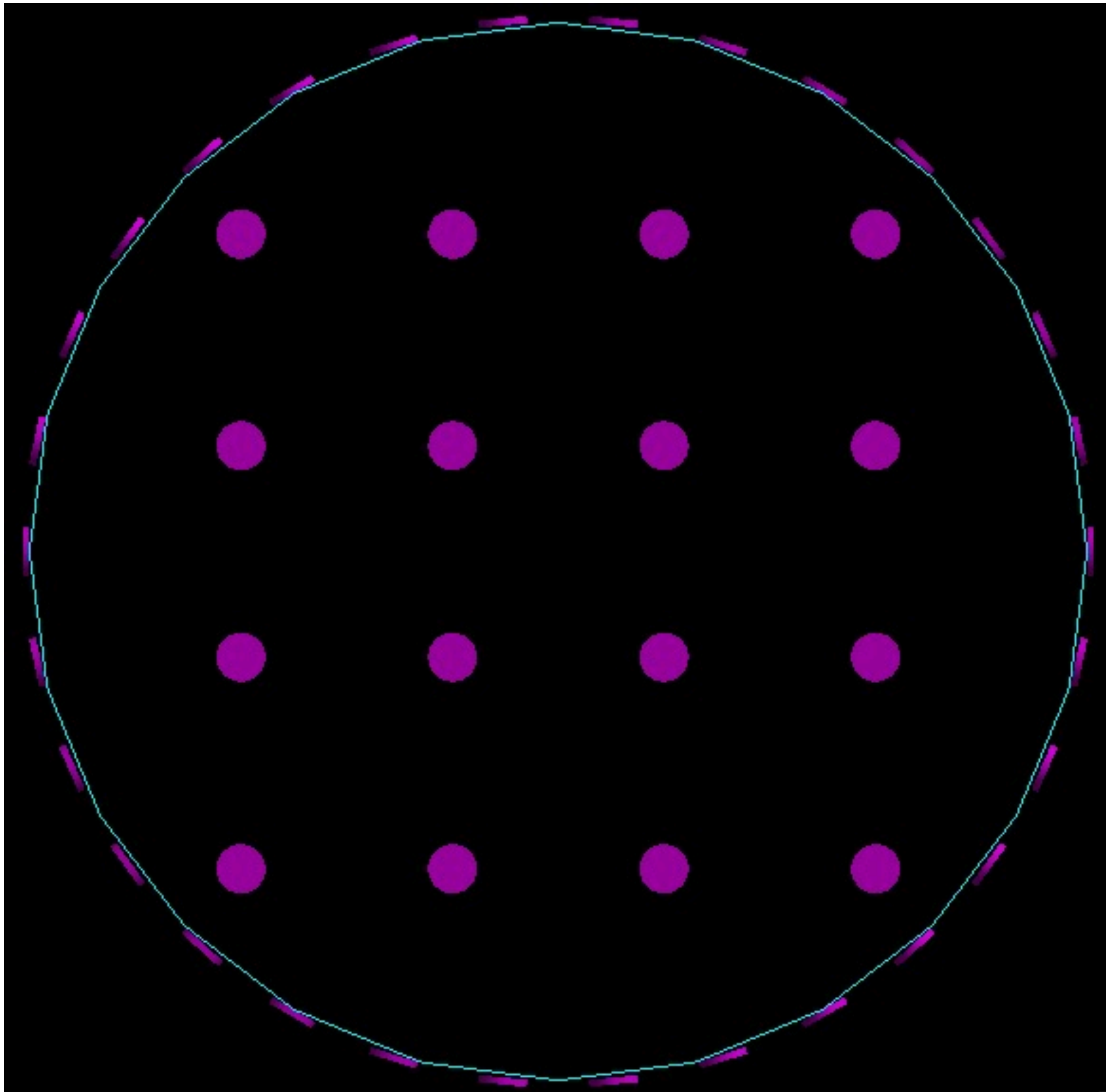
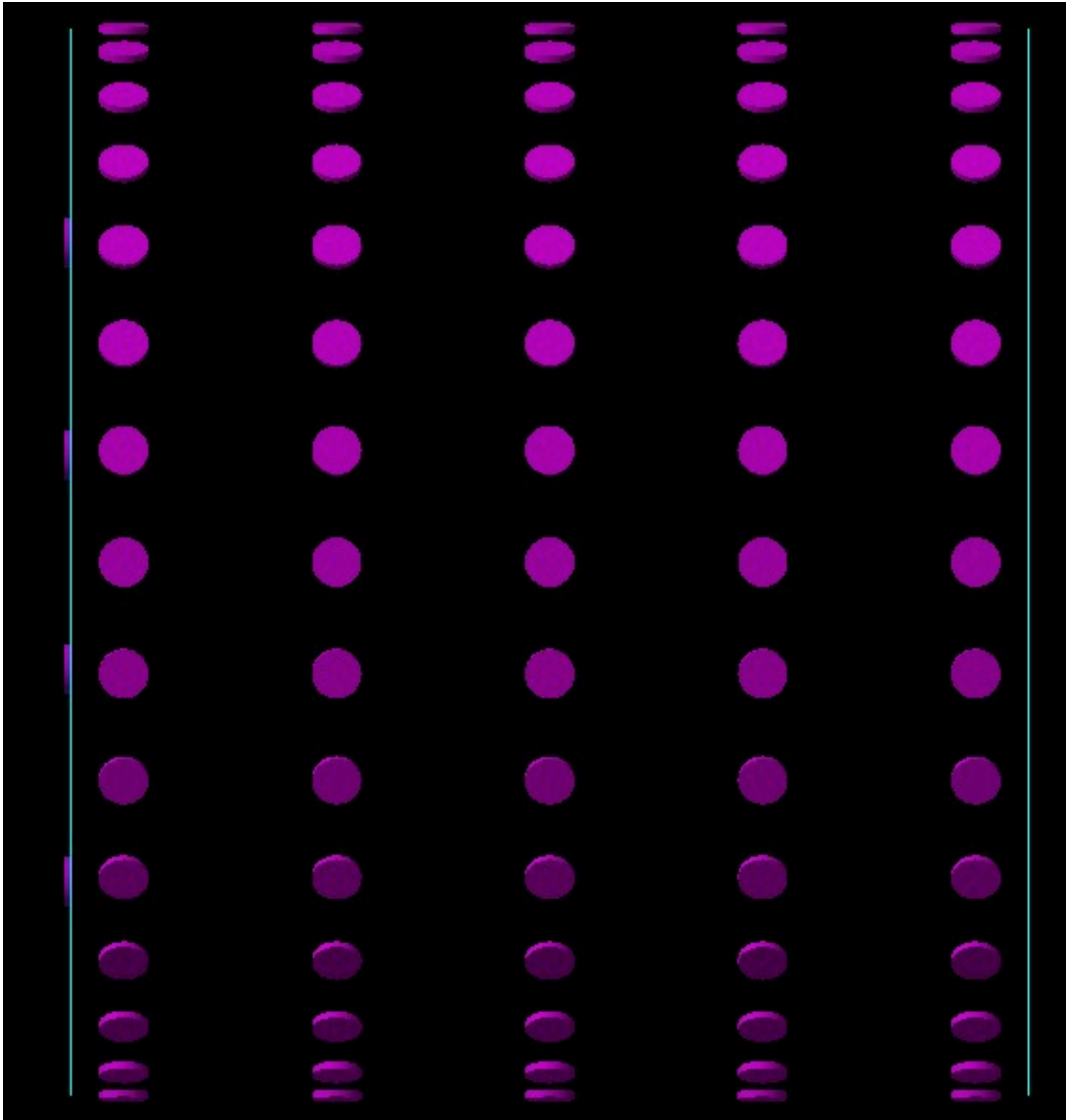


