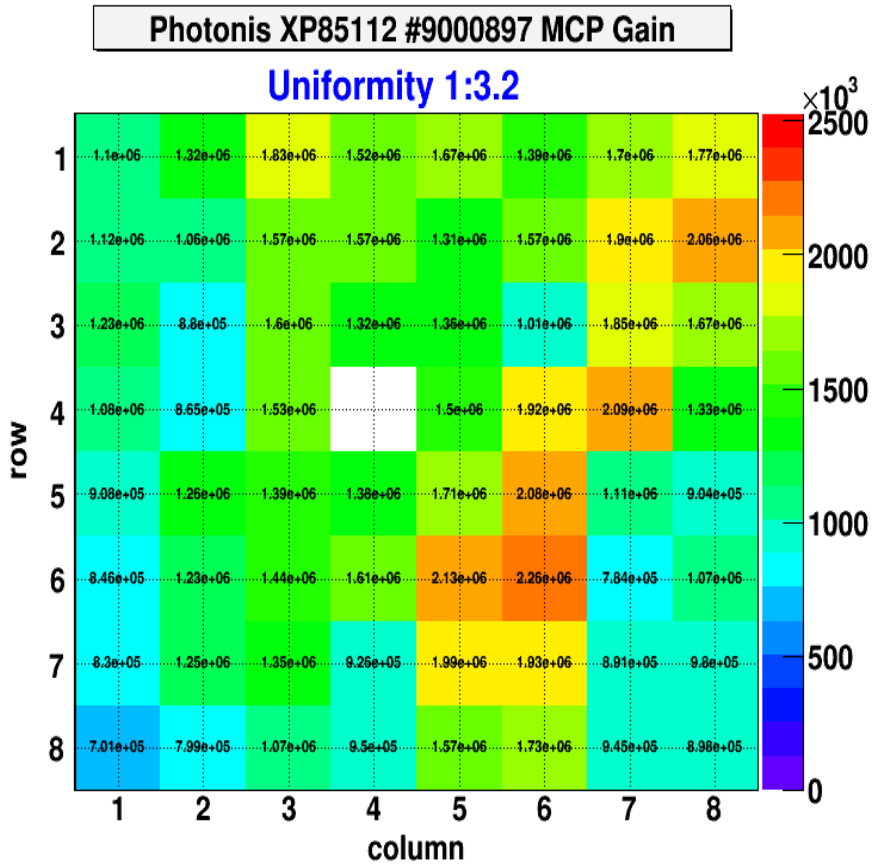




- gain varies by factor ~ 2
- dead pixels due to electronic problems

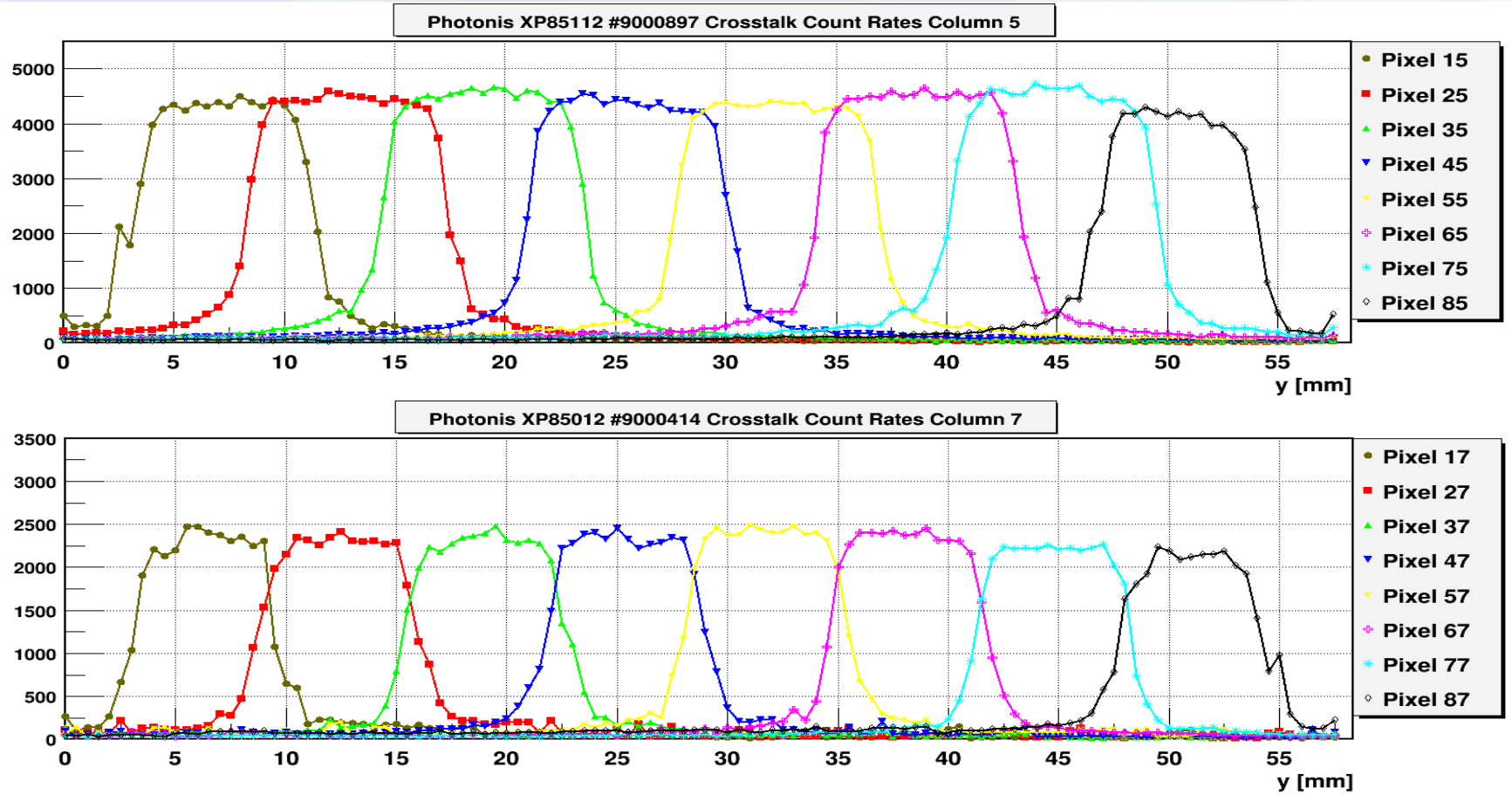
Uniformity XP85112





