



BESS-Polar ACC Status

T. Hams (GSFC)
for the Video Conference
on 04/24/03 at 7:00 p.m. (EDT)

ACC Simulation

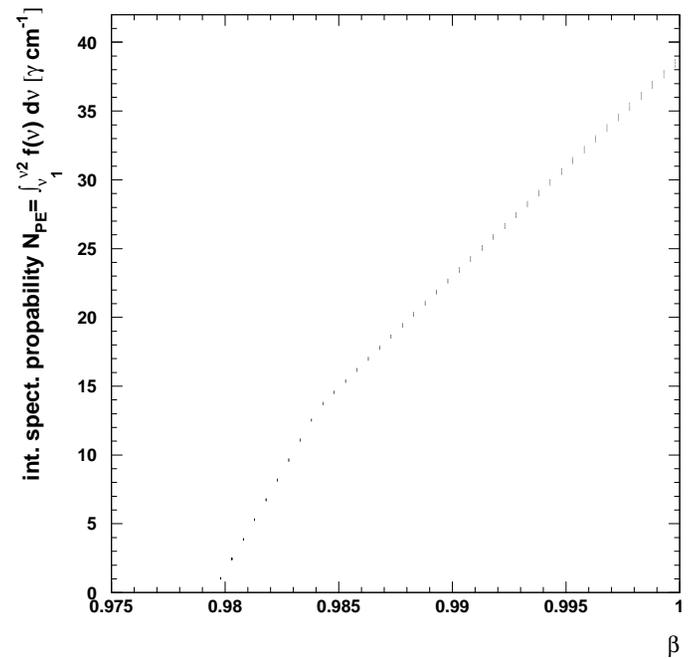
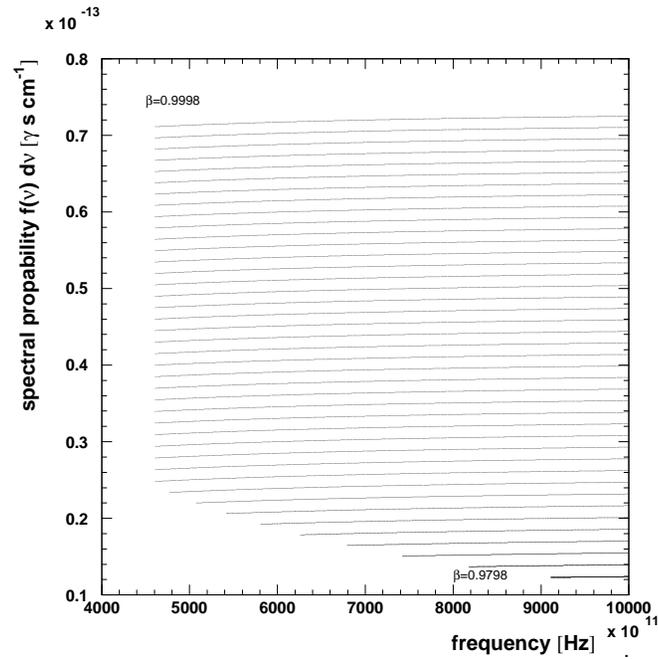
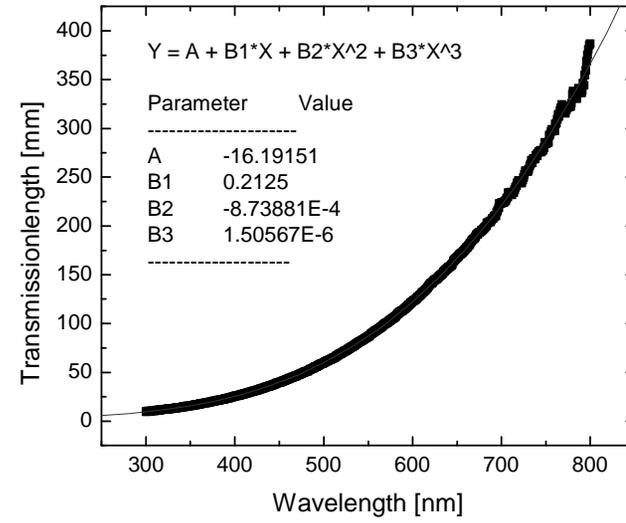
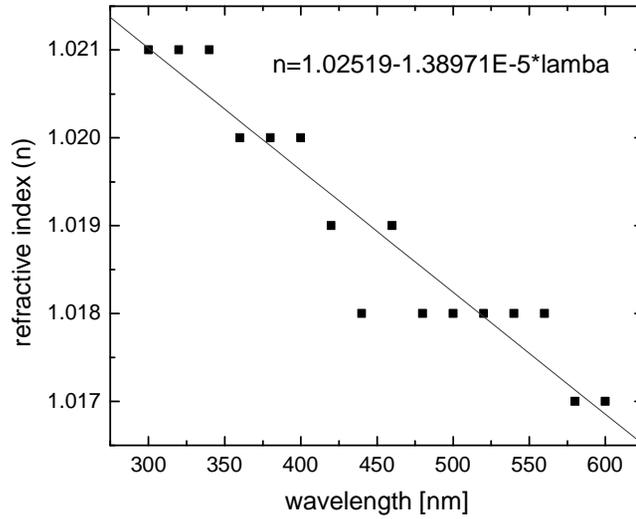
Objective of Simulation

