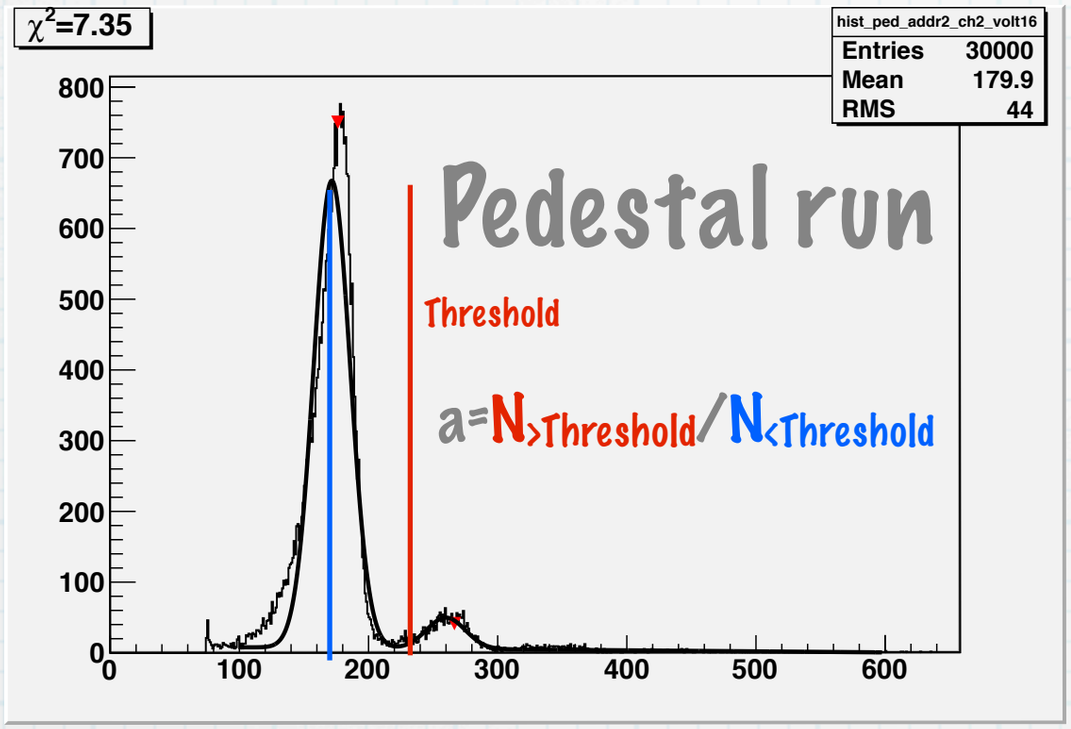
Update: USM PDE Measurements

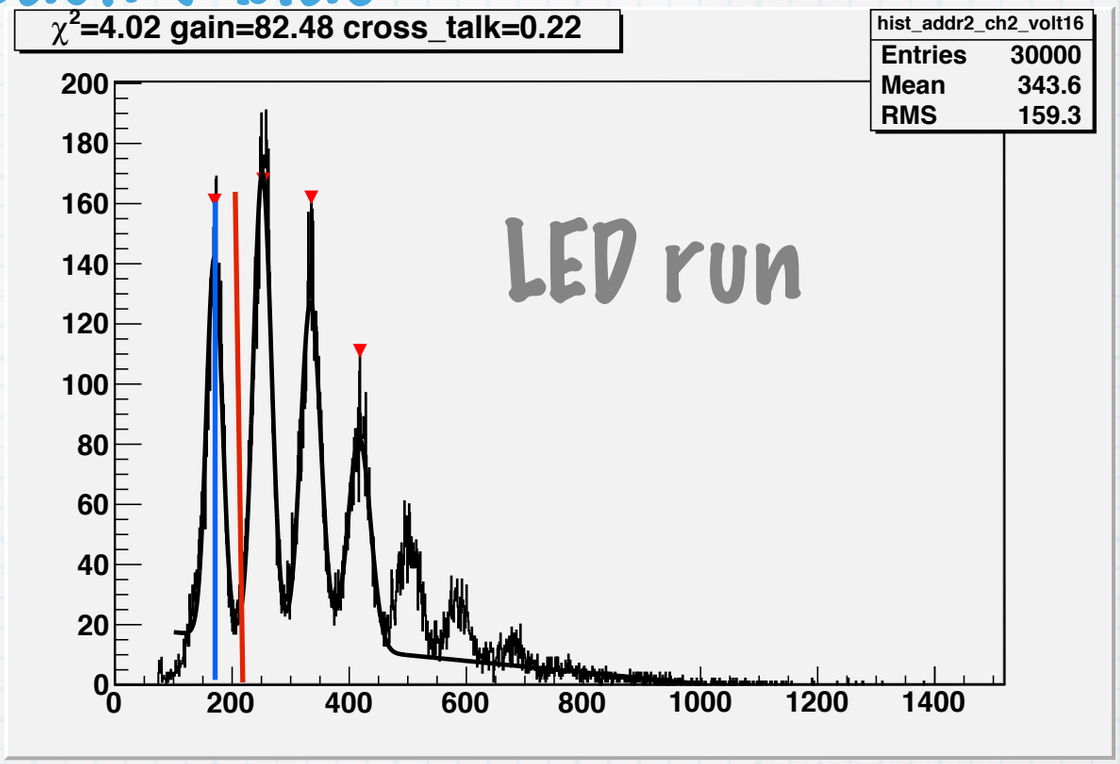
S. Kuleshov, W. Brooks, R. Rojas

METHOD

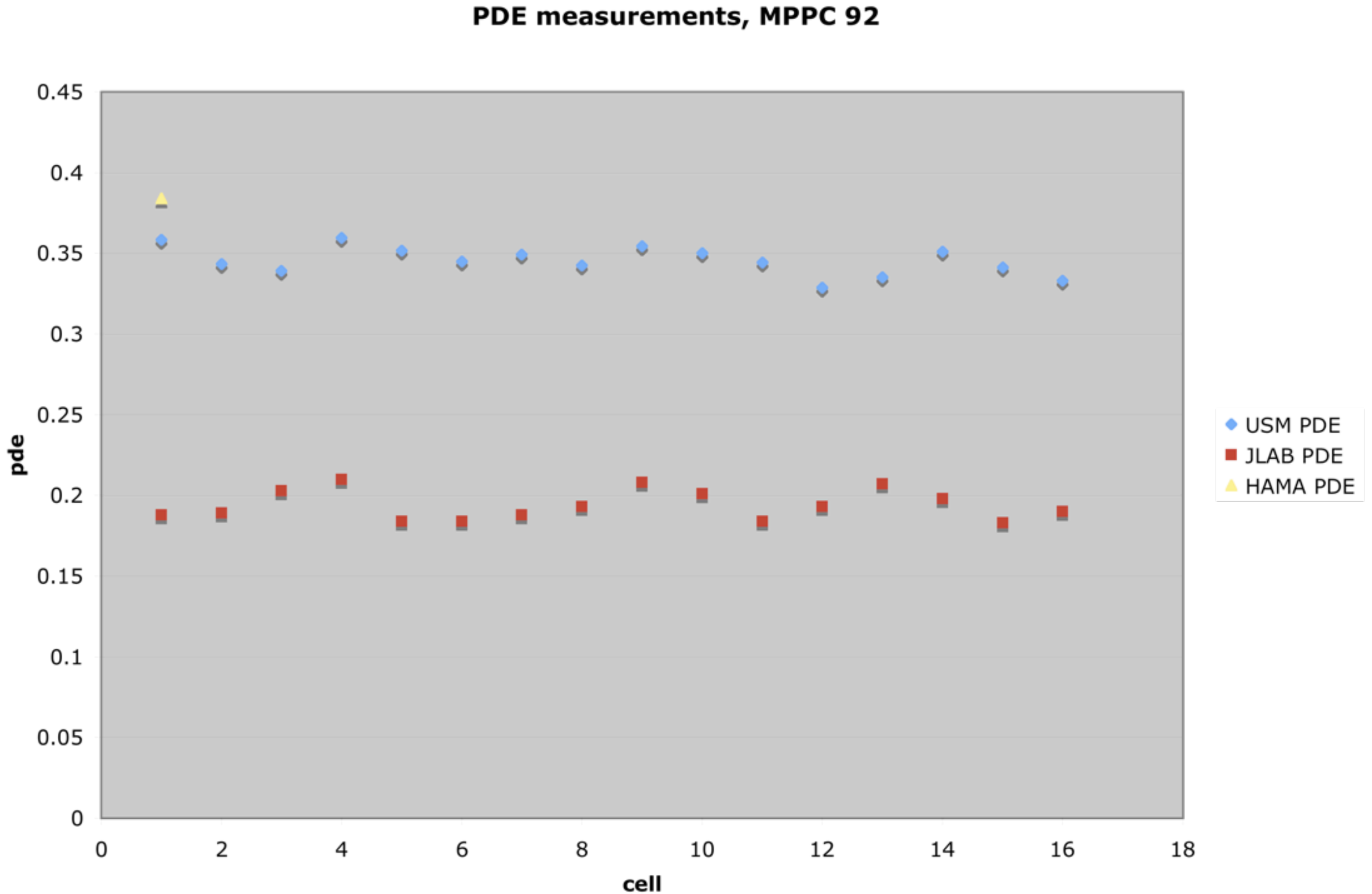
- Determine breakdown voltage via gain vs. bias voltage, extrapolate
    - Gain is 1pe peak minus pedestal
    - Operating voltage is breakdown voltage + 0.9V
    - Illuminate each cell of MPPC with Y-11 fiber, mean wavelength 490 nm
    - Normalize to photodiode of known efficiency (0.3 A/watt, 1.2 electrons/photon@490 nm)

