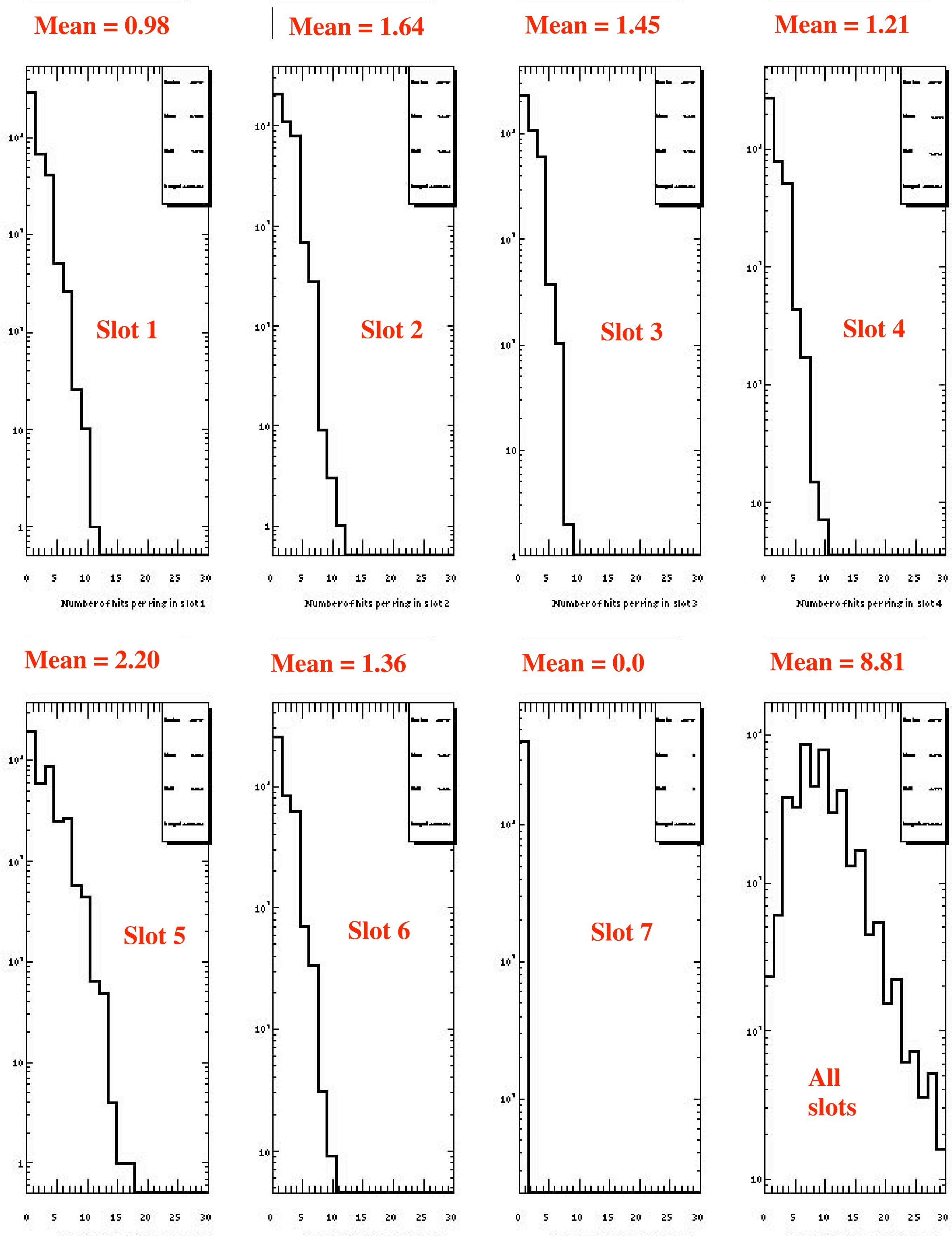
Average number of photoelectrons per slot:

- Position 4, run 18, average over both peaks



- Spreadsheet prediction for slot 3 & 4: Npe ~ 1.49 & 1.46 (using Jose's toy MC geometry factors, and a relative efficiency to Photonis PMT as determined in the scanning setup).

Jose:

I calculated the number of photons which are "geometrically" accepted in the prototype. I generated HALF of a ring from position 1 uniformly with theta=47deg. There is, of course, no accounting for detector efficiencies and total internal reflection losses or any physics, this is pure geometry.

Out of 100,000 Direct rays generated:
51100 make it to the detector plane defined by the edges of slot1 and slot7.
and here is the break down in slots:
slot ndetected
0 5752
1 4930
2 5689
3 5582
4 5726
5 5538
6 4644

Out of 100,000 Indirect rays generated:
51101 make it to the detector plane defined by the edges of slot1 and slot7, and here is the break down in slots:
slot ndetected
0 5789
1 5332
2 5378
3 5758
4 5734
5 5738
6 4669