水チェレンコフMC

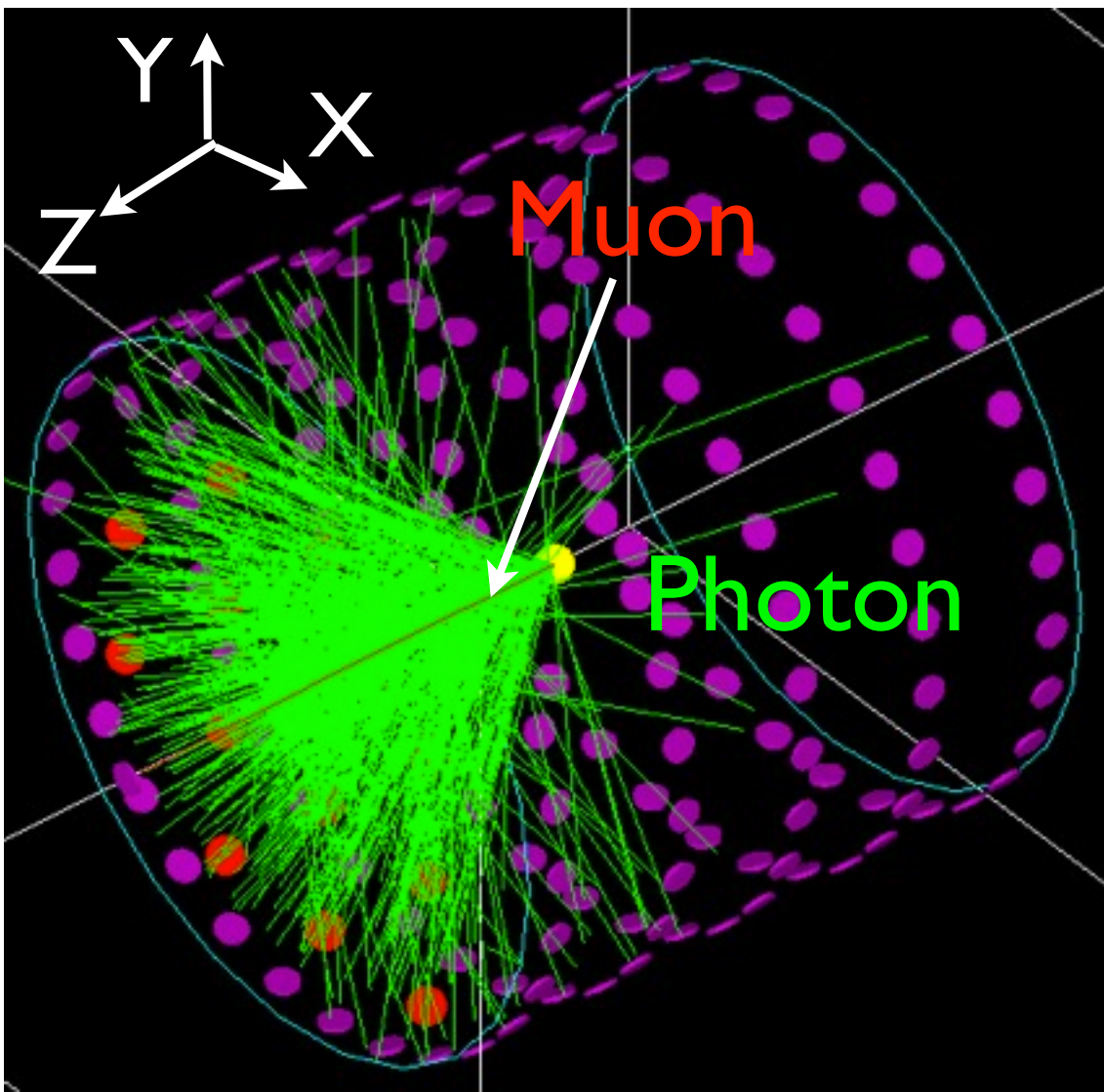
村上 明

- PMTをタンク外側につける
 - PMTとタンクが重ならないように、タンク外側に接着。
 - 側面は局面に接する形でPMTを設置
- Muon
 - 1 GeV
 - position : (0,0,0)
 - Direction : (0,0,1)





- Hit PMT : # of PMTs which has some hits
 - Total PMTs = 166 (temporary)
- Efficiency = Total P.E. into PMT / Total P.E.
 - Total P.E. = Total Optical Photons \times QE
 - Total PE = Sum of P.E. of each PMT



紫：PMT

水色線：タンク

赤丸：ヒットのあったPMT

黄色：Vertex

Number of optical photons produced in this event : 35095
Number of photo-electrons produced in this event : 1010

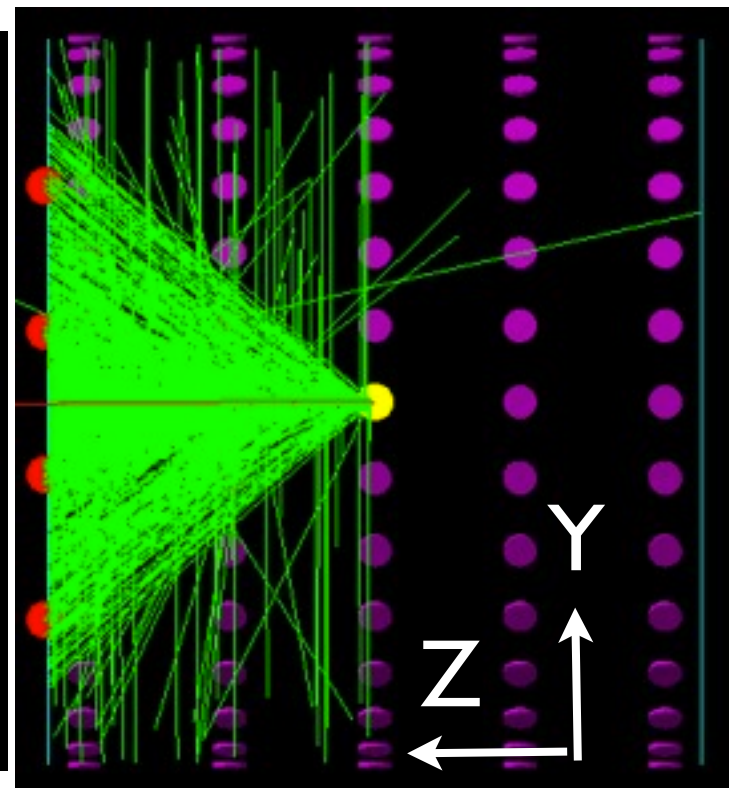
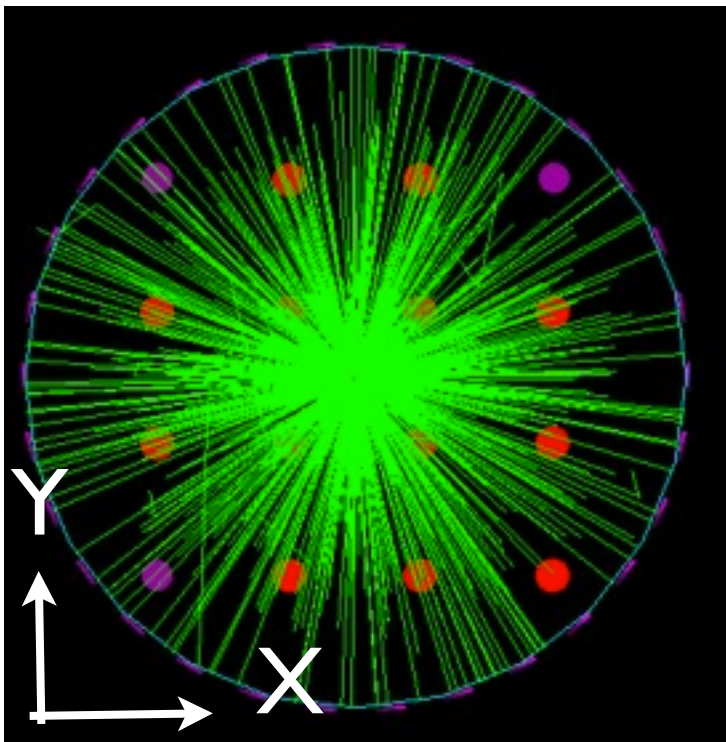
Print hit information in this Event