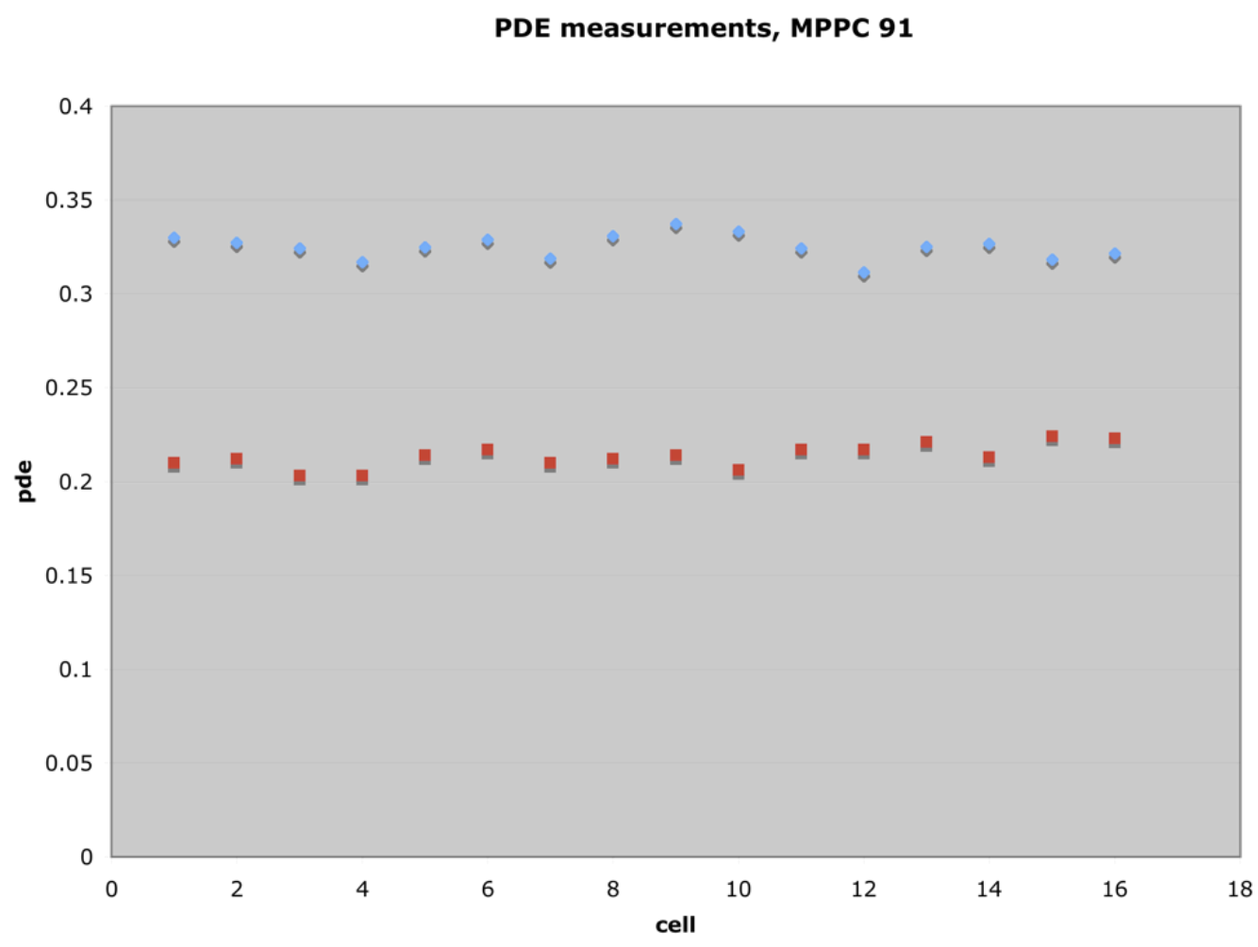
typical distributions from station #3 data only, we have the pedestal run and LED run for each V bias