Use Jose'a geometrical factor for SLOT 4

Verify that Npe_expected & Npe_measured are consistent:

c) Determined from MCP-PMT/Photonis rel eff. & MC: a) Fraction of a ring seen in the prototype (MC), b) relative efficiency to Photonis PMT —> 0.05582 * 0.6 = **SLOT 3 (MaPMT) IN PRESENT FOCUSING DIRC PROTOTYPE**

b) Determined from MCP-PMT/Photonis rel eff. & MC: a) A fraction of a ring seen by this MCP-PMT, b) relative efficiency to Photonis PMT —> 0.05582 * 0.5 = **SLOT 4 (MCP-PMT) IN PRESENT FOCUSING DIRC PROTOTYPE**

a) Determined from future Burle MCP-PMT parameters: a) geometrical hole acceptance of the 1-st MCP, b) packing fraction of PMTs, c) PMT-PMT gaps —> 0.7 * 0.85 * 0.9 = **FINAL DETECTOR WITH MCP-PMTs (FROM 1-st PRINCIPLES)**

r*1.7*ABS(kz/ky) = Nbx*3.5*ABS(kz/kx)

The correction is only small due to tiny mismatches of refraction index of cookie and oil (BaBar DIRC had 0.6)

Estimate that ~20% of photoelectrons arrive in the tail of the timing distribution (recoils from the MCP top surface)

Keep for now the same as the BaBar DIRC (only a guess)

Finite mirror size (the factor is a guess only)

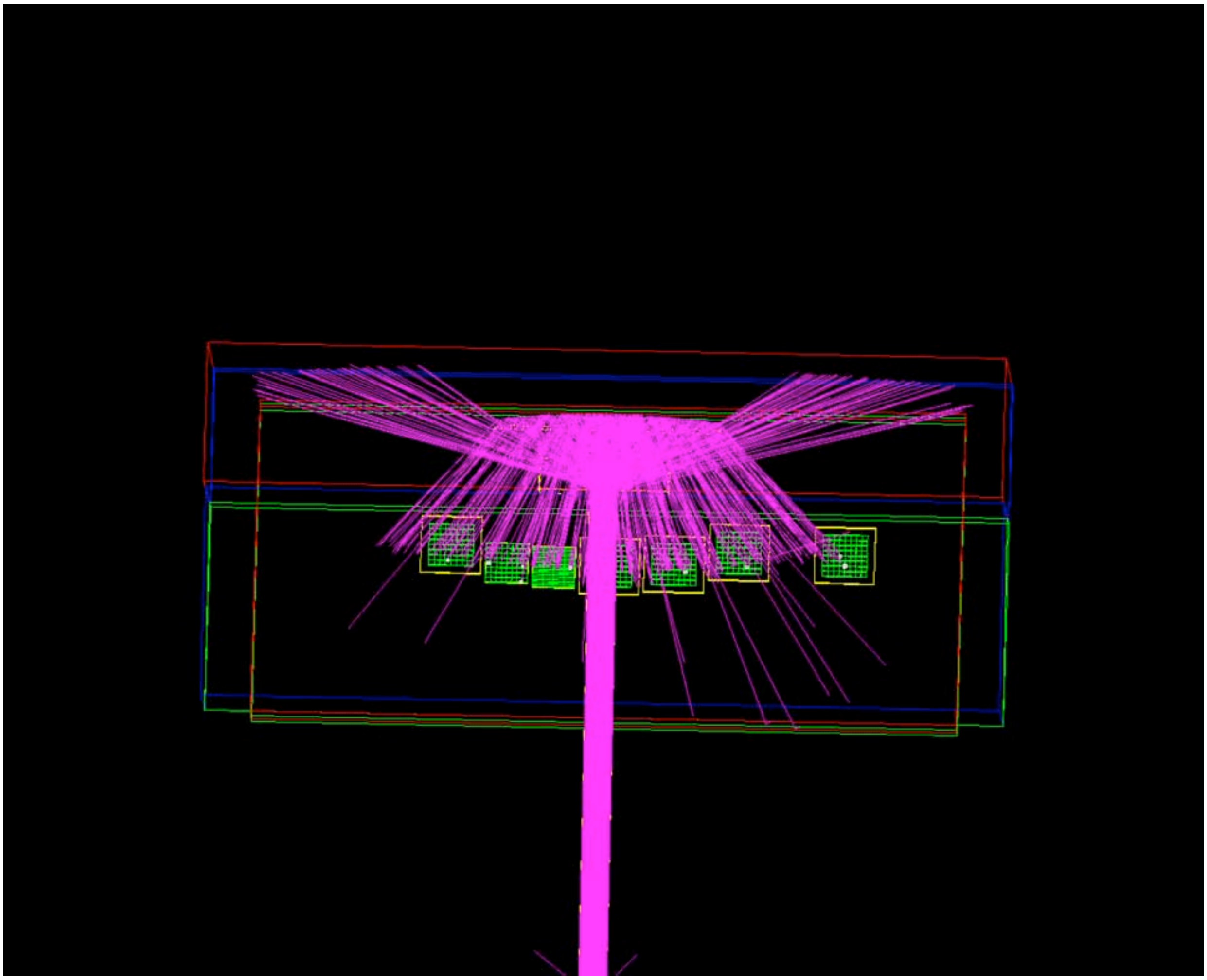
Oil is from G. Gratta (KamLand) - no purification (use it as it came)