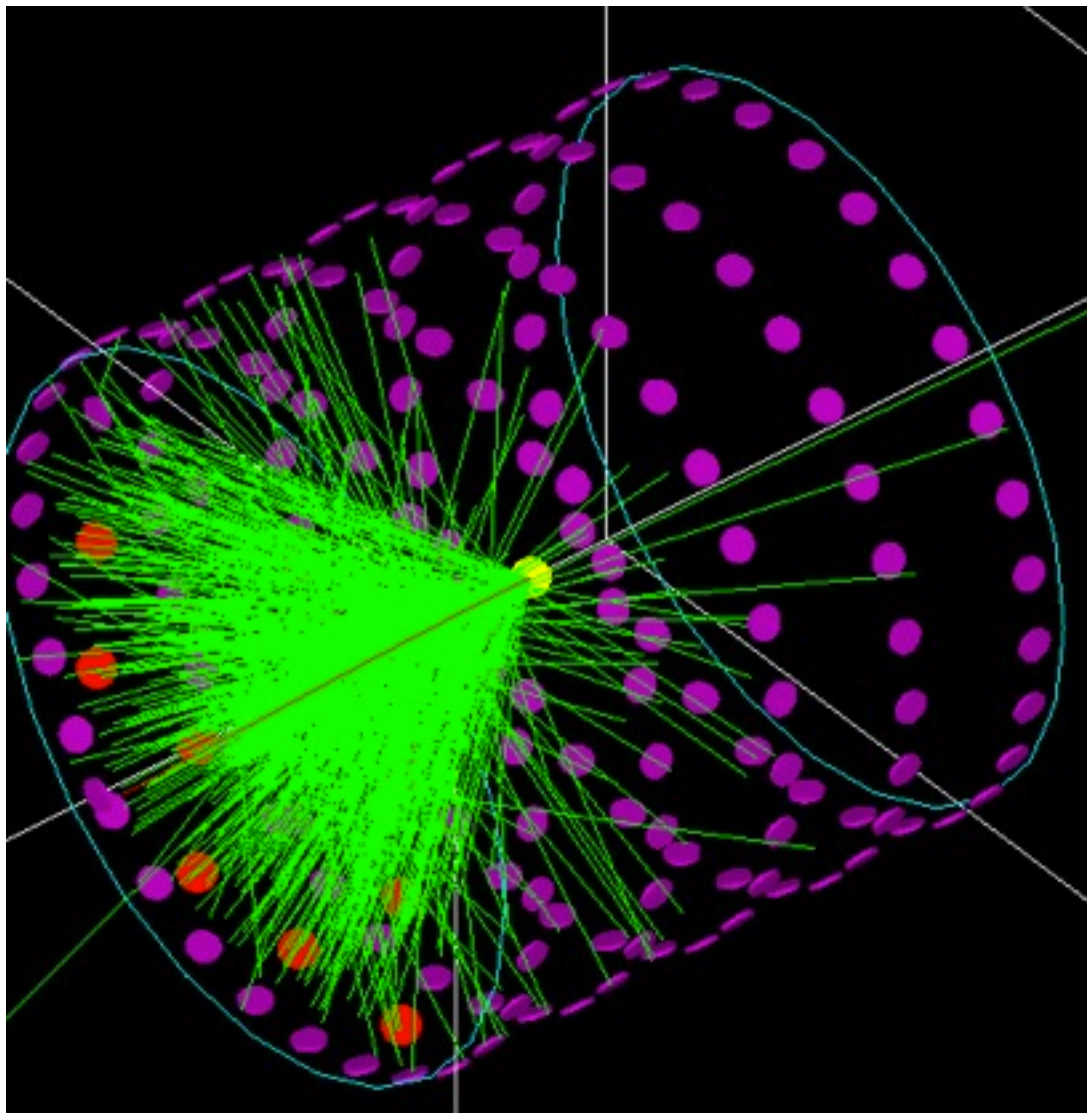
PMT ID: 8	# of hits: 2	PMT pos [cm] 15, -45, 68
PMT ID: 1	# of hits: 7	PMT pos [cm] -45, -15, 68
PMT ID: 14	# of hits: 2	PMT pos [cm] 45, 15, 68
PMT ID: 11	# of hits: 3	PMT pos [cm] 15, 45, 68
PMT ID: 13	# of hits: 1	PMT pos [cm] 45, -15, 68
PMT ID: 7	# of hits: 2	PMT pos [cm] -15, 45, 68
PMT ID: 2	# of hits: 1	PMT pos [cm] -45, 15, 68
PMT ID: 4	# of hits: 1	PMT pos [cm] -15, -45, 68
PMT ID: 10	# of hits: 5	PMT pos [cm] 15, 15, 68
PMT ID: 12	# of hits: 1	PMT pos [cm] 45, -45, 68
PMT ID: 9	# of hits: 3	PMT pos [cm] 15, -15, 68
PMT ID: 5	# of hits: 8	PMT pos [cm] -15, -15, 68
PMT ID: 6	# of hits: 3	PMT pos [cm] -15, 15, 68

Hit PMTs 13 / Ratio: 0.0783

Total p.e. into PMTs 39

Efficiency: 0.0386



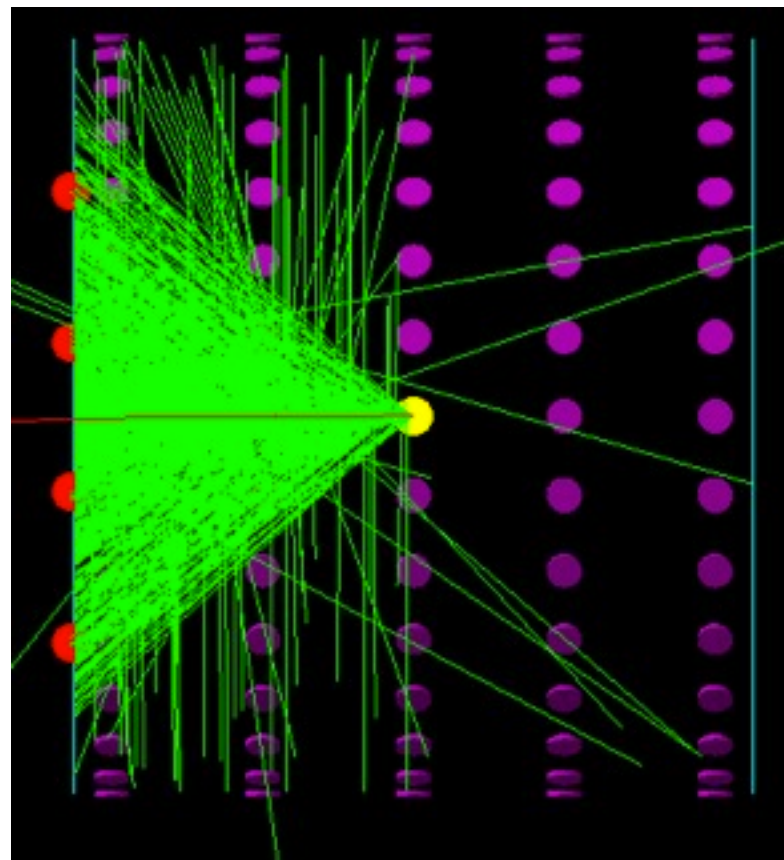
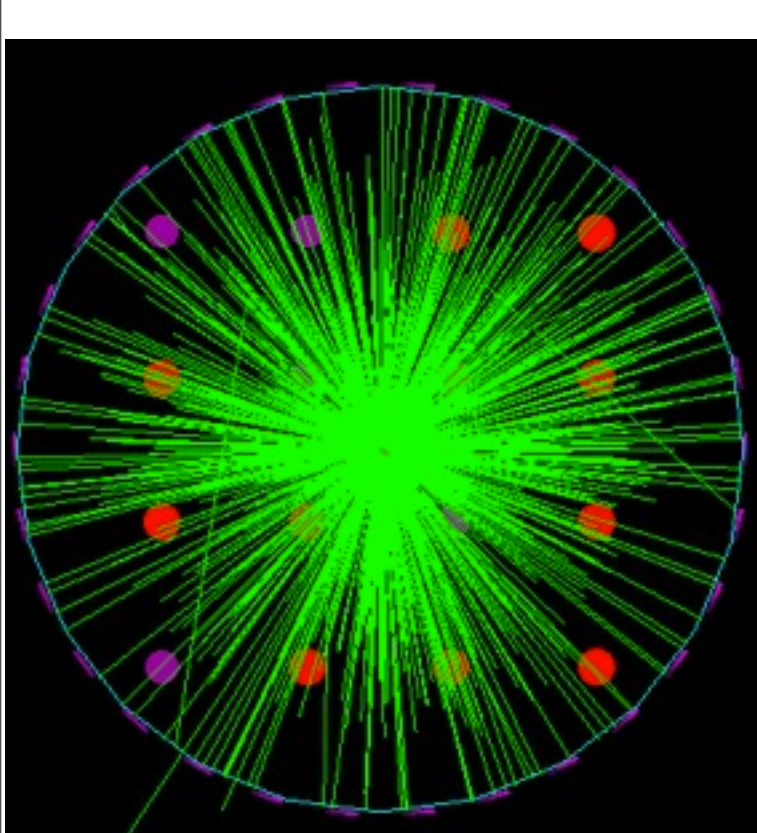