- Optimize location of the Aerogel, opening angle of the ACC box and location of PMTs.
- Currently inject a single photon, consider absorption in the Aerogel (see next page) and the reflective Lining of Counter (Reflectivity 98%).

Following scatter plots show the end points of $7E+5$ photons that were downwardly injected into the ACC at $x=-536, y=0, z=0$ (top ACC lid) for the aerogel at the top and $x=-720, y=0, z=0$ (bottom ACC lid) for the aerogel at the bottom.

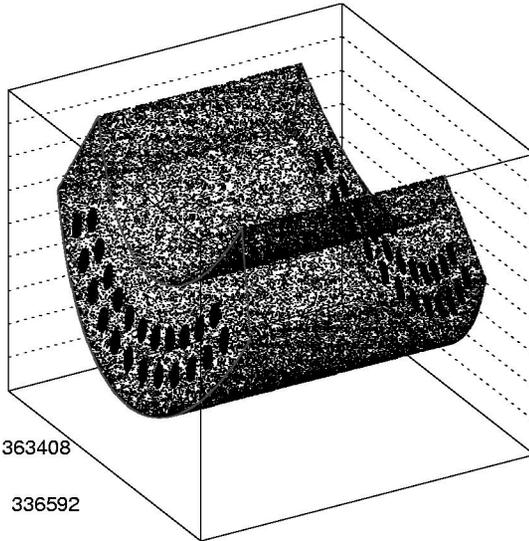
Top: left) no absorption in aerogel, right) 300 nm photon