- very good Uniformity for count rates
- gain varies by factor ~3

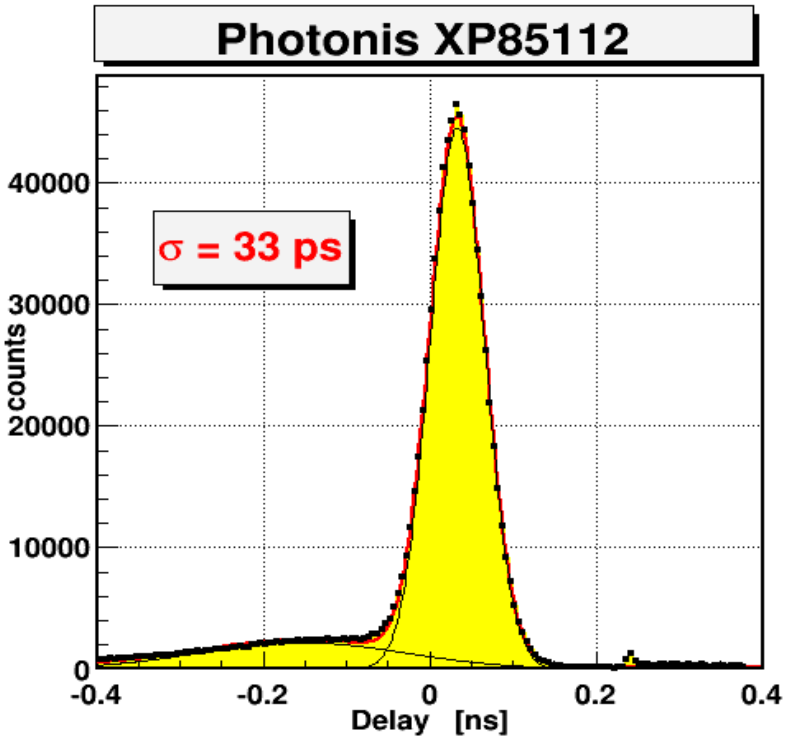
Crosstalk XP85012 and XP85112

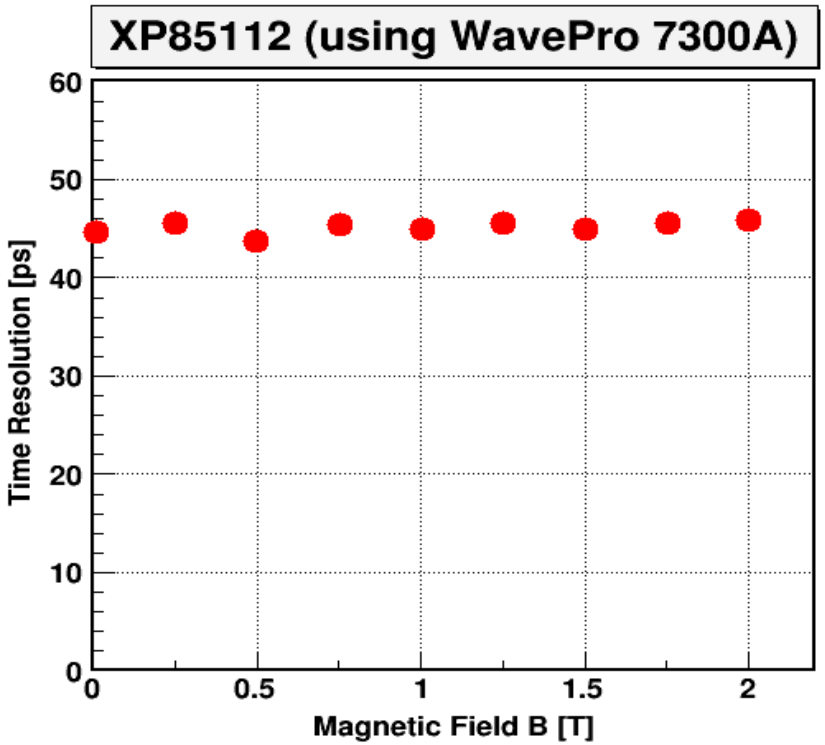