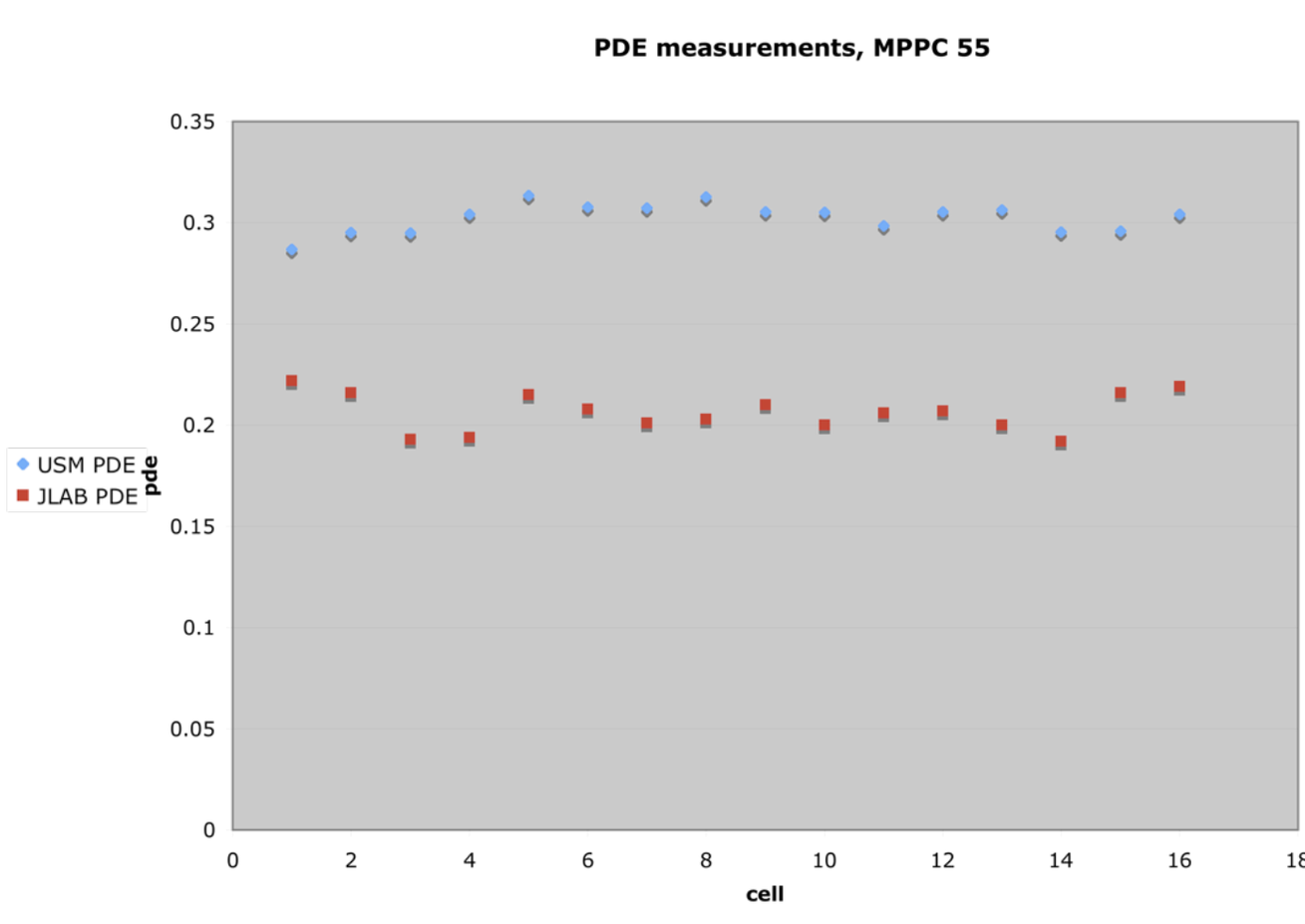


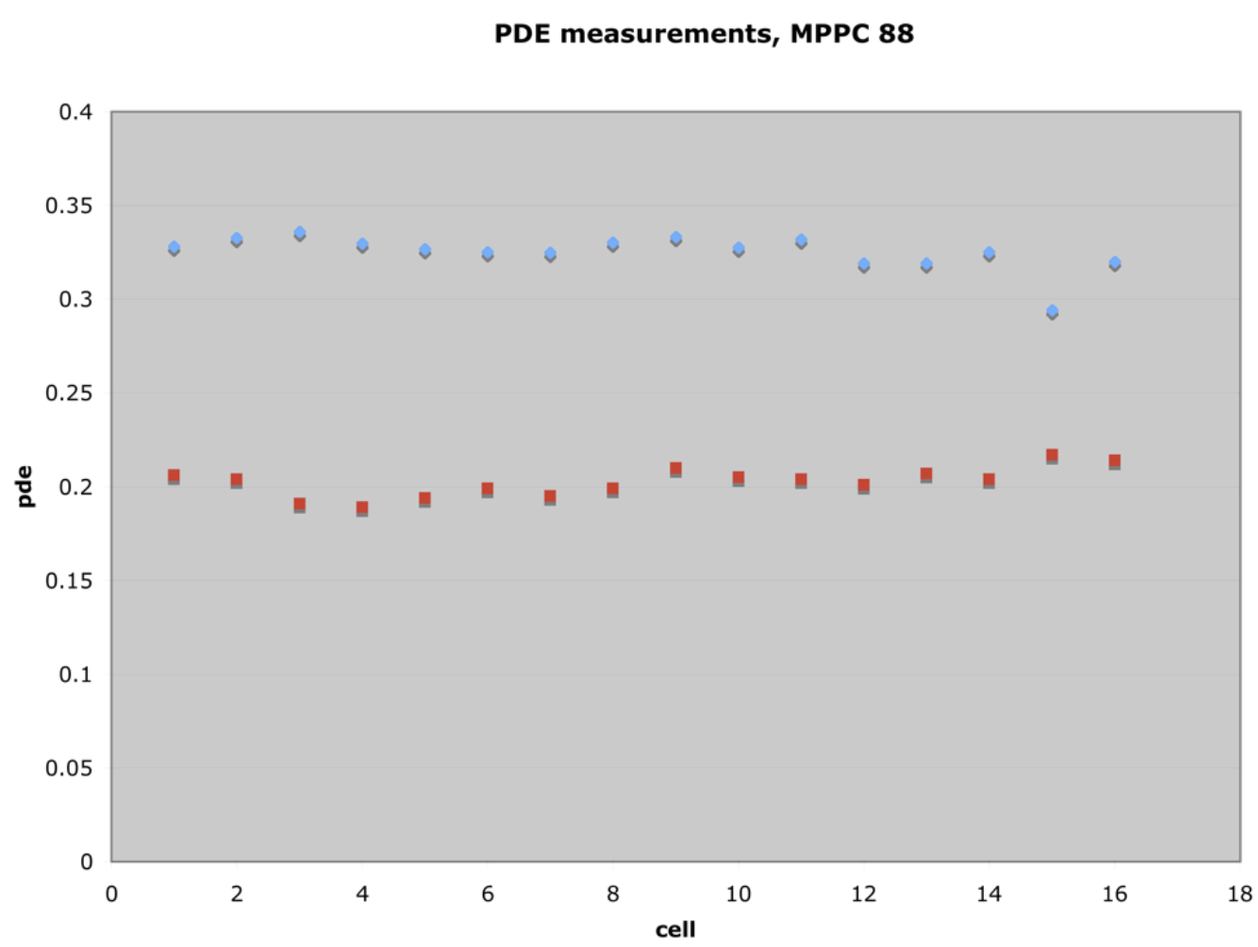


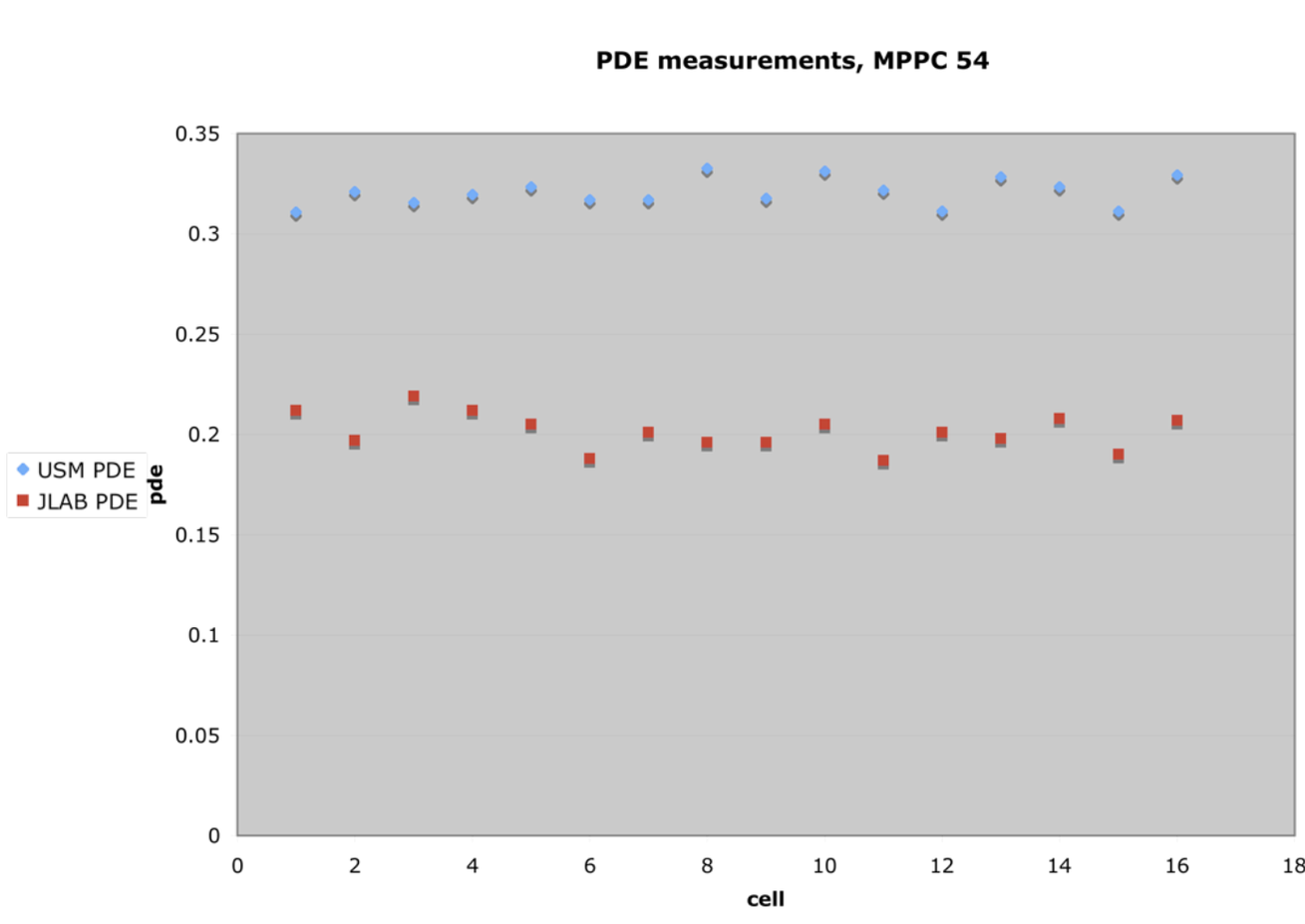
* N photons must be determined for each Vbias.
* coefficient "a" must be calculated from the pedestal run
* Number photoelectrons for LED run is calculated from P0 term from Poisson distribution (Np *(1+a))/(N events in LED run) histogram where Np is number events in pedestal peak, with amplitude <Threshold.


PDE measurements, MPPC 92
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
pde
0
2
4
6
8
10
12
14
16
18
cell
USM PDE
JLAB PDE
HAMA PDE

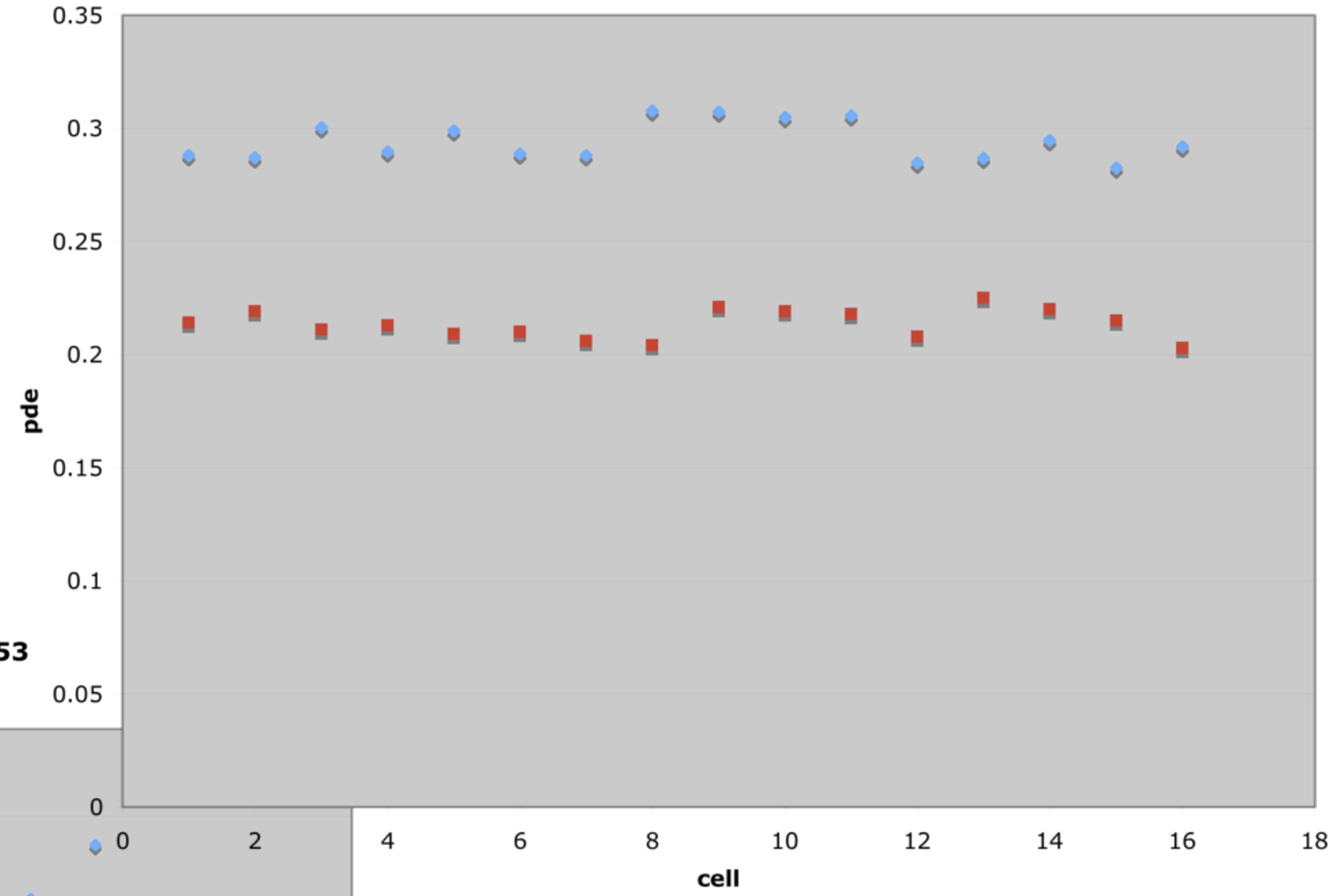

PDE measurements, MPPC 91
pde
cell
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0
2
4
6
8
10
12
14
16
18


PDE measurements, MPPC 55
pde
cell
USM PDE
JLAB PDE
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0
2
4
6
8
10
12
14
16
18

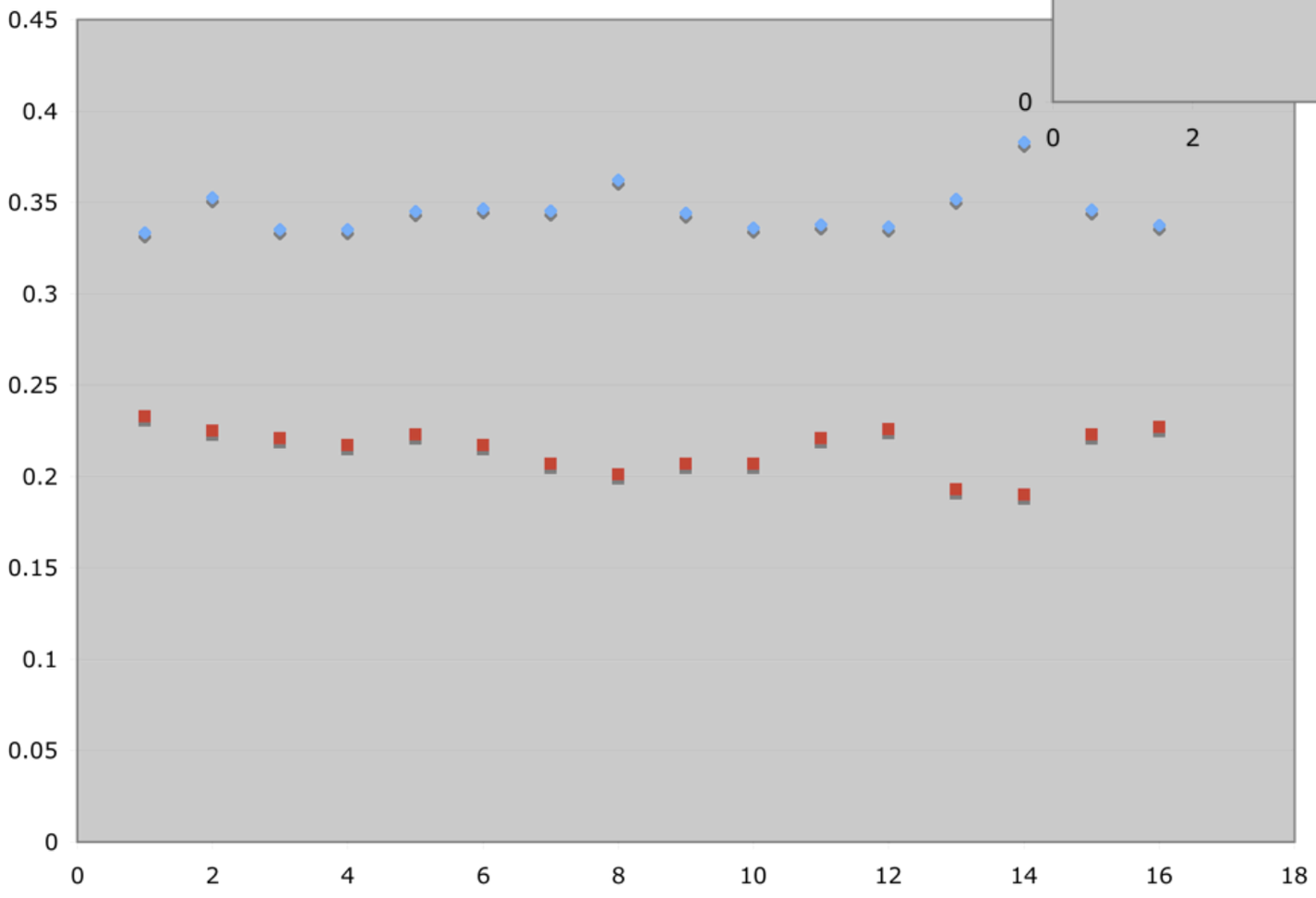

PDE measurements, MPPC 88
pde
cell
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0.4
0
2
4
6
8
10
12
14
16
18