Tr-quartz (full length) (Phi~0)	R-mirror	R-mirror effective	PM packing fraction (future MCP-PMT)	Fraction of phot. going into oil	Late arrivals	Detection efficiency	Mirror size	Tr-mineral oil (0.5 m long)	DIRC's FINAL EFF. Efficiency #2	Integrate No (a more proper way)	Determine average CHTh	Cherenkov angle (Beta = 1)	Integrate Npe (a most proper way)	DIRC's DEGRADED EFF. Efficiency #2 C*E*H*M*P*Q*S*T*V	Weizmann Uncoated PC K-Cs-Sb (refl.)
0.728420093	0.78	0.6942	0.02791	0.95	0.8	0.9	0.9	0	0			49.84167412		0	
0.770515292	0.8	0.72	0.02791	0.95	0.8	0.9	0.9	0	0	0	0	49.45873048	0	0	
0.805387709	0.82	0.7462	0.02791	0.95	0.8	0.9	0.9	0	0	0	0	49.14031911	0	0	
0.834288802	0.84	0.7728	0.02791	0.95	0.8	0.9	0.9	0	0	0	0	48.87190688	0	0	
0.858288423	0.86	0.7998	0.02791	0.95	0.8	0.9	0.9	0	0	0	0	48.64301609	0	0	
0.87827725	0.885	0.83411	0.02791	0.95	0.8	0.9	0.9	0	0	0	0	48.44588938	0	0	0.22
0.894985674	0.89	0.84105	0.02791	0.95	0.8	0.9	0.9	0	0	0	0	48.27465512	0	0	
0.909007712	0.895	0.84801	0.02791	0.95	0.8	0.9	0.9	0	0	0	0	48.12478514	0	0	
0.920824538	0.905	0.86201	0.02791	0.95	0.8	0.9	0.9	0	0	0	0	47.99273085	0	0	
0.930825458	0.91	0.86905	0.02791	0.95	0.8	0.9	0.9	0.00186	2.83769E-08	2.16286E-09	6.16417E-06	47.87567228	2.02618E-09	4.10541E-05	
0.939325649	0.92	0.8832	0.02791	0.95	0.8	0.9	0.9	0.019192	1.06636E-05	7.60607E-07	0.002243789	47.77134091	7.10053E-07	0.0008222	0.26
0.946580752	0.922	0.88604	0.02791	0.95	0.8	0.9	0.9	0.324022	0.000280782	1.93953E-05	0.059155514	47.67789191	1.80495E-05	0.020215408	
0.95279868	0.924	0.88889	0.02791	0.95	0.8	0.9	0.9	0.65727	0.000744199	6.39477E-05	0.201435111	47.59381038	5.9343E-05	0.051778631	
0.958149078	0.926	0.89174	0.02791	0.95	0.8	0.9	0.9	0.77020213	0.001128068	0.00010973	0.356621596	47.51784147	0.000101569	0.077169098	
0.962770858	0.928	0.89459	0.02791	0.95	0.8	0.9	0.9	0.842637	0.001614686	0.000151291	0.506826475	47.44893749	0.000139716	0.109709756	
0.966778206	0.93	0.89745	0.02791	0.95	0.8	0.9	0.9	0.85657	0.001932684	0.000184493	0.636500994	47.38621737	0.000170018	0.130111902	0.29
0.970265344	0.932	0.90031	0.02791	0.95	0.8	0.9	0.9	0.883299	0.002302923	0.000208049	0.738573834	47.3289353	0.000191357	0.153629344	
0.973310331	0.934	0.90318	0.02791	0.95	0.8	0.9	0.9	0.89982	0.002665377	0.000230847	0.84259125	47.27645612	0.000211951	0.176209953	
0.975978091	0.935	0.90461	0.02791	0.95	0.8	0.9	0.9	0.924507	0.00305913	0.000251984	0.944940676	47.22823586	0.000230983	0.20126042	
0.978322833	0.936	0.90605	0.02791	0.95	0.8	0.9	0.9	0.93	0.003395531	0.000269554	1.037782743	47.18380625	0.000246719	0.222547881	
0.980389993	0.937	0.90748	0.02791	0.95	0.8	0.9	0.9	0.94	0.003620227	0.000278337	1.099430013	47.1427622	0.000254406	0.236630995	
0.982217801	0.937	0.90748	0.02791	0.95	0.8	0.9	0.9	0.96	0.003723991	0.000277155	1.122476413	47.10475177	0.000253001	0.243153308	0.25
0.983838535	0.938	0.90892	0.02791	0.95	0.8	0.9	0.9	0.97	0.003778707	0.000269653	1.11905874	47.06946782	0.000245861	0.246210293	
0.985279551	0.9382	0.90921	0.02791	0.95	0.8	0.9	0.9	0.98	0.003824054	0.00026054	1.107294175	47.03664132	0.000237289	0.248973084	
0.98656411	0.939	0.91036	0.02791	0.95	0.8	0.9	0.9	0.99	0.00386204	0.000251423	1.093690195	47.00603572	0.00022875	0.251027075	0.18