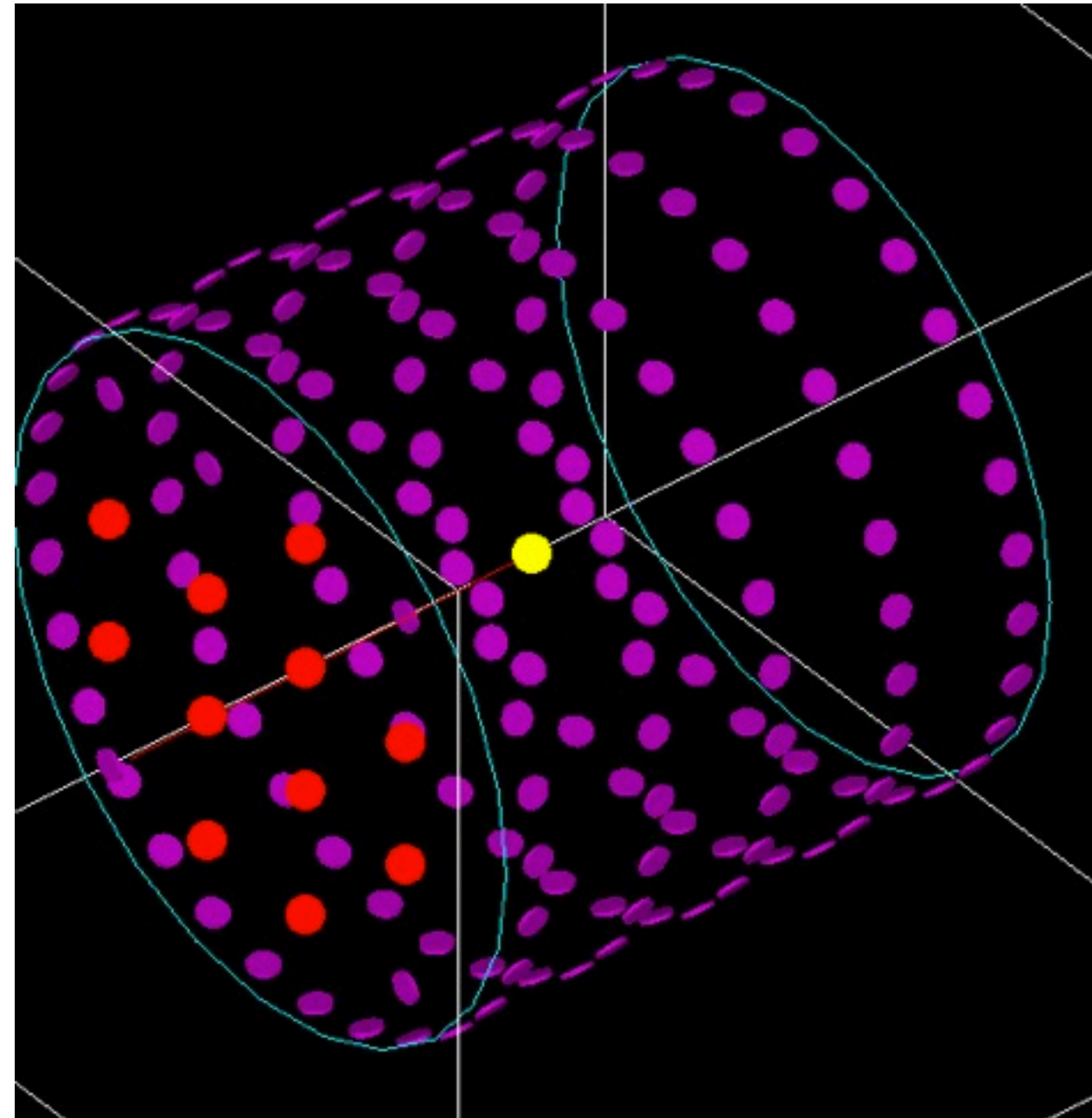
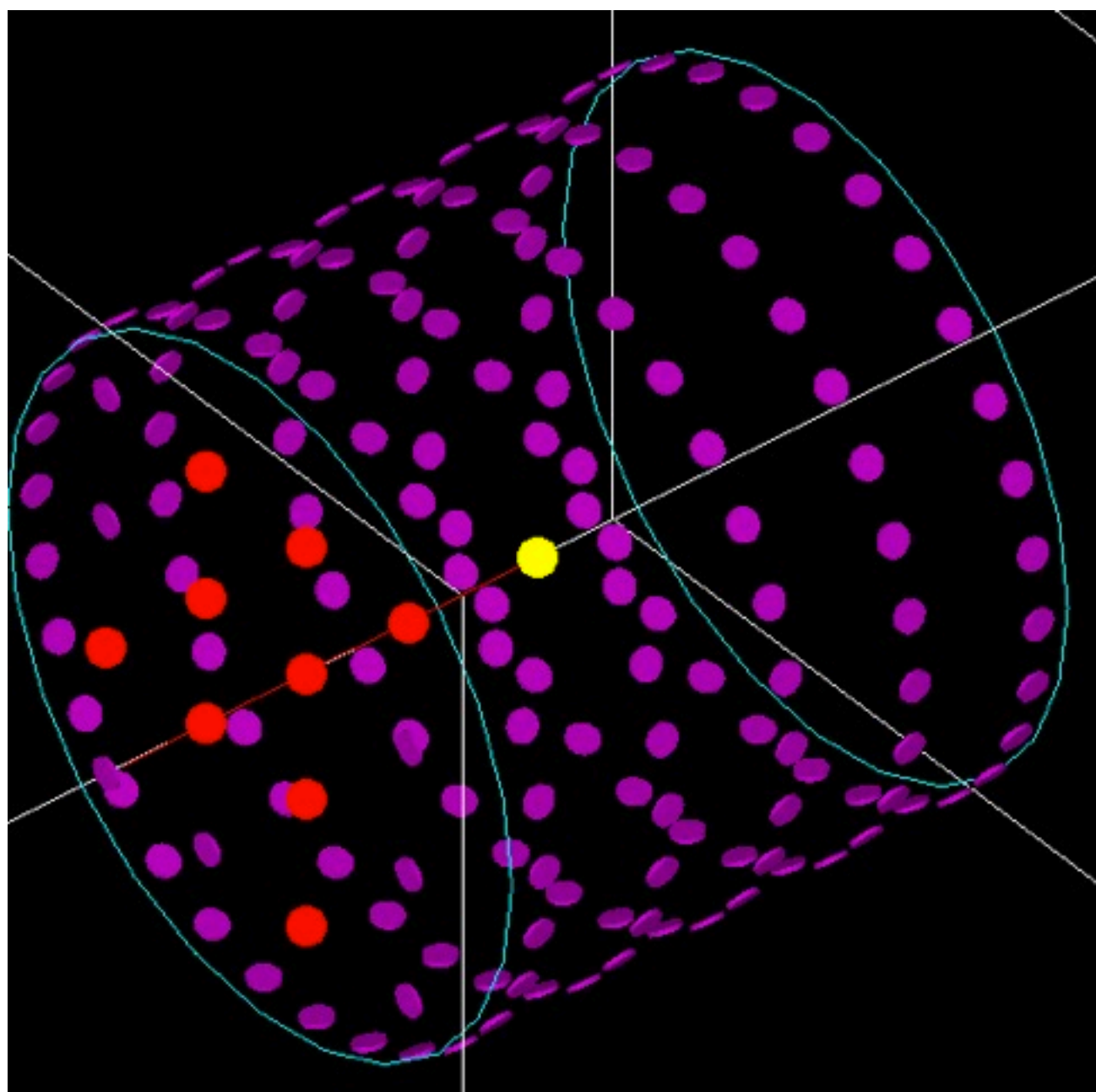
Number of optical photons produced in this event : 34124
 Number of photo-electrons produced in this event : 1003