- XP85012 shows less crosstalk than XP85112

XP85112 Single Photon Time Resolution

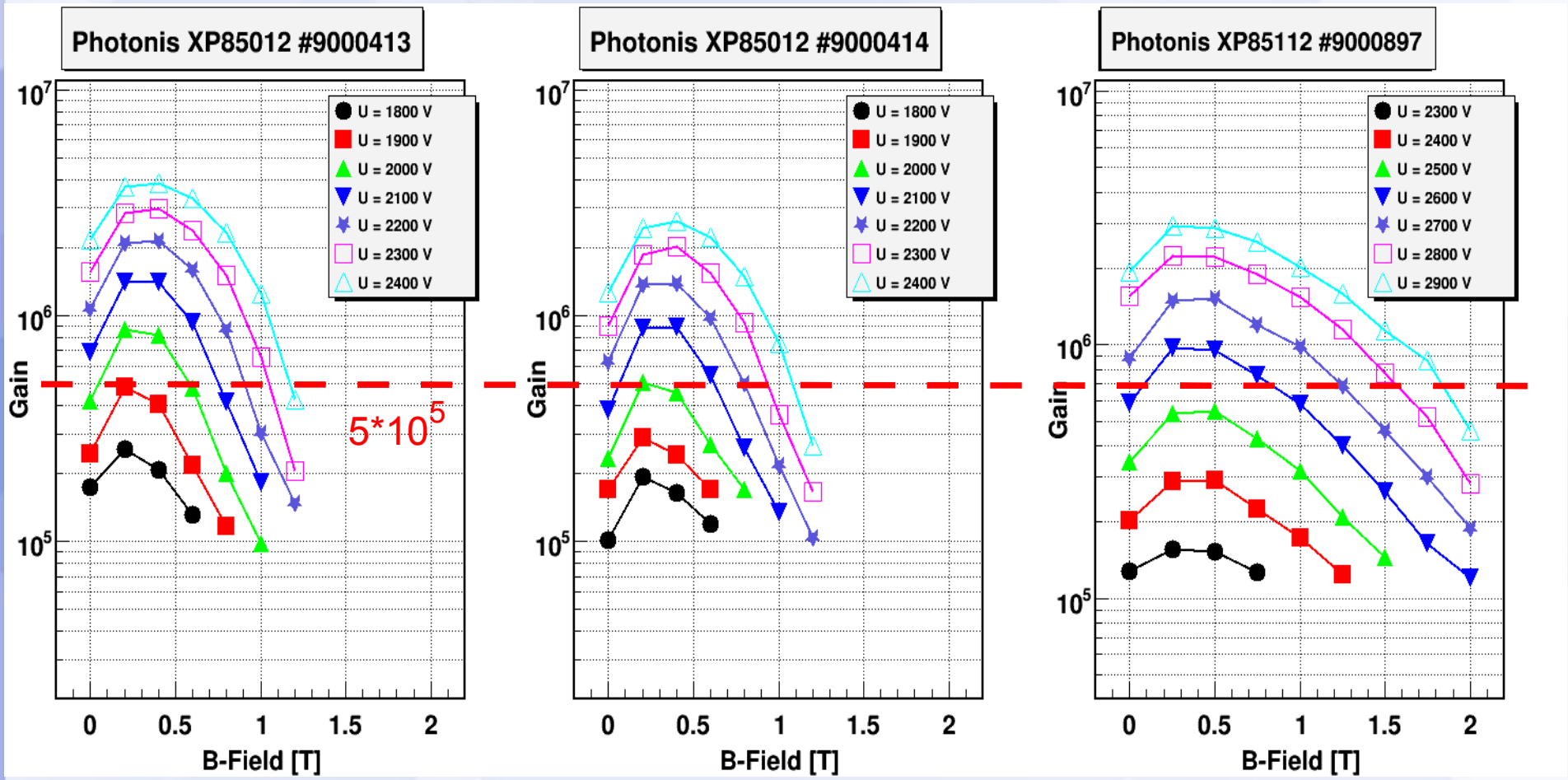
Amplifier Ortec FTA820 (x200; 350 MHz) --- Discriminator Philips Scientific 705