0.98771206	0.94	0.9118	0.02791	0.95	0.8	0.9	0.9	0.997536591	0.003886396	0.000242197	1.077778133	46.97744232	0.000220144	0.252121357	
0.988740391	0.94	0.9118	0.02791	0.95	0.8	0.9	0.9	0.997880183	0.003622135	0.000224494	1.021448541	46.95067633	0.000203869	0.234903984	
0.98966369	0.938	0.90892	0.02791	0.95	0.8	0.9	0.9	0.997992205	0.003342612	0.000199375	0.927092517	46.92557371	0.000180904	0.217402455	
0.990494523	0.937	0.90748	0.02791	0.95	0.8	0.9	0.9	0.997885132	0.002787731	0.000168177	0.798839966	46.90198834	0.000152476	0.181556148	
0.991243743	0.936	0.90605	0.02791	0.95	0.8	0.9	0.9	0.997571464	0.002370774	0.00013574	0.658337762	46.87978971	0.000122975	0.154612771	
0.991920754	0.935	0.90461	0.02791	0.95	0.8	0.9	0.9	0.997063719	0.002092678	0.000112752	0.558123765	46.85886097	0.000102077	0.136667225	
0.992533723	0.93	0.89745	0.02791	0.95	0.8	0.9	0.9	0.996374433	0.001802875	9.45474E-05	0.477464251	46.83909721	8.55389E-05	0.118660794	
0.993089763	0.928	0.89459	0.02791	0.95	0.8	0.9	0.9	0.995516151	0.001385292	7.44026E-05	0.383173384	46.82040402	6.72712E-05	0.091454101	
0.993595088	0.926	0.89174	0.02791	0.95	0.8	0.9	0.9	0.994501428	0.00124555	5.90794E-05	0.310166882	46.80269625	5.33849E-05	0.082480525	
0.994055135	0.9245	0.8896	0.02791	0.95	0.8	0.9	0.9	0.993342822	0.000968735	4.78833E-05	0.256175876	46.78589692	4.32435E-05	0.064295799	
0.994474675	0.923	0.88746	0.02791	0.95	0.8	0.9	0.9	0.992052894	0.000830432	3.74917E-05	0.204329916	46.7699363	3.38406E-05	0.055242388	0.032
0.994857905	0.92	0.8832	0.02791	0.95	0.8	0.9	0.9	0.990644203	0.000690496	3.05617E-05	0.169617686	46.75475109	2.75714E-05	0.046149765	
0.995208525	0.915	0.87611	0.02791	0.95	0.8	0.9	0.9	0.989129303	0.00054941	2.40407E-05	0.135829689	46.74028375	2.16778E-05	0.037012778	
0.995529803	0.91	0.86905	0.02791	0.95	0.8	0.9	0.9	0.987520743	0.000409798	1.79569E-05	0.103251995	46.7264818	1.61845E-05	0.027828187	
0.995824631	0.905	0.86201	0.02791	0.95	0.8	0.9	0.9	0.985831062	0.000271657	1.23247E-05	0.072099686	46.7132974	1.11033E-05	0.018595455	
0.996095576	0.9	0.855	0.02791	0.95	0.8	0.9	0.9	0.984072792	0.000202541	8.29041E-06	0.049327962	46.70068676	7.46565E-06	0.013975954	
0.99634492	0.895	0.84801	0.02791	0.95	0.8	0.9	0.9	0.982258449	0.000134184	5.69396E-06	0.034448472	46.68860981	5.12542E-06	0.009333884	
0.996574693	0.89	0.84105	0.02791	0.95	0.8	0.9	0.9	0.980400538	6.66442E-05	3.28643E-06	0.020211531	46.67702976	2.95713E-06	0.004673299	
0.996786707	0.885	0.83411	0.02791	0.95	0.8	0.9	0.9	0.978511548	2.64661E-05	1.47532E-06	0.009220742	46.66591286	1.327E-06	0.001870929	
0.996982584	0.88	0.8272	0.02791	0.95	0.8	0.9	0.9	0.976603956	1.31302E-05	6.07791E-07	0.003859472	46.655228	5.4649E-07	0.000935735	
0.997163772	0.87	0.81345	0.02791	0.95	0.8	0.9	0.9	0.97469022	0	1.95343E-07	0.001259965	46.64494658	1.75581E-07	0	
									Approximately:	More exact:			Most exact:		
				Fudge factor =	1			No (FINAL)	0.695254119	1.601079423				45.71863143	
								L (cm)	1.7					1.7	
								n (quartz)	1.47034425					1.474	
								CHTh (Beta=1)	47.15101174	0.822940401		47.36787177		47.2827114	
								Npe	0.635225251	1.462840781			1.461180134	41.94934777	
								Average photon wavelength			4191.728781				
								Ratio = Eff-starting / Eff-final		0.011921562					

