

Recent progress on MCP-PMT

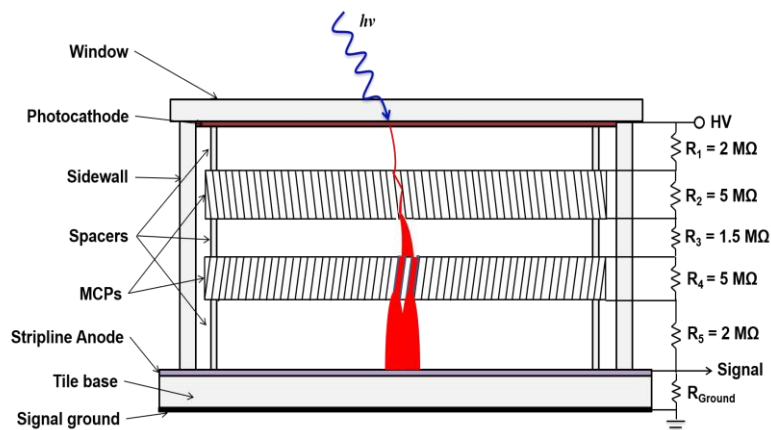
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Configuration of 6cm MCP-PMTs with ALD coated MCPs

Only smaller pore size, no space reducing yet



Standard **20 μm MCP** stack height

Component	Thickness	Total stack height
Photocathode		
Spacer 1	3.25 mm	
MCP 1	1.2 mm	
Spacer 2	1.75 mm	
MCP 2	1.2 mm	
Spacer 3	2.0 mm	
Anode		
4X Shims	0.3 mm	
		9.7 mm

10 μm MCP stack with same side wall height

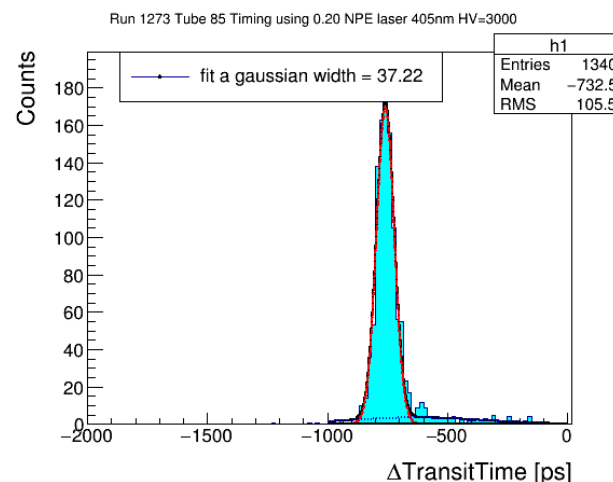
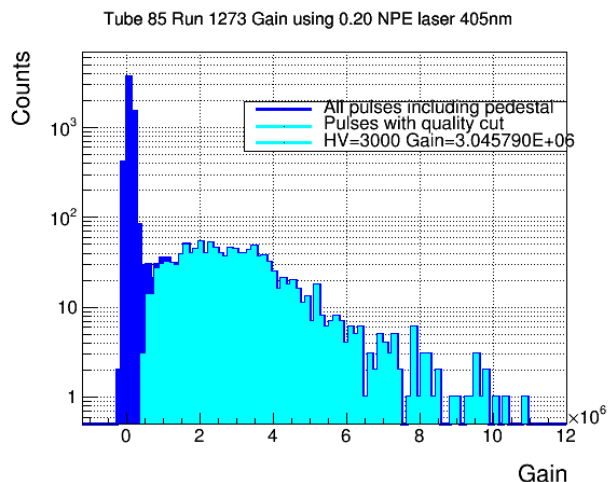
Component	Thickness	Total stack height
Photocathode		
Spacer 1	2.25 mm	
MCP 1	0.60 mm	
Spacer 2	2.00 mm	
MCP 2	0.60 mm	
Spacer 3	2.0+2.0 mm	
Anode		
4X Shims	0.3 mm	
		9.75 mm



Argonne 6cm MCP-PMT with pair of INCOM 10 μm MCP

Greatly improved rise time, timing resolution and B field tolerance as pore size reduced

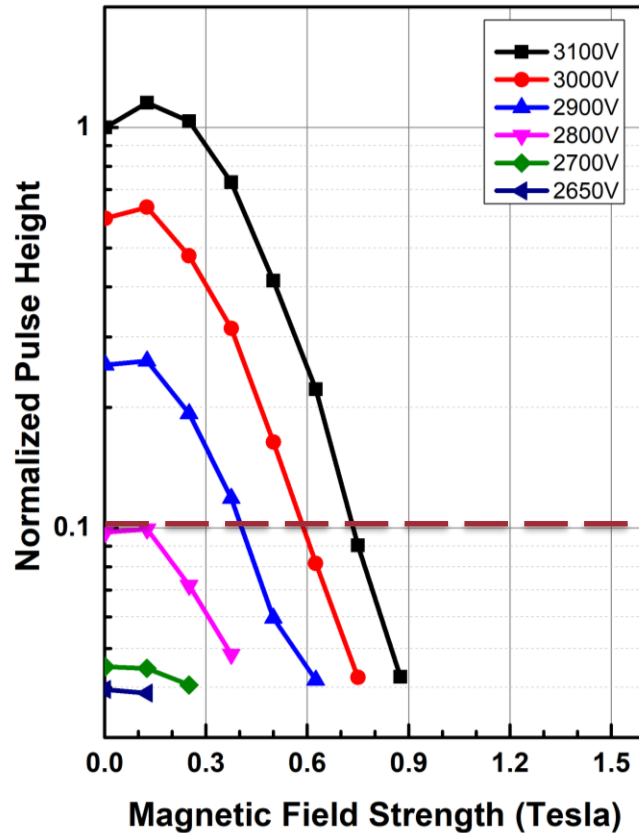
Performance	20 μm pore (tube #79)	10 μm pore (tube #85)
Rise time	557 ps	457 ps
Gain	6.1×10^6	3.0×10^6
Overall Transit time spread (σ)	57 ps	37 ps (with laser start time jitter: $\sigma_{\text{laser}} \sim 30\text{ps}$)
Timing resolution (SPE)	48 ps	20 ps
Standard deviation (RMS)	204 ps	105 ps
Magnetic field tolerance	0.7 T (tube#69 tested)	1.3 T



B Field test result

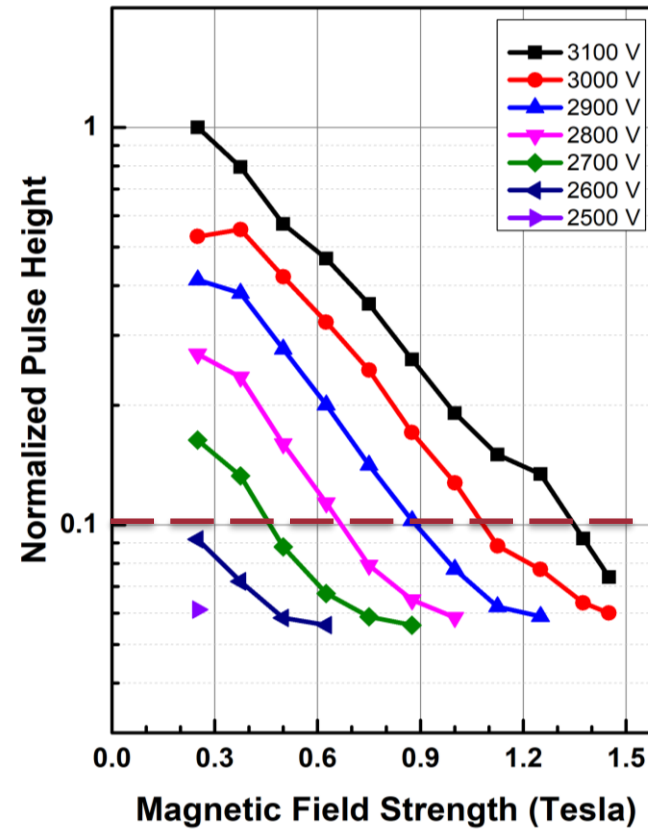
B field tolerance improved up to 1.3 T

Tube #69



20 μm MCP-PMT 0.7 T

Tube #85



10 μm MCP-PMT 1.3 T