Bottom: left) 450 nm , right) 650 nm



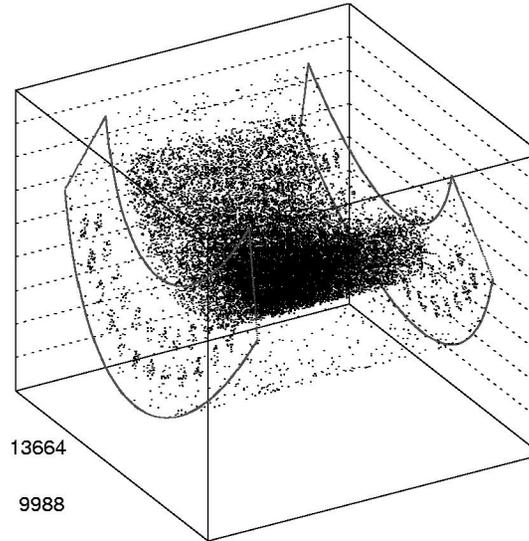
Opening angle 88° , Aerogel at the Top

photon-x0y0z0-r098



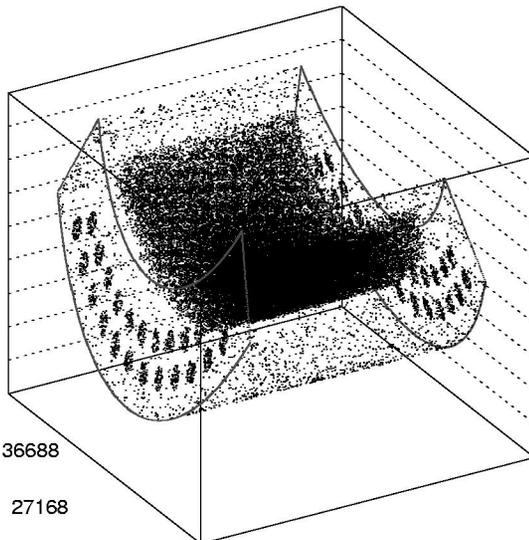
Wall 363408
PMT 336592
Aerogel 0

photon-300nm-x0y0z0-a-r098



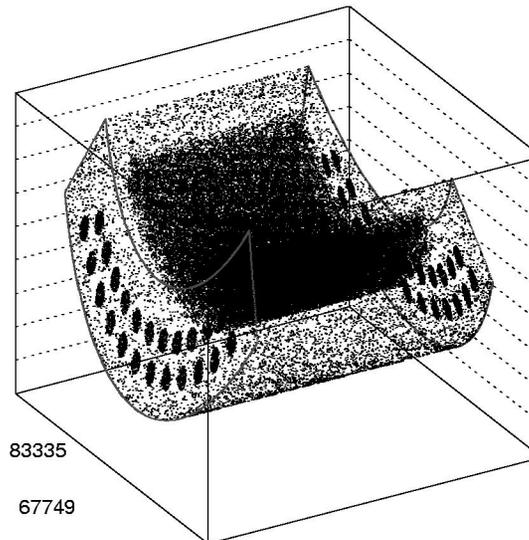
Wall 13664
PMT 9988
Aerogel 676348

photon-450nm-x0y0z0-a-r098



Wall 36688
PMT 27168
Aerogel 636144

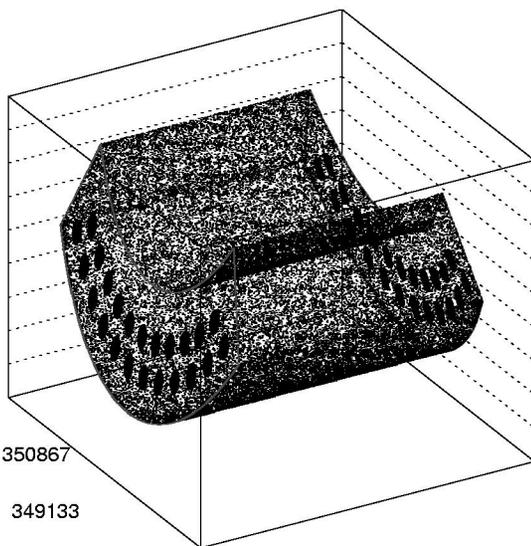
photon-650nm-x0y0z0-a-r098



Wall 83335
PMT 67749
Aerogel 548916

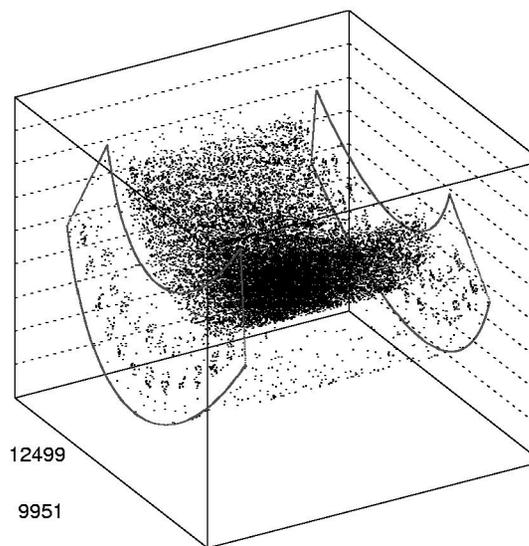