!

Joe's MC hit simulation:

Joe ran with much loser cuts on the directional cosine of propagated photons in Geant and now I see that
  a) we get hits outside the area of slot 7 and
  b) a significant number of photons miss the mirror.
I am attaching a screenshot that shows the detection plane in a top view. This may mean that Jose's 49% loss is real.



- This shows that some photons miss the mirror.

Expected No calculation of the prototype (middle of BaBar acceptance):

d) Determined from Hamamatsu MaPMT parameters: a) relative efficiency to Photonis PMT, b) packing fraction of PMTs —> 0.5 * 0.95 = **FINAL DETECTOR WITH MaPMTs (use Photonis PMT to normalize)**

c) Determined from Hamamatsu MaPMT parameters: a) geometrical hole acceptance of the 1-st dynode, b) packing fraction of PMTs —> 0.75 * 0.95 = **FINAL DETECTOR WITH MaPMTs (FROM 1-st PRINCIPLES)**

b) Determined from MaPMT/Photonis rel eff. & MC: a) A fraction of a ring seen by this MCP-PMT, b) relative efficiency to Photonis PMT —> 0.05582 * 0.5 = **SLOT 3 (MaPMT) IN THE PRESENT FOCUSING DIRC**

a) Determined from future Burle MCP-PMT parameters: a) geometrical hole acceptance of the 1-st MCP, b) packing fraction of PMTs —> 0.7 * 0.8 = **FINAL DETECTOR WITH MCP-PMTs (FROM 1-st PRINCIPLES)**

The correction is only small due to tiny mismatches of refraction index of cookie and oil (BaBar DIRC had 0.6)

Estimate that ~5% of photoelectrons arrive in the tail of the timing distribution - MaPMT

Keep for now the same as the BaBar DIRC (only a guess)

Finite mirror size (the factor is a guess only)

Oil is from G. Gratta (KamLand) - no purification (use it as it came)