Print hit information in this Event

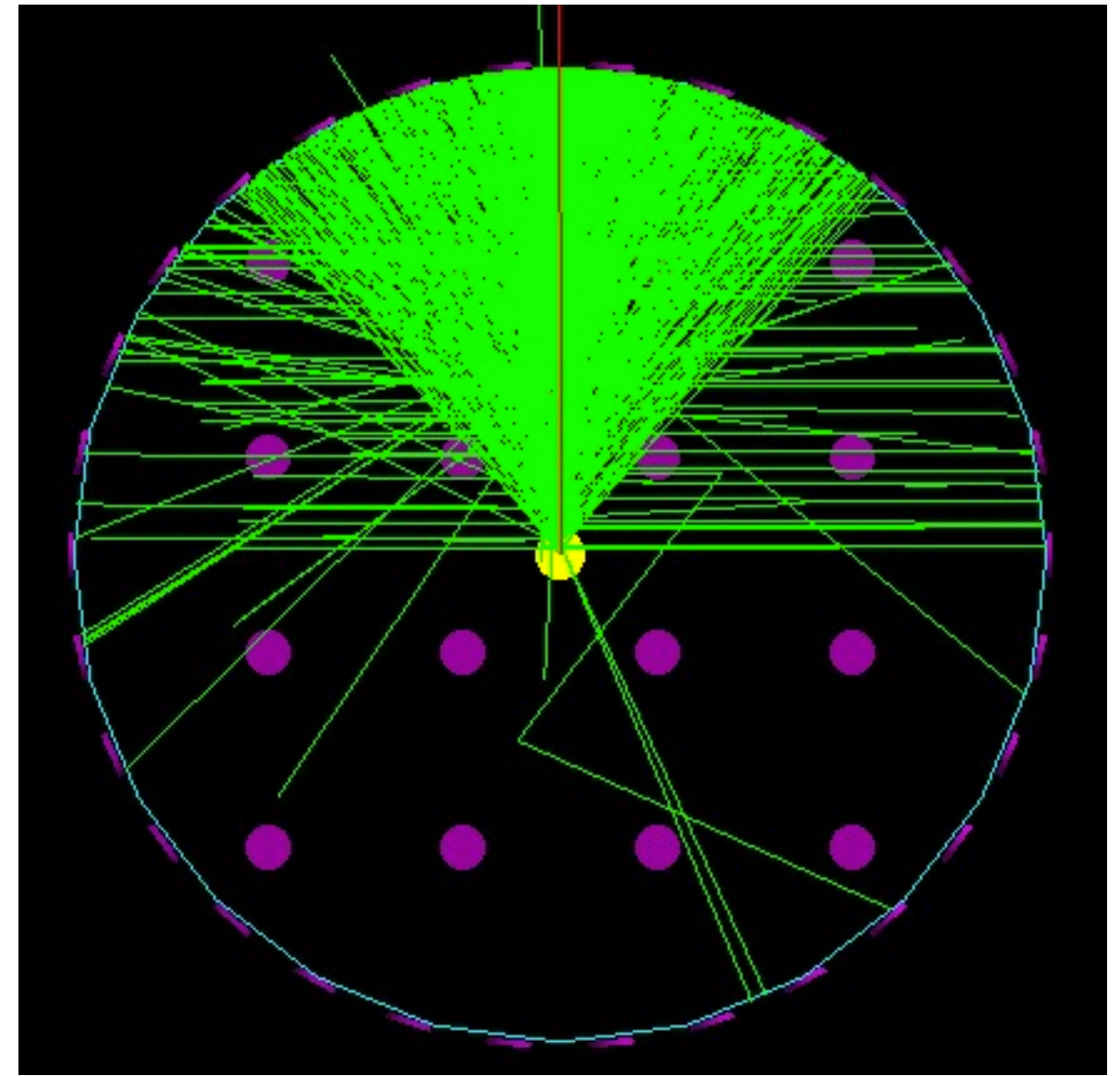
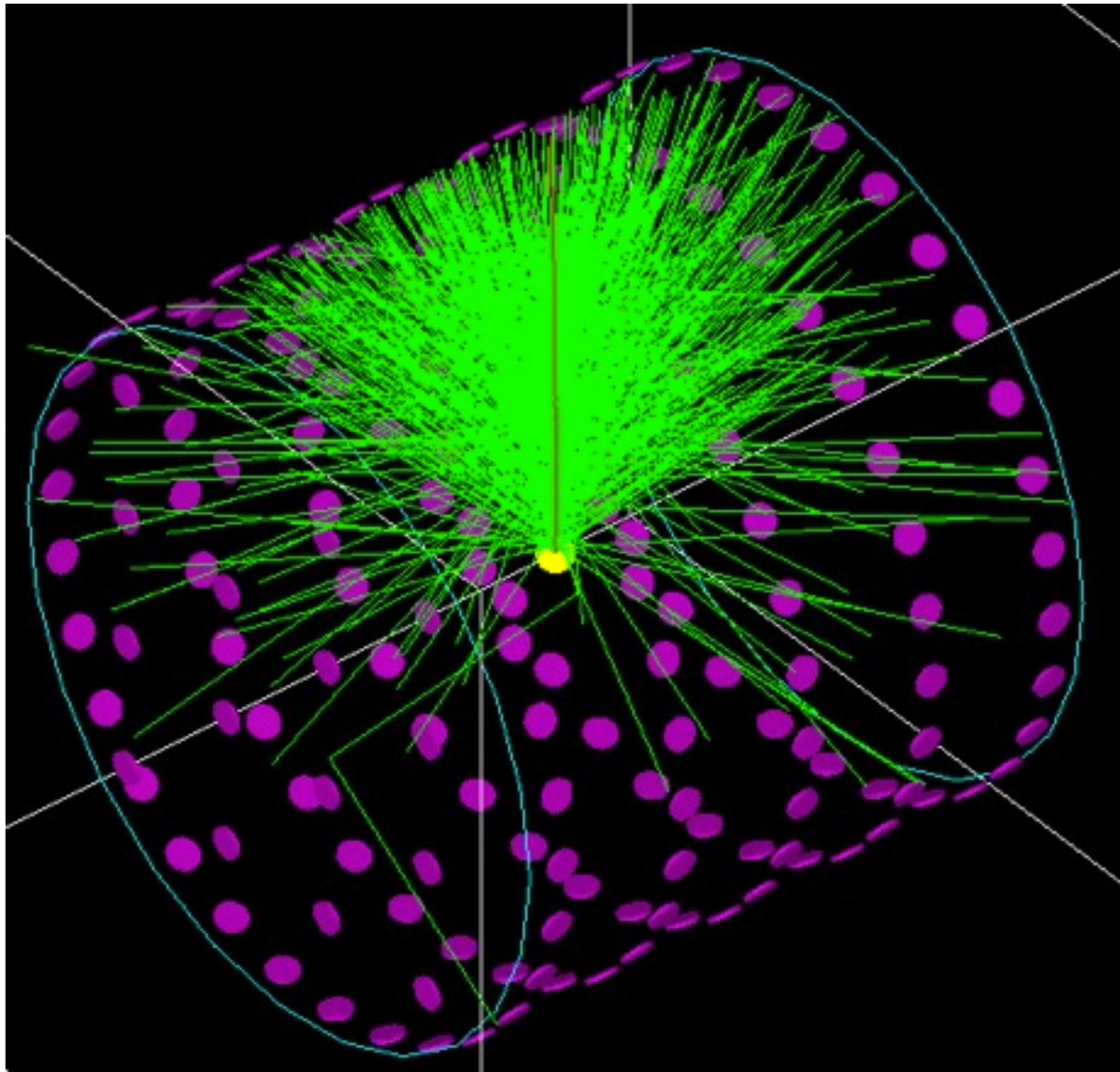
PMT ID: 12	# of hits: 1	PMT pos [cm] 45, -45, 68
PMT ID: 15	# of hits: 1	PMT pos [cm] 45, 45, 68
PMT ID: 1	# of hits: 2	PMT pos [cm] -45, -15, 68
PMT ID: 14	# of hits: 1	PMT pos [cm] 45, 15, 68
PMT ID: 4	# of hits: 1	PMT pos [cm] -15, -45, 68
PMT ID: 11	# of hits: 1	PMT pos [cm] 15, 45, 68
PMT ID: 2	# of hits: 1	PMT pos [cm] -45, 15, 68
PMT ID: 13	# of hits: 1	PMT pos [cm] 45, -15, 68
PMT ID: 8	# of hits: 1	PMT pos [cm] 15, -45, 68
PMT ID: 10	# of hits: 4	PMT pos [cm] 15, 15, 68
PMT ID: 5	# of hits: 1	PMT pos [cm] -15, -15, 68