Opening angle 80°, Aerogel at the Top

photon-x0y0z0-r098-ang80



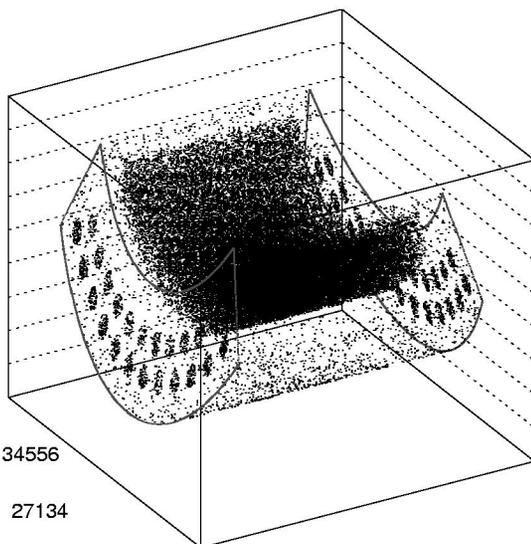
Wall 350867
PMT 349133
Aerogel 0

photon-300nm-x0y0z0-a-r098-ang80



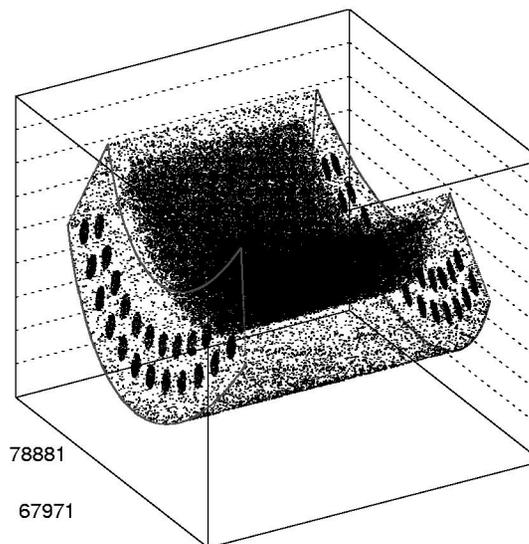
Wall 12499
PMT 9951
Aerogel 677550

photon-450nm-x0y0z0-a-r098-ang80



Wall 34556
PMT 27134
Aerogel 638310

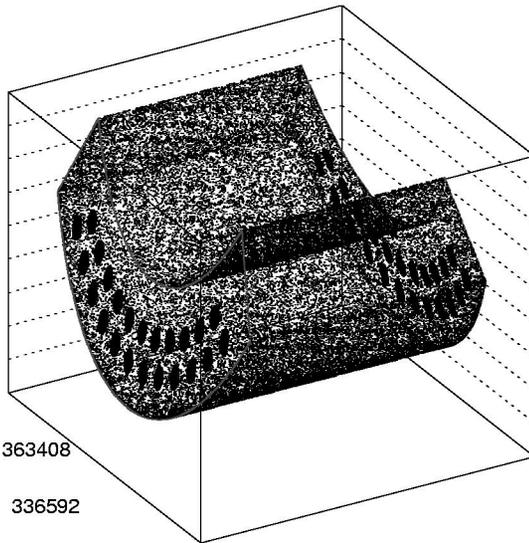
photon-650nm-x0y0z0-a-r098-ang80



Wall 78881
PMT 67971
Aerogel 553148

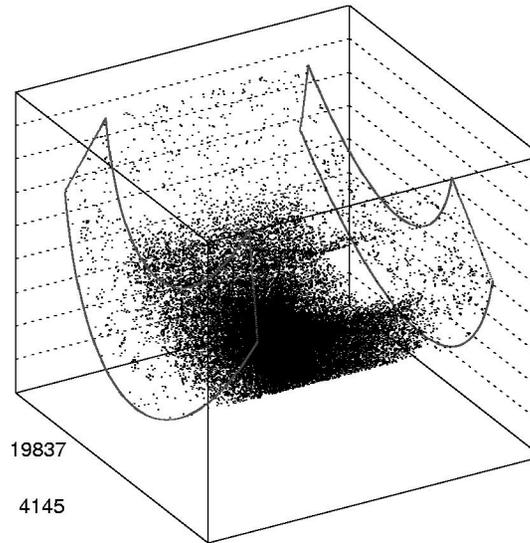
Opening angle 88° , Aerogel at the bottom

photon-x0y0z0-r098



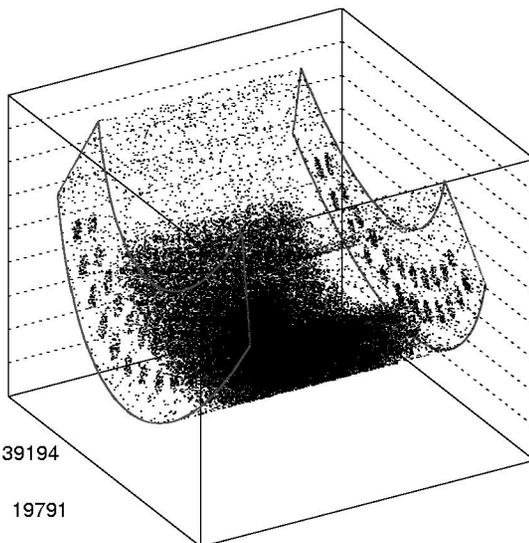
Wall 363408
PMT 336592
Aerogel 0

photon-300nm-x-720y0z0-a-bot-r098



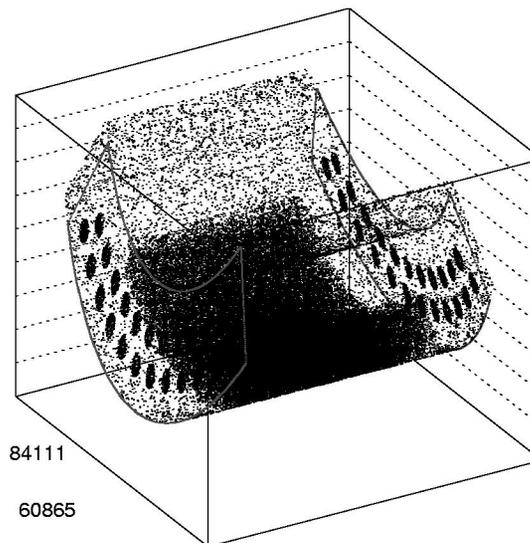
Wall 19837
PMT 4145
Aerogel 676018

photon-450nm-x-720y0z0-a-bot-r098



Wall 39194
PMT 19791
Aerogel 641015

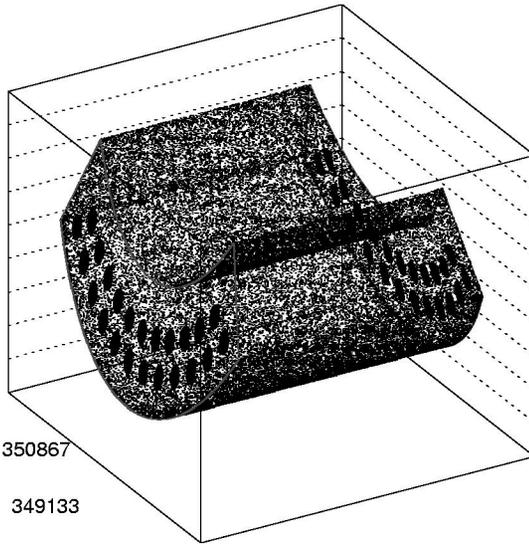
photon-650nm-x-720y0z0-a-bot-r098



Wall 84111
PMT 60865
Aerogel 555024

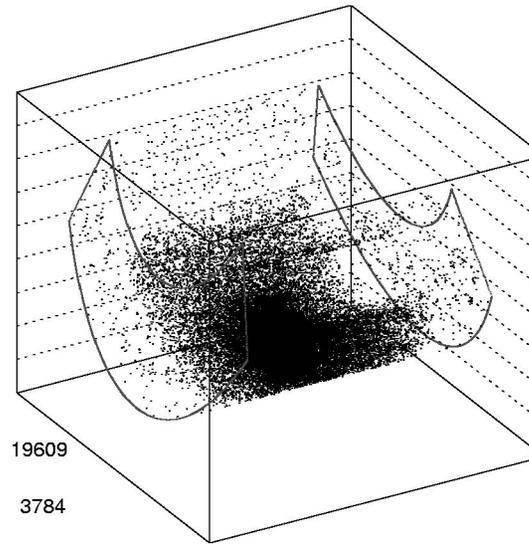
Opening angle 80°, Aerogel at the bottom

photon-x0y0z0-r098-ang80



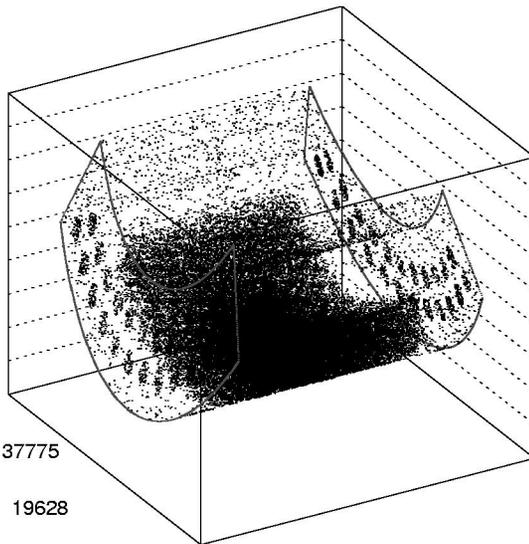
Wall 350867
PMT 349133
Aerogel 0

photon-300nm-x-720y0z0-a-bot-r098-ang80



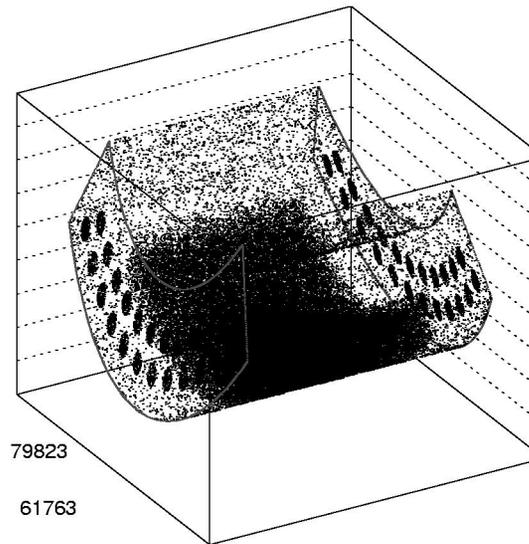
Wall 19609
PMT 3784
Aerogel 676607

photon-450nm-x-720y0z0-a-bot-r098-ang80



Wall 37775
PMT 19628
Aerogel 642597

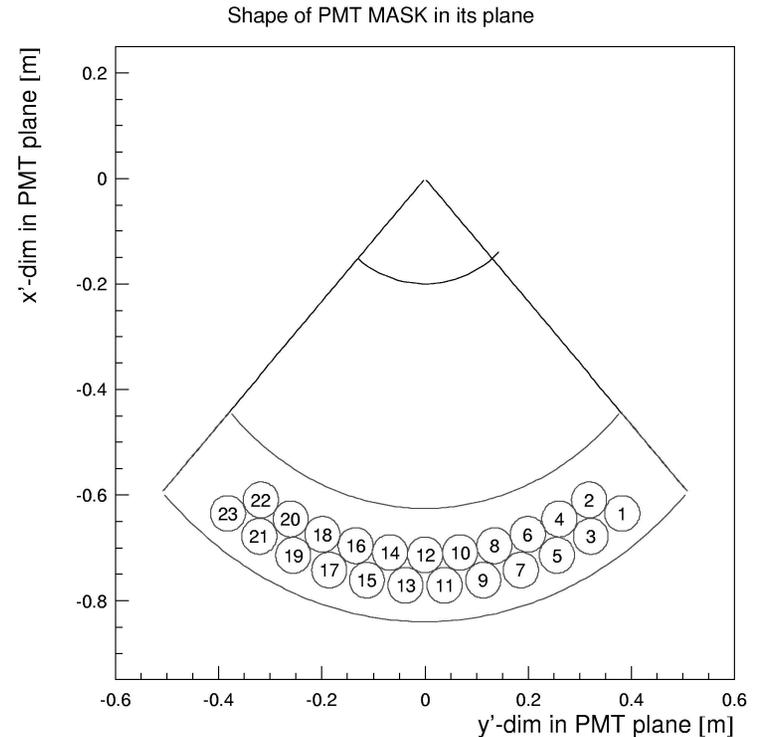
photon-650nm-x-720y0z0-a-bot-r098-ang80



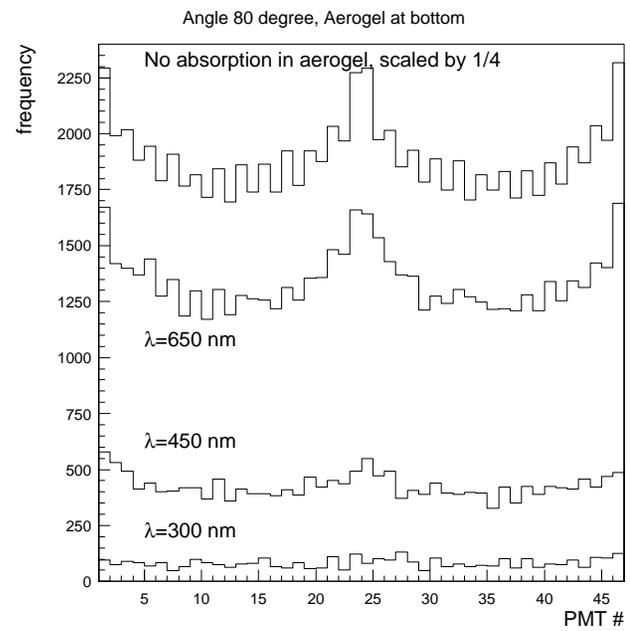
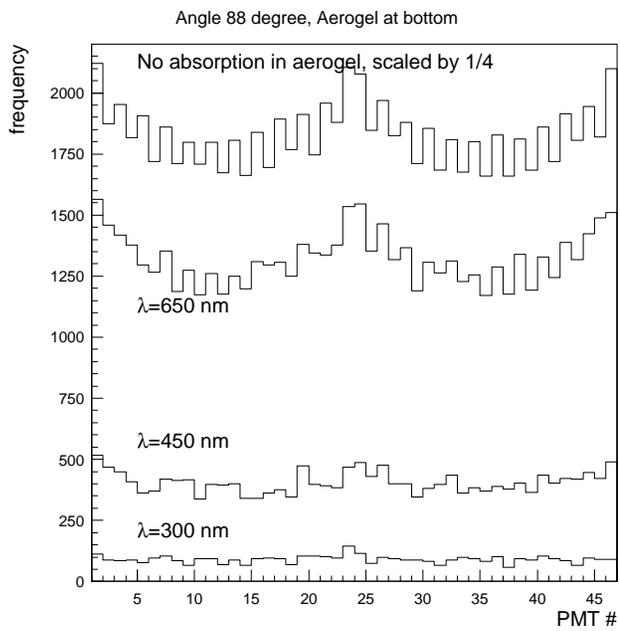
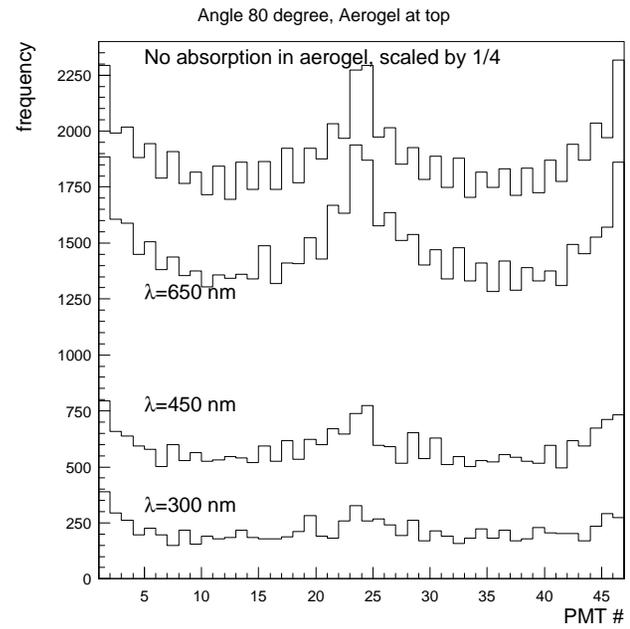
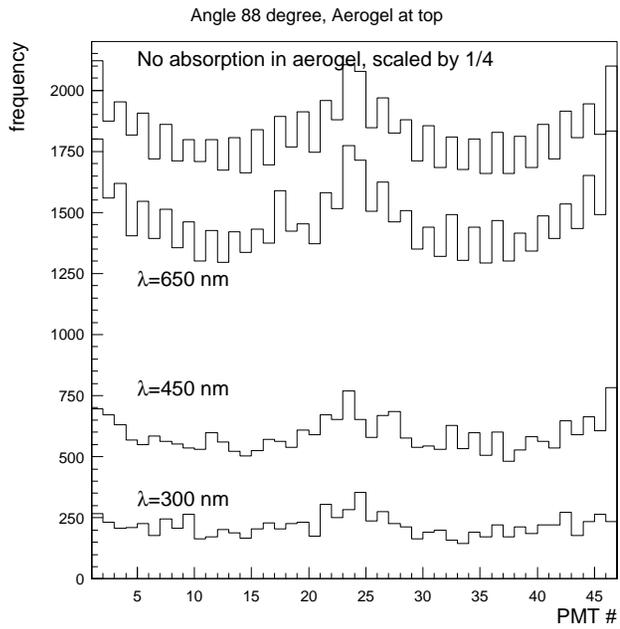
Wall 79823
PMT 61763
Aerogel 558414

Numbering of the PMTs

The histograms on the next page show the frequency with which a PMT detected a photon. The highest histogram in each plot is without absorption in the aerogel (scaled to $\frac{1}{4}$). The three other histograms in each plot are generated with absorption in the aerogel for different wavelength of the photons.



- PMTs in the lower row have a higher probability (10%) than those in the upper row
- PMT on the side of the counter see more light than the ones at in the center ($y=0$). At present PMT are closed packed in the center.



Conclusion

- The PMT distribution in the 88 degree box is a little bit more uniform from the center (PMT=12) to the edges (PMT=1,23).
- Aerogel at the top of the counter is preferable, in the 300 nm wavelength range the number of photons collected is larger by a factor of 2.5 if the aerogel is at the top of the counter.
- Investigated moving the PMT slightly outboard, might further improve photon collection efficiency and allow to mount a "support net" to mount the aerogel at the top of the counter.
- Dependence of the collection efficiency from the incident point is still under investigation.
- Also refining ideas to support aerogel from the top.