H-9500 MaPMT

PM packing fraction (future MCP-PMT)	Fraction of phot. going into oil	Late arrivals	Detection efficiency	Mirror size	Tr-mineral oil (0.5 m long)	F.DIRC FINAL EFF. Efficiency #2	Integrate No (a more proper way)	Determine average CHTh	Cherenkov angle (Beta = 1)	Integrate Npe (a most proper way)	F.DIRC DEGRADED EFF. Efficiency #2 C*E*H*M*P*Q*S*T*V
0.475	0.95	0.95	0.9	0.9	0	0			49.84167412		0
0.475	0.95	0.95	0.9	0.9	0	0	0	0	49.45873048	0	0
0.475	0.95	0.95	0.9	0.9	0	0	0	0	49.14031911	0	0
0.475	0.95	0.95	0.9	0.9	0	0	0	0	48.87190688	0	0
0.475	0.95	0.95	0.9	0.9	0	0	0	0	48.64301609	0	0
0.475	0.95	0.95	0.9	0.9	0	0	0	0	48.44588938	0	0
0.475	0.95	0.95	0.9	0.9	0	0	0	0	48.27465512	0	0
0.475	0.95	0.95	0.9	0.9	0	0	0	0	48.12478514	0	0
0.475	0.95	0.95	0.9	0.9	0	0	0	0	47.99273085	0	0
0.475	0.95	0.95	0.9	0.9	0.00186	1.31085E-06	9.99122E-08	0.00028475	47.87567228	9.35981E-08	9.38381E-05
0.475	0.95	0.95	0.9	0.9	0.019192	0.000409473	2.92223E-05	0.086205899	47.77134091	2.72801E-05	0.001562179
0.475	0.95	0.95	0.9	0.9	0.324022	0.00993059	0.000688115	2.098749291	47.67789191	0.00064037	0.035376963
0.475	0.95	0.95	0.9	0.9	0.65727	0.026609752	0.002279719	7.181116372	47.59381038	0.002115564	0.091608347
0.475	0.95	0.95	0.9	0.9	0.77020213	0.036477295	0.003697403	12.01655903	47.51784147	0.003422423	0.123470557
0.475	0.95	0.95	0.9	0.9	0.842637	0.044960866	0.004492164	15.04874882	47.44893749	0.004148459	0.151155664
0.475	0.95	0.95	0.9	0.9	0.85657	0.049019843	0.004887787	16.86286384	47.38621737	0.004504304	0.163290437
0.475	0.95	0.95	0.9	0.9	0.883299	0.053523516	0.005036832	17.88075412	47.3289353	0.00463272	0.176673746
0.475	0.95	0.95	0.9	0.9	0.89982	0.057009672	0.00513581	18.74570679	47.27645612	0.004715422	0.186488867
0.475	0.95	0.95	0.9	0.9	0.924507	0.060636228	0.005178595	19.41973167	47.22823586	0.004746994	0.197390027
0.475	0.95	0.95	0.9	0.9	0.93	0.061761464	0.005111466	19.67914544	47.18380625	0.004678456	0.200293093
0.475	0.95	0.95	0.9	0.9	0.94	0.063073254	0.004952577	19.56268064	47.1427622	0.004526766	0.203992237
0.475	0.95	0.95	0.9	0.9	0.96	0.062718368	0.0047471	19.22575375	47.10475177	0.004333403	0.202627757
0.475	0.95	0.95	0.9	0.9	0.97	0.062749812	0.004509423	18.71410366	47.06946782	0.004111549	0.20230566
0.475	0.95	0.95	0.9	0.9	0.98	0.061228781	0.004248635	18.05669955	47.03664132	0.00386949	0.197249803
0.475	0.95	0.95	0.9	0.9	0.99	0.059507749	0.003949463	17.1801637	47.00603572	0.003593309	0.191385891
0.475	0.95	0.95	0.9	0.9	0.997536591	0.056664074	0.00363125	16.15906054	46.97744232	0.00330061	0.181887551
0.475	0.95	0.95	0.9	0.9	0.997880183	0.05208712	0.003251503	14.79433909	46.95067633	0.002952777	0.167143219
0.475	0.95	0.95	0.9	0.9	0.997992205	0.049258388	0.002901144	13.49032001	46.92557371	0.00263238	0.158522623
0.475	0.95	0.95	0.9	0.9	0.997885132	0.045072146	0.002587818	12.29213411	46.90198834	0.002346215	0.145244918
0.475	0.95	0.95	0.9	0.9	0.997571464	0.040867367	0.002261393	10.96775623	46.87978971	0.002048734	0.131875599
0.475	0.95	0.95	0.9	0.9	0.997063719	0.038063821	0.001993898	9.869797357	46.85886097	0.001805121	0.123000502
0.475	0.95	0.95	0.9	0.9	0.996374433	0.032232022	0.001706121	8.615913342	46.83909721	0.001543562	0.104969164
0.475	0.95	0.95	0.9	0.9	0.995516151	0.027996828	0.001405567	7.238669767	46.82040402	0.001270844	0.091454101
0.475	0.95	0.95	0.9	0.9	0.994501428	0.022375672	0.001131188	5.938736834	46.80269625	0.001022155	0.073316022
0.475	0.95	0.95	0.9	0.9	0.993342822	0.018179746	0.000877	4.691951512	46.78589692	0.00079202	0.059703242
0.475	0.95	0.95	0.9	0.9	0.992052894	0.013985885	0.00067028	3.653024777	46.7699363	0.000605005	0.046035324
0.475	0.95	0.95	0.9	0.9	0.990644203	0.009768465	0.000477324	2.649146052	46.75475109	0.00043062	0.032304835
0.475	0.95	0.95	0.9	0.9	0.989129303	0.008327705	0.000350868	1.982406495	46.74028375	0.000316384	0.027759583
0.475	0.95	0.95	0.9	0.9	0.987520743	0.005521362	0.000259262	1.490754059	46.7264818	0.000233672	0.018552124
0.475	0.95	0.95	0.9	0.9	0.985831062	0.004666663	0.00018426	1.077919554	46.7132974	0.000165999	0.015806137
0.475	0.95	0.95	0.9	0.9	0.984072792	0.002728905	0.000129297	0.769317696	46.70068676	0.000116434	0.009317303
0.475	0.95	0.95	0.9	0.9	0.982258449	0.002169495	8.28311E-05	0.501128417	46.68860981	7.45605E-05	0.007467107
0.475	0.95	0.95	0.9	0.9	0.980400538	0.001346883	5.75433E-05	0.353891112	46.67702976	5.17774E-05	0.004673299
0.475	0.95	0.95	0.9	0.9	0.978511548	0.00053488	2.98163E-05	0.186351652	46.66591286	2.68186E-05	0.001870929
0.475	0.95	0.95	0.9	0.9	0.976603956	0.000265362	1.22835E-05	0.078000131	46.655228	1.10446E-05	0.000935735
0.475	0.95	0.95	0.9	0.9	0.97469022	0	3.9479E-06	0.025463965	46.64494658	3.54849E-06	0
						Approximately:	More exact:			Most exact:	
	Fudge factor =	1			No (FINAL)	12.6717707	30.68764296				41.36282568
					L (cm)	1.7					1.7
					n (quartz)	1.47034425					1.474
					CHTh (Beta=1)	47.15101174	0.822940401		47.36787177		47.2827114
					Npe	11.57767859	28.03804417			28.04905722	37.95265748
					Average photon wavelength			4081.849406			
					Ratio = Eff-starting / Eff-final		0.218636641				

c) Determined from Burle/Photonis MCP-PMT parameters: a) geometrical packing efficiency, b) relative efficiency to Photonis PMT —> 0.8 * 0.5 = **FINAL DETECTOR WITH MCP-PMTs (use Photonis PMT to normalize)**

b) Determined from MCP-PMT/Photonis rel eff. & MC: a) A fraction of a ring seen by this MCP-PMT, b) relative efficiency to Photonis PMT —> 0.05582 * 0.5 = **SLOT 4 (MCP-PMT) IN PRESENT FOCUSING DIRC**

a) Determined from future Burle MCP-PMT parameters: a) geometrical hole acceptance of the 1-st MCP, b) packing fraction of PMTs —> 0.7 * 0.8 = **FINAL DETECTOR WITH MCP-PMTs (FROM 1-st PRINCIPLES)**

The correction is only small due to tiny mismatches of refraction index of cookie and oil (BaBar DIRC had 0.6)

Estimate that ~20% of photoelectrons arrive in the tail of the timing distribution - MCP-PMT

Keep for now the same as the BaBar DIRC (only a guess)

Finite mirror size (the factor is a guess only)