Hit PMTs 11 / Ratio: 0.0663
 Total p.e. into PMTs 15
 Efficiency: 0.015



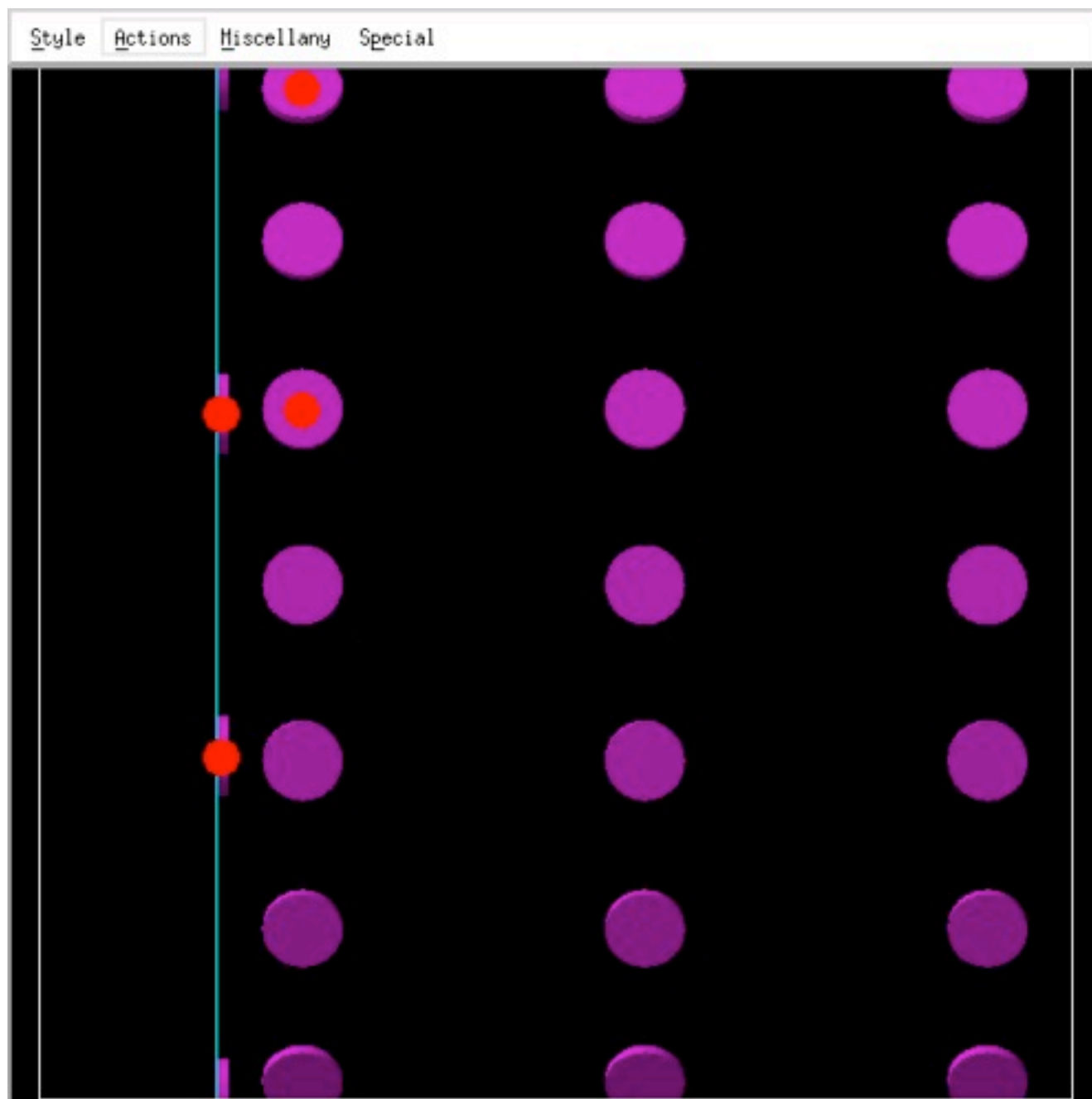


→ 側面PMTにヒットなし



上に向けて打っても、、、
側面PMTにヒットなし

- PMTをタンク内に設置することに

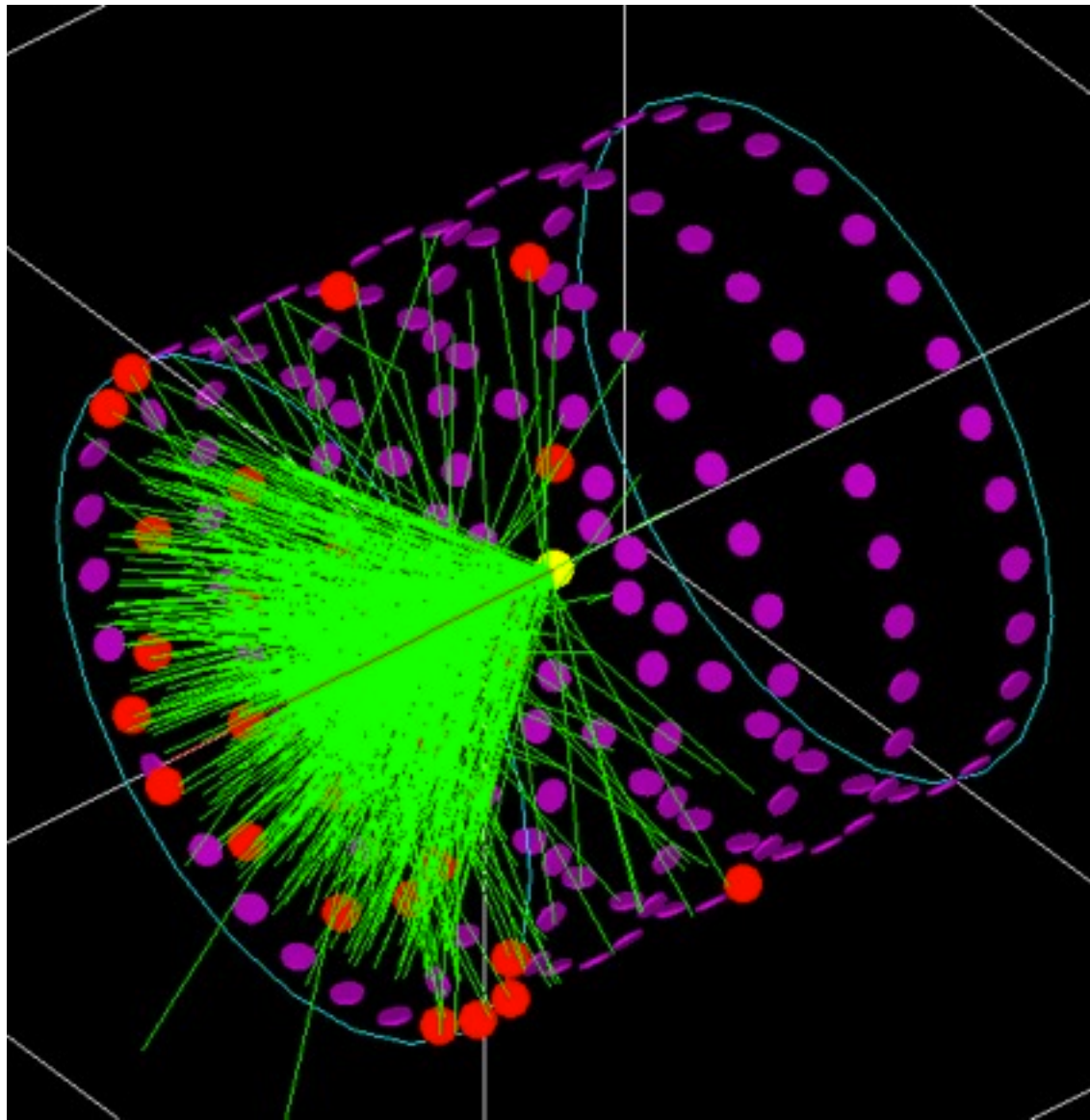


横から見た図



底から見た図

- Muon
 - 1 GeV
 - position : (0,0,0)
 - Direction : (0,0,1)

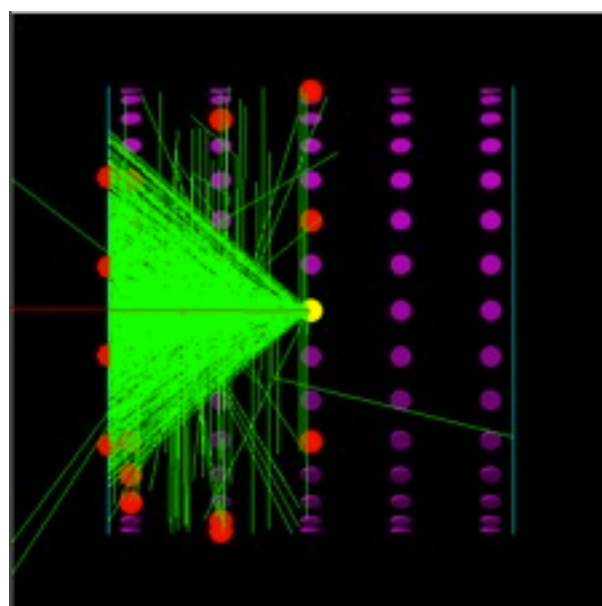
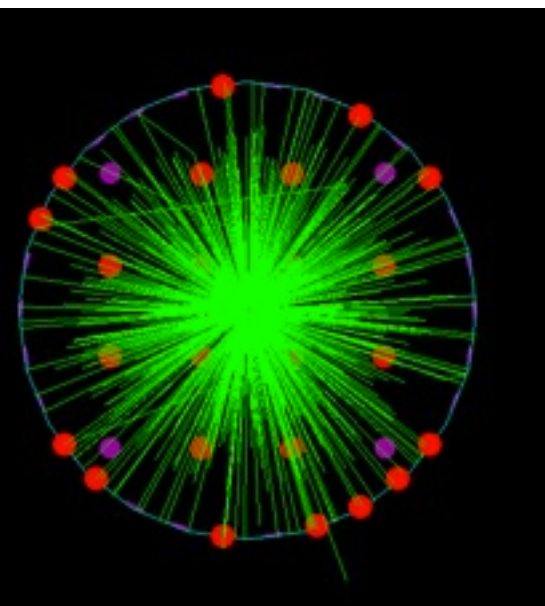


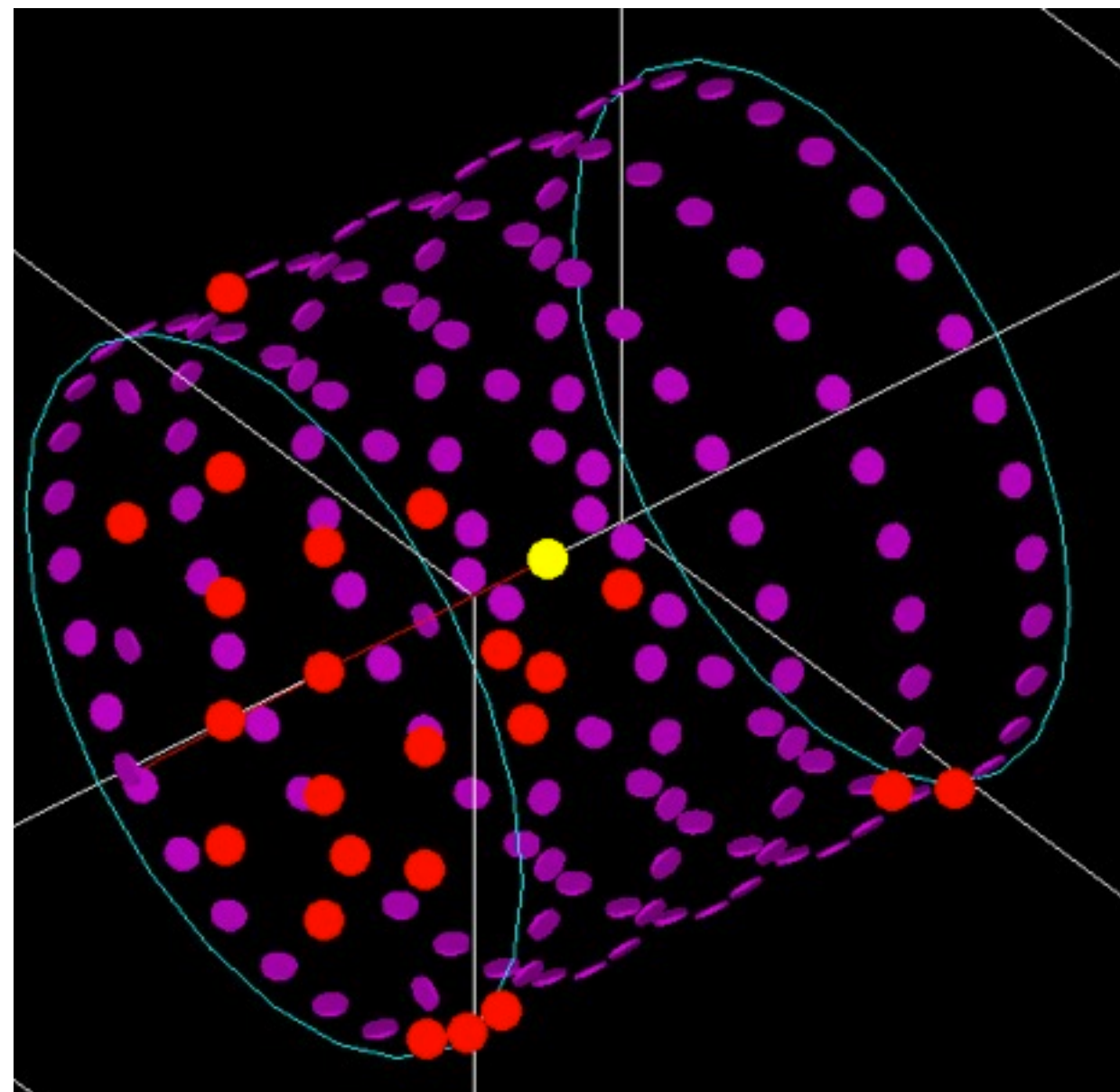
Number of optical photons produced in this event : 34188
 Number of photo-electrons produced in this event : 1007

Print hit information in this Event

PMT ID: 58	# of hits: 1	PMT pos [cm]	-7.74, 73.6, 0
PMT ID: 153	# of hits: 1	PMT pos [cm]	59.9, -43.5, 0
PMT ID: 14	# of hits: 3	PMT pos [cm]	45, 15, 67
PMT ID: 1	# of hits: 3	PMT pos [cm]	-45, -15, 67
PMT ID: 7	# of hits: 4	PMT pos [cm]	-15, 45, 67
PMT ID: 4	# of hits: 3	PMT pos [cm]	-15, -45, 67
PMT ID: 2	# of hits: 2	PMT pos [cm]	-45, 15, 67
PMT ID: 11	# of hits: 1	PMT pos [cm]	15, 45, 67
PMT ID: 13	# of hits: 1	PMT pos [cm]	45, -15, 67
PMT ID: 8	# of hits: 1	PMT pos [cm]	15, -45, 67
PMT ID: 9	# of hits: 7	PMT pos [cm]	15, -15, 67
PMT ID: 129	# of hits: 1	PMT pos [cm]	-7.74, -73.6, 30
PMT ID: 44	# of hits: 1	PMT pos [cm]	37, 64.1, 30
PMT ID: 83	# of hits: 1	PMT pos [cm]	-67.6, 30.1, 0
PMT ID: 5	# of hits: 7	PMT pos [cm]	-15, -15, 67
PMT ID: 10	# of hits: 7	PMT pos [cm]	15, 15, 67
PMT ID: 110	# of hits: 2	PMT pos [cm]	-59.9, -43.5, 60
PMT ID: 139	# of hits: 1	PMT pos [cm]	22.9, -70.4, 30
PMT ID: 145	# of hits: 2	PMT pos [cm]	37, -64.1, 60
PMT ID: 6	# of hits: 2	PMT pos [cm]	-15, 15, 67
PMT ID: 85	# of hits: 1	PMT pos [cm]	-67.6, 30.1, 60
PMT ID: 115	# of hits: 1	PMT pos [cm]	-49.5, -55, 60
PMT ID: 150	# of hits: 1	PMT pos [cm]	49.5, -55, 60
PMT ID: 155	# of hits: 1	PMT pos [cm]	59.9, -43.5, 60
PMT ID: 35	# of hits: 1	PMT pos [cm]	59.9, 43.5, 60
PMT ID: 80	# of hits: 1	PMT pos [cm]	-59.9, 43.5, 60

Hit PMTs 26 / Ratio: 0.157
 Total p.e. into PMTs 57
 Efficiency: 0.0566



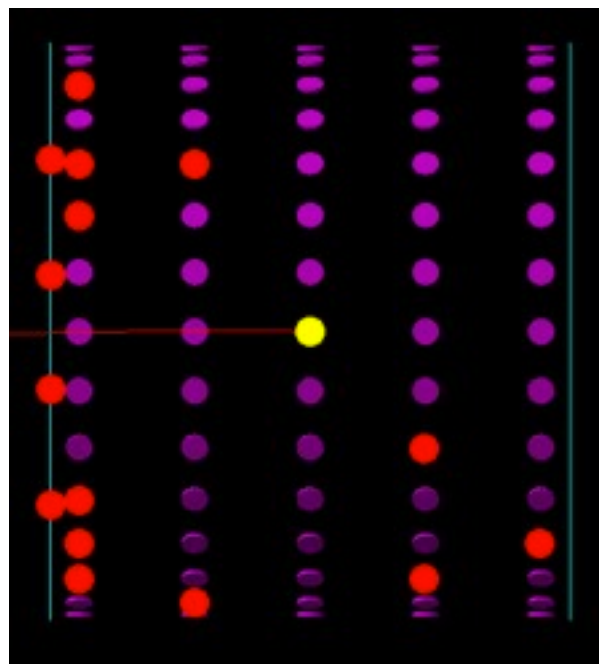
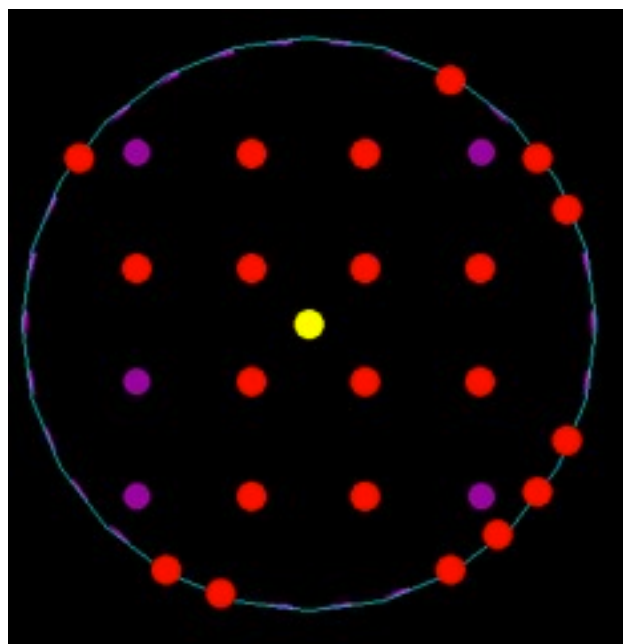


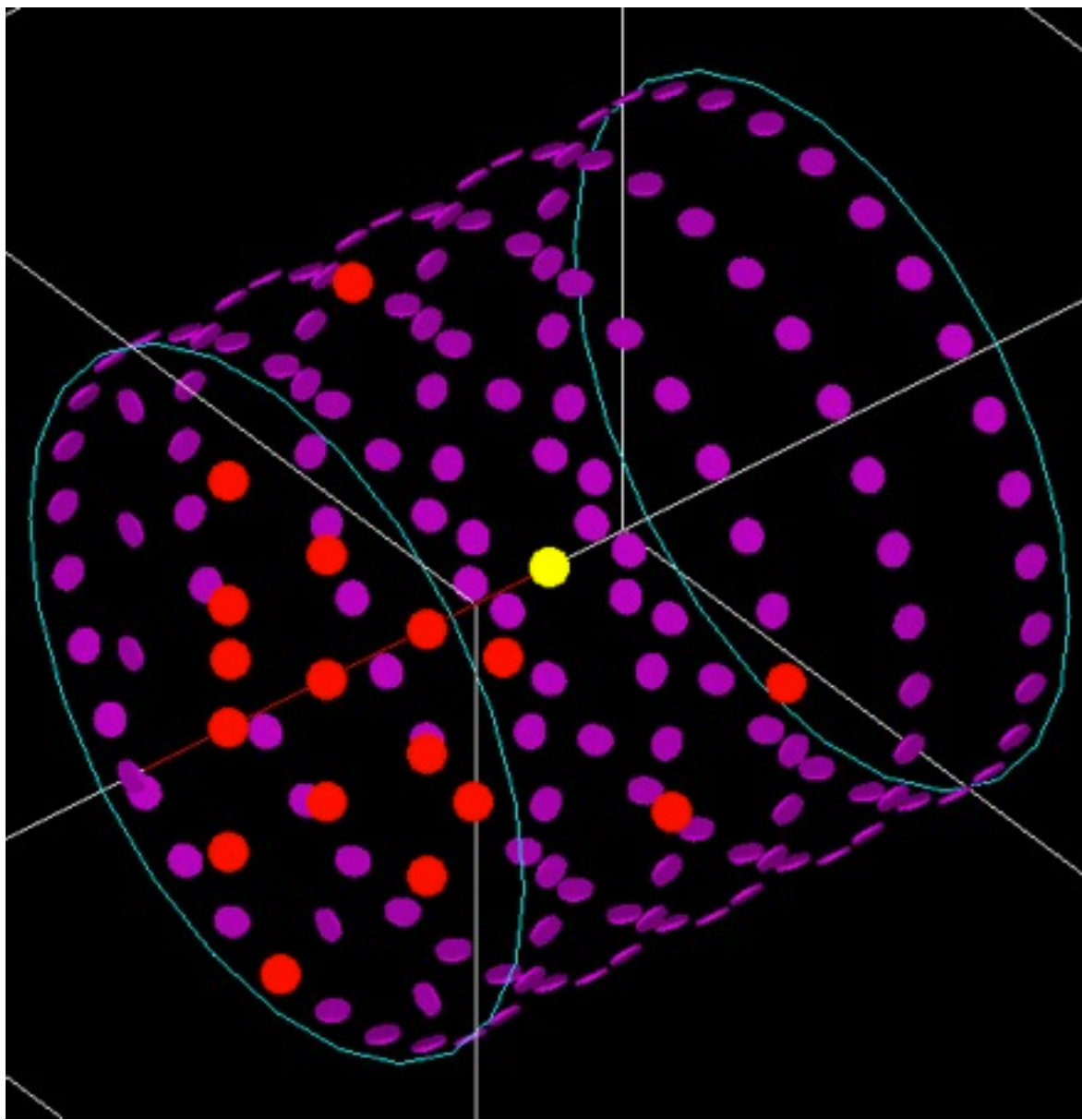
Number of optical photons produced in this event : 36943
 Number of photo-electrons produced in this event : 1083

Print hit information in this Event

PMT ID: 14	# of hits: 5	PMT pos [cm] 45, 15, 67
PMT ID: 13	# of hits: 3	PMT pos [cm] 45, -15, 67
PMT ID: 2	# of hits: 5	PMT pos [cm] -45, 15, 67
PMT ID: 11	# of hits: 2	PMT pos [cm] 15, 45, 67
PMT ID: 4	# of hits: 1	PMT pos [cm] -15, -45, 67
PMT ID: 8	# of hits: 2	PMT pos [cm] 15, -45, 67
PMT ID: 157	# of hits: 1	PMT pos [cm] 67.6, -30.1, -30
PMT ID: 34	# of hits: 1	PMT pos [cm] 59.9, 43.5, 30
PMT ID: 146	# of hits: 1	PMT pos [cm] 49.5, -55, -60
PMT ID: 117	# of hits: 1	PMT pos [cm] -37, -64.1, -30
PMT ID: 10	# of hits: 5	PMT pos [cm] 15, 15, 67
PMT ID: 124	# of hits: 1	PMT pos [cm] -22.9, -70.4, 30
PMT ID: 155	# of hits: 1	PMT pos [cm] 59.9, -43.5, 60
PMT ID: 5	# of hits: 6	PMT pos [cm] -15, -15, 67
PMT ID: 6	# of hits: 2	PMT pos [cm] -15, 15, 67
PMT ID: 9	# of hits: 1	PMT pos [cm] 15, -15, 67
PMT ID: 79	# of hits: 1	PMT pos [cm] -59.9, 43.5, 30
PMT ID: 45	# of hits: 1	PMT pos [cm] 37, 64.1, 60
PMT ID: 35	# of hits: 1	PMT pos [cm] 59.9, 43.5, 60
PMT ID: 150	# of hits: 1	PMT pos [cm] 49.5, -55, 60
PMT ID: 30	# of hits: 1	PMT pos [cm] 67.6, 30.1, 60
PMT ID: 7	# of hits: 1	PMT pos [cm] -15, 45, 67
PMT ID: 145	# of hits: 1	PMT pos [cm] 37, -64.1, 60

Hit PMTs 23 / Ratio: 0.139
 Total p.e. into PMTs 45
 Efficiency: 0.0416



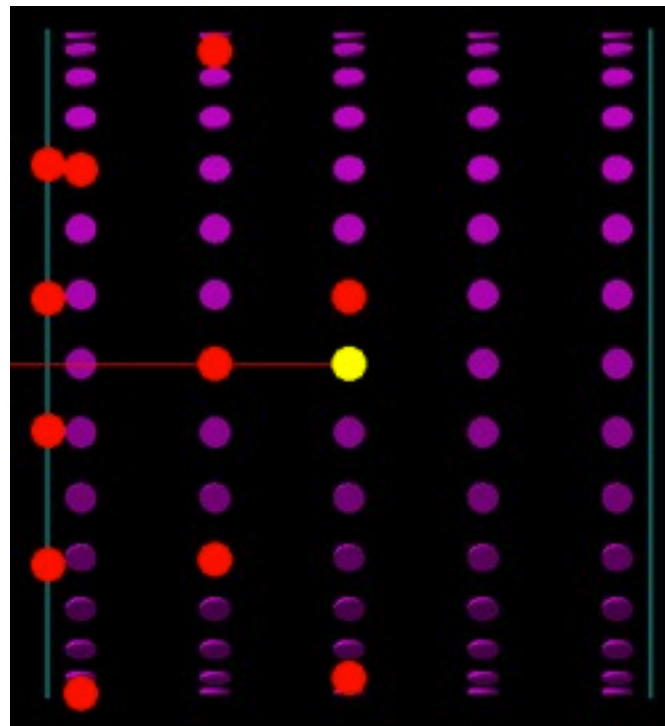
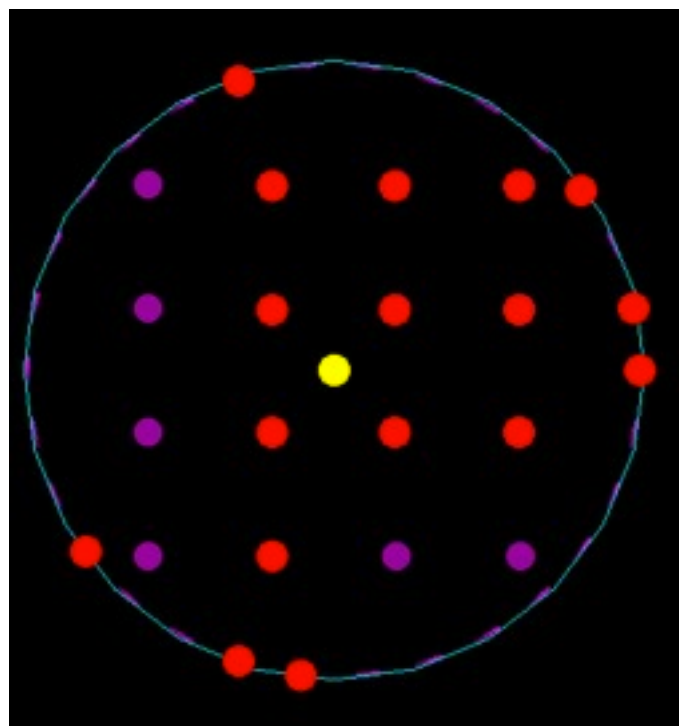