PDE measurements, MPPC 54
pde
cell
USM PDE
JLAB PDE
0
0.05
0.1
0.15
0.2
0.25
0.3
0.35
0
2
4
6
8
10
12
14
16
18

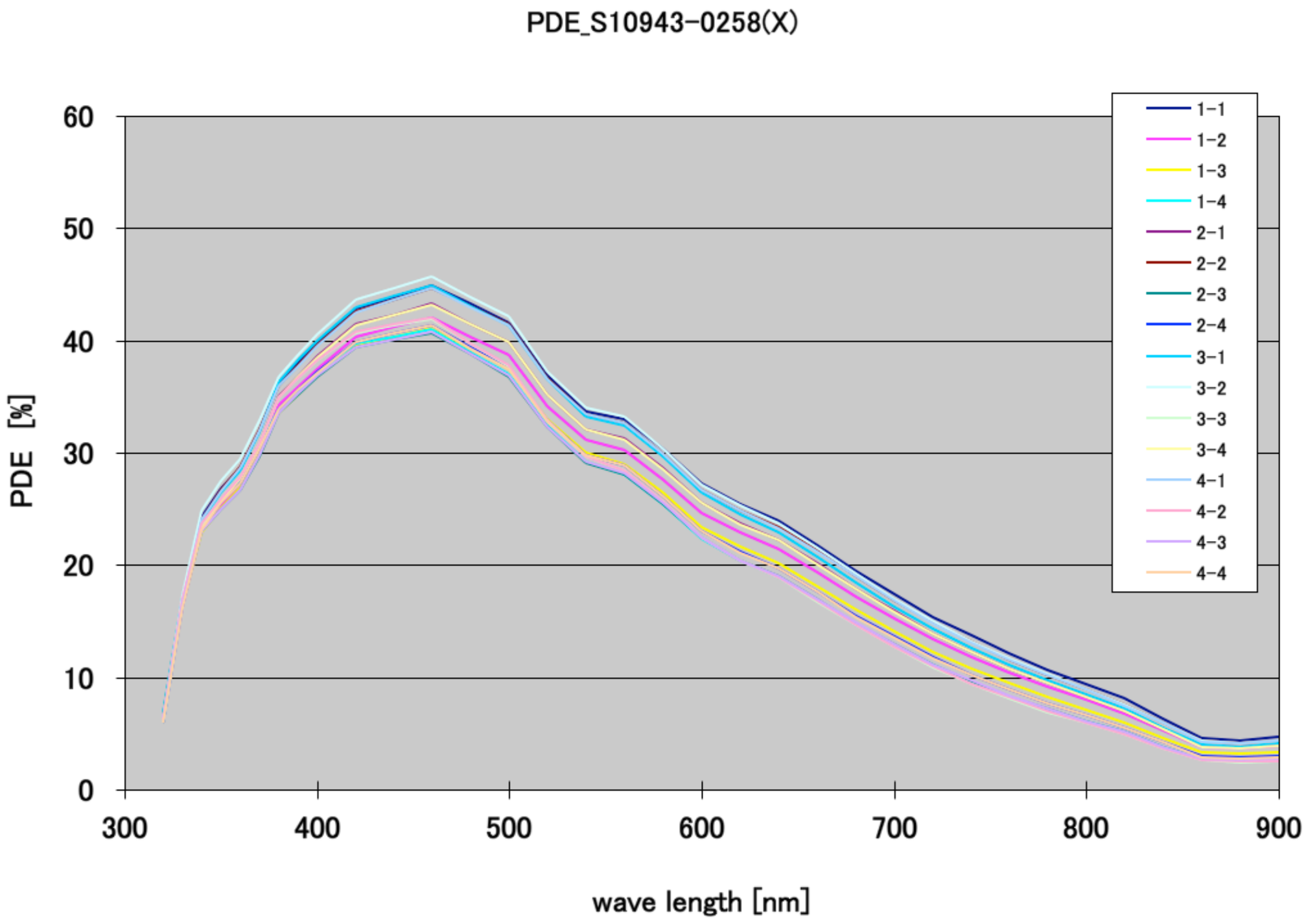
PDE measurements, MPPC 86



PDE measurements, MPPC 53



Hamamatsu PDE vs. Wavelength, MPPC 130



Hamamatsu PDE measurements

PDE at 490nm

Serial No.	ch.	Vop[V]	PDE at 490nm
43	1-1	72.11	39.5%
50		72.25	39.1%
57		72.08	42.2%
64		72.52	37.4%
71		71.51	40.3%
78		71.91	41.6%
85		72.13	40.1%
92		73.00	38.4%
99		72.09	40.5%
106		72.07	40.9%
113		71.81	40.9%
120		72.32	41.6%