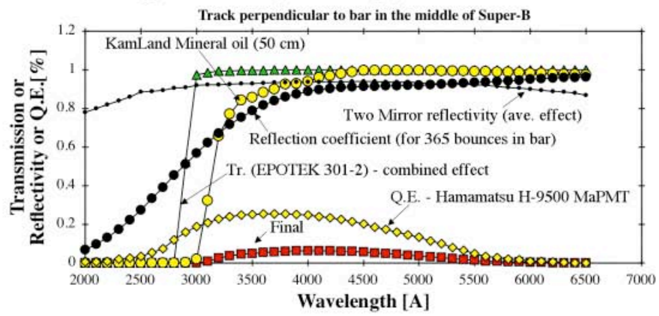
Oil is from G. Gratta (KamLand) - no purification (use it as it came)

MCP-PMT

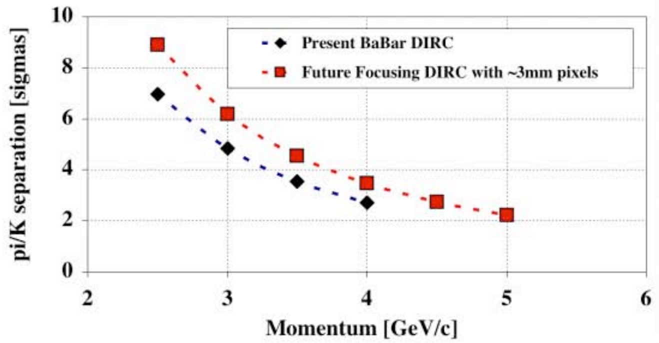
PM packing fraction (future MCP-PMT)	Fraction of phot. going into oil	Late arrivals	Detection efficiency	Mirror size	Tr-mineral oil (0.5 m long)	F.DIRC FINAL EFF. Efficiency #2	Integrate No (a more proper way)	Determine average CHTh	Cherenkov angle (Beta = 1)	Integrate Npe (a most proper way)	F.DIRC DEGRADED EFF. Efficiency #2 C*E*H*M*P*Q*S*T*V
0.4	0.95	0.8	0.9	0.9	0	0			49.84167412		0
0.4	0.95	0.8	0.9	0.9	0	0	0	0	49.45873048	0	0
0.4	0.95	0.8	0.9	0.9	0	0	0	0	49.14031911	0	0
0.4	0.95	0.8	0.9	0.9	0	0	0	0	48.87190688	0	0
0.4	0.95	0.8	0.9	0.9	0	0	0	0	48.64301609	0	0
0.4	0.95	0.8	0.9	0.9	0	0	0	0	48.44588938	0	0
0.4	0.95	0.8	0.9	0.9	0	0	0	0	48.27465512	0	0
0.4	0.95	0.8	0.9	0.9	0	0	0	0	48.12478514	0	0
0.4	0.95	0.8	0.9	0.9	0	0	0	0	47.99273085	0	0
0.4	0.95	0.8	0.9	0.9	0.00186	4.06692E-07	3.09977E-08	8.83435E-05	47.87567228	2.90387E-08	4.10541E-05
0.4	0.95	0.8	0.9	0.9	0.019192	0.000152829	1.09008E-05	0.032157495	47.77134091	1.01763E-05	0.0008222
0.4	0.95	0.8	0.9	0.9	0.324022	0.004024109	0.000277968	0.847803853	47.67789191	0.000258682	0.020215408
0.4	0.95	0.8	0.9	0.9	0.65727	0.010665694	0.000916484	2.886923844	47.59381038	0.000850491	0.051778631
0.4	0.95	0.8	0.9	0.9	0.77020213	0.016167222	0.001572622	5.111022509	47.51784147	0.001455665	0.077169098
0.4	0.95	0.8	0.9	0.9	0.842637	0.023141327	0.002168276	7.263725903	47.44893749	0.002002377	0.109709756
0.4	0.95	0.8	0.9	0.9	0.85657	0.0276988	0.002644114	9.12219267	47.38621737	0.002436664	0.130111902
0.4	0.95	0.8	0.9	0.9	0.883299	0.033004987	0.002981712	10.58507824	47.3289353	0.002742485	0.153629344
0.4	0.95	0.8	0.9	0.9	0.89982	0.038199601	0.003308447	12.07583304	47.27645612	0.003037637	0.176209953
0.4	0.95	0.8	0.9	0.9	0.924507	0.043842782	0.003611382	13.54268256	47.22823586	0.003310397	0.20126042
0.4	0.95	0.8	0.9	0.9	0.93	0.048664003	0.003863188	14.87327471	47.18380625	0.003535924	0.222547881
0.4	0.95	0.8	0.9	0.9	0.94	0.051884304	0.003989061	15.75678986	47.1427622	0.00364609	0.236630995
0.4	0.95	0.8	0.9	0.9	0.96	0.05337142	0.00397212	16.08708582	47.10475177	0.003625961	0.243153308
0.4	0.95	0.8	0.9	0.9	0.97	0.054155599	0.003864603	16.03810448	47.06946782	0.003523623	0.246210293
0.4	0.95	0.8	0.9	0.9	0.98	0.054805507	0.003733999	15.86949732	47.03664132	0.00340078	0.248973084
0.4	0.95	0.8	0.9	0.9	0.99	0.055349912	0.00360334	15.67452806	47.00603572	0.003278398	0.251027075
0.4	0.95	0.8	0.9	0.9	0.997536591	0.055698977	0.003471119	15.44647986	46.97744232	0.00315506	0.252121357
0.4	0.95	0.8	0.9	0.9	0.997880183	0.051911638	0.003217401	14.63917651	46.95067633	0.002921808	0.234903984
0.4	0.95	0.8	0.9	0.9	0.997992205	0.047905586	0.002857395	13.28688667	46.92557371	0.002592683	0.217402455
0.4	0.95	0.8	0.9	0.9	0.997885132	0.039953148	0.002410274	11.44879922	46.90198834	0.002185247	0.181556148
0.4	0.95	0.8	0.9	0.9	0.997571464	0.033977415	0.001945392	9.435152453	46.87978971	0.001762449	0.154612771