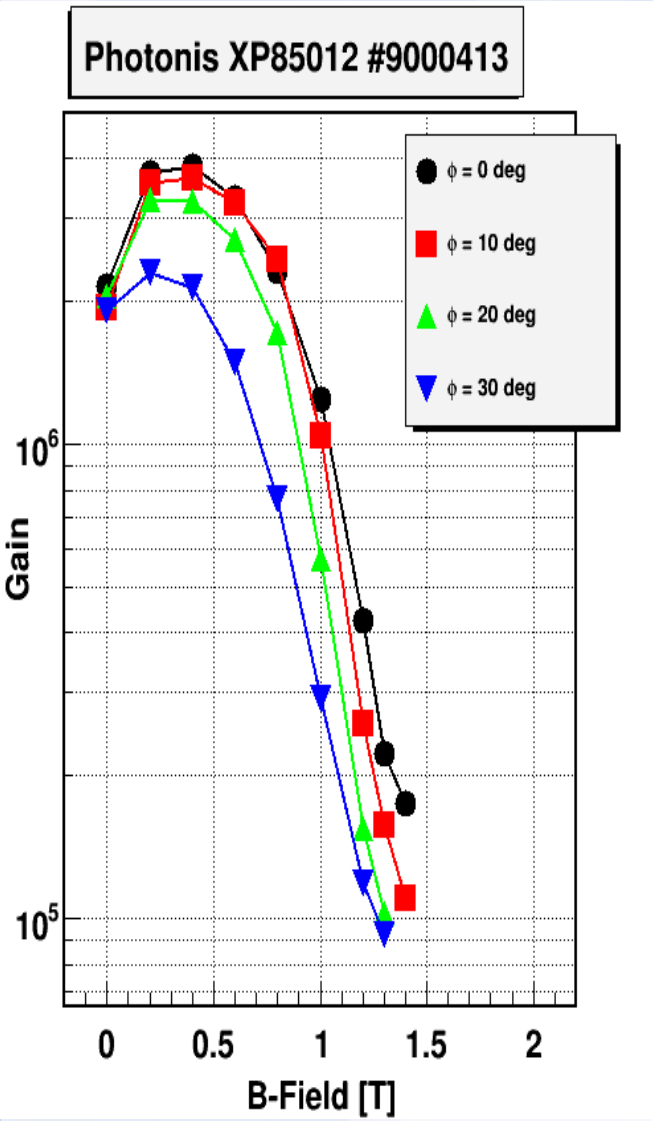
- time resolution < 35 ps
- **no dependence on the B-field**

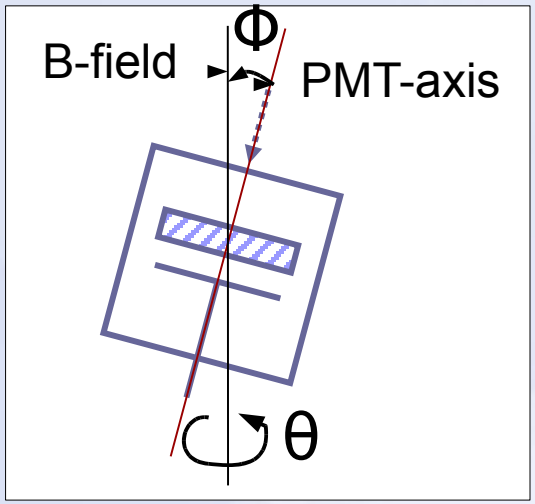
Gain in Magnetic Field



- 25 µm MCP gain breaks down at ~1 T → marginal for Barrel DIRC
- 10 µm MCPs should be suitable for both Endcap and Barrel DIRC

Gain and Direction of B-Field (Φ)

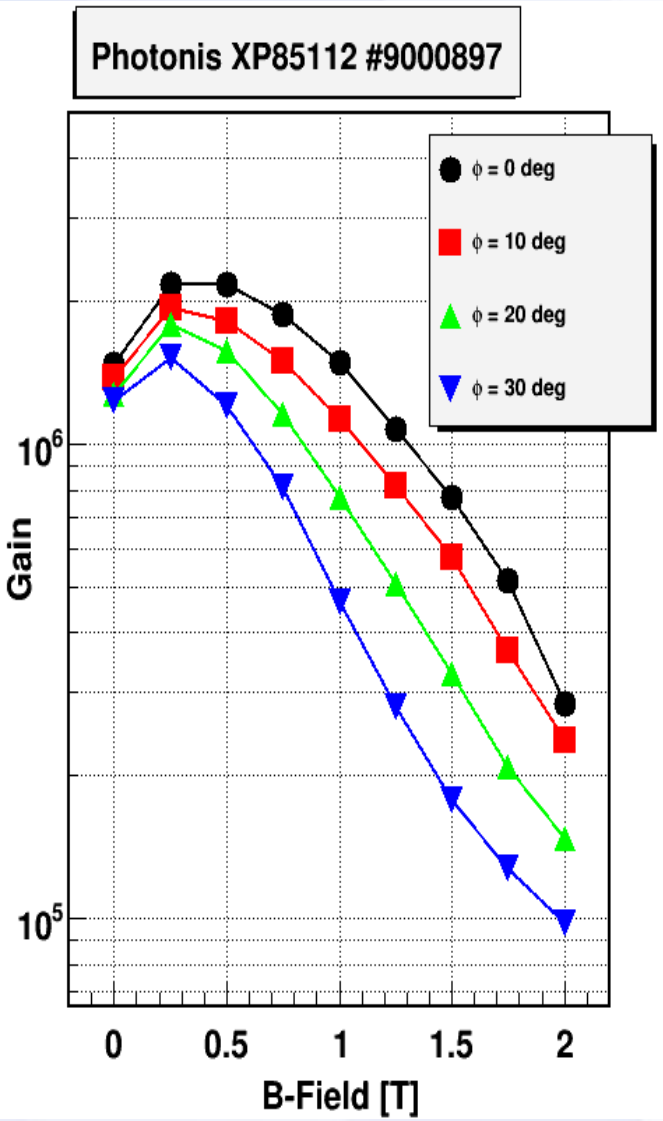




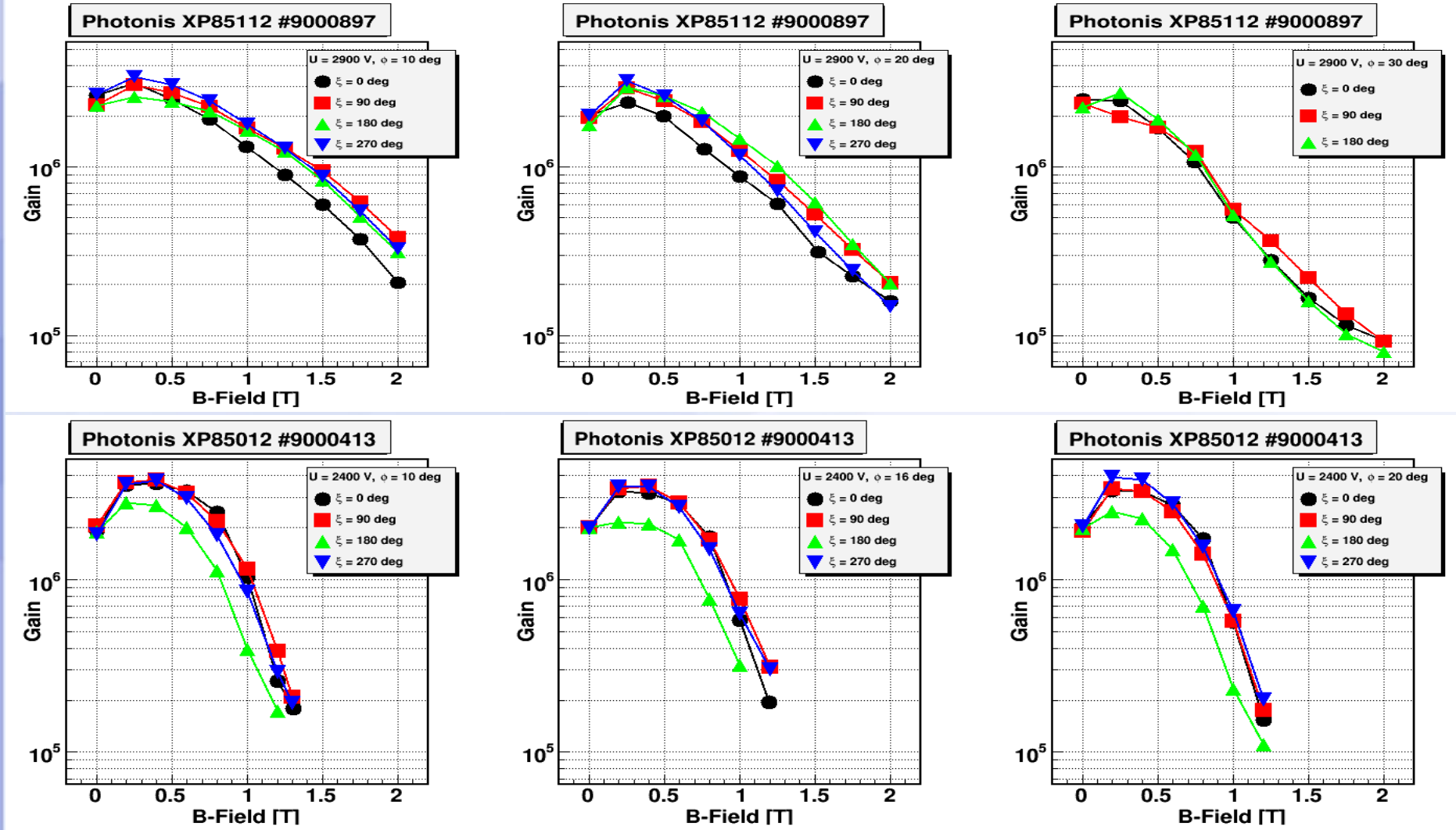
φ = tilt angle between B-field direction and PMT-axis

θ = rotation angle of PMT around B-field direction

Significant gain loss at high B-field and large φ-angles



Gain and Direction of B-Field (θ)



- Chevron angle = 16^{o} (85012) and 10^{o} (85112)

Summary and Outlook

- New Photonis XP85112 (10 µm) shows very good performance in rate stability, time resolution and magnetic field immunity
- Lifetime measurement for new XP85112
- got offer for Hamamatsu SL10 with protection layer
- Diamond dynode PMTs not yet delivered
- Preparations for performance measurements of SiPMs
  - new cooling box exists and will be ready for tests very soon
  - several SiPM candidates available