0.4	0.95	0.8	0.9	0.9	0.997063719	0.029991807	0.001615941	7.998907417	46.85886097	0.001462948	0.136667225
0.4	0.95	0.8	0.9	0.9	0.996374433	0.025838412	0.001355032	6.842912953	46.83909721	0.001225925	0.118660794
0.4	0.95	0.8	0.9	0.9	0.995516151	0.019853707	0.001066322	5.491556921	46.82040402	0.000964116	0.091454101
0.4	0.95	0.8	0.9	0.9	0.994501428	0.017850951	0.000846713	4.445243745	46.80269625	0.0007651	0.082480525
0.4	0.95	0.8	0.9	0.9	0.993342822	0.013883701	0.000686254	3.67145648	46.78589692	0.000619756	0.064295799
0.4	0.95	0.8	0.9	0.9	0.992052894	0.011901562	0.000537323	2.928411548	46.7699363	0.000484997	0.055242388
0.4	0.95	0.8	0.9	0.9	0.990644203	0.009896031	0.000438004	2.430923484	46.75475109	0.000395148	0.046149765
0.4	0.95	0.8	0.9	0.9	0.989129303	0.007874026	0.000344545	1.946681314	46.74028375	0.000310682	0.037012778
0.4	0.95	0.8	0.9	0.9	0.987520743	0.005873139	0.000257354	1.479784954	46.7264818	0.000231952	0.027828187
0.4	0.95	0.8	0.9	0.9	0.985831062	0.003893322	0.000176635	1.03331689	46.7132974	0.00015913	0.018595455
0.4	0.95	0.8	0.9	0.9	0.984072792	0.002902769	0.000118816	0.706957537	46.70068676	0.000106996	0.013975954
0.4	0.95	0.8	0.9	0.9	0.982258449	0.001923098	8.16046E-05	0.493707942	46.68860981	7.34564E-05	0.009333884
0.4	0.95	0.8	0.9	0.9	0.980400538	0.00095513	4.71004E-05	0.289667224	46.67702976	4.23809E-05	0.004673299
0.4	0.95	0.8	0.9	0.9	0.978511548	0.000379306	2.11439E-05	0.132149648	46.66591286	1.90182E-05	0.001870929
0.4	0.95	0.8	0.9	0.9	0.976603956	0.000188179	8.71073E-06	0.055313112	46.655228	7.83217E-06	0.000935735
0.4	0.95	0.8	0.9	0.9	0.97469022	0	2.79962E-06	0.018057549	46.64494658	2.51638E-06	0
						Approximately:	More exact:			Most exact:	
	Fudge factor =	1			No (FINAL)	9.964229585	22.94631922				45.71863143
					L (cm)	1.7					1.7
					n (quartz)	1.47034425					1.474
					CHTh (Beta=1)	47.15101174	0.822940401		47.36787177		47.2827114
					Npe	9.103909011	20.96511331			20.94131328	41.94934777
					Average photon wavelength			4191.728781			
					Ratio = Eff-starting / Eff-final		0.170857208				

Expected final performance at incidence angle of 90^o

Focusing DIRC prototype bandwidth:



Expected performance of a final device:



- Prototype's **Npe_measured** and **Npe_expected** are consistent within **~20%.**
- **Hamamatsu H-9500 MaPMTs**:
  We expect **No ~ 31 cm^{-1}**, which in turn gives **Npe ~ 28**, and somewhat better performance in **pi/K** separation than the present BaBar DIRC.
- **Burle-Photonis MCP-PMTs:**
  We expect **No ~ 22 cm^{-1}** and **Npe ~ 20** for B = 0kG.

Comments on what goes on into these statements:

1. To get $\mathbf{N_o}$ for the Focusing DIRC with the Hamamatsu H-9500, I assume:

   50% rel eff. to Photonis PMT & 95% packing eff. & 90% detection eff. & everything else

2. To get $\mathbf{N_o}$ for the Focusing DIRC with the Burle MCP-PMT, I assume:

   50% rel eff. to Photonis PMT & 80% packing eff. & 80% in time photons & 90% det. eff. & etc.

3. To get the pi/K separation, assume: σ_{TRACK} ~ sqrt((6/SQRT(28))^2+1.5^2) = 1.88 mrads.

Joe's MC hit simulation of slot 7 population in the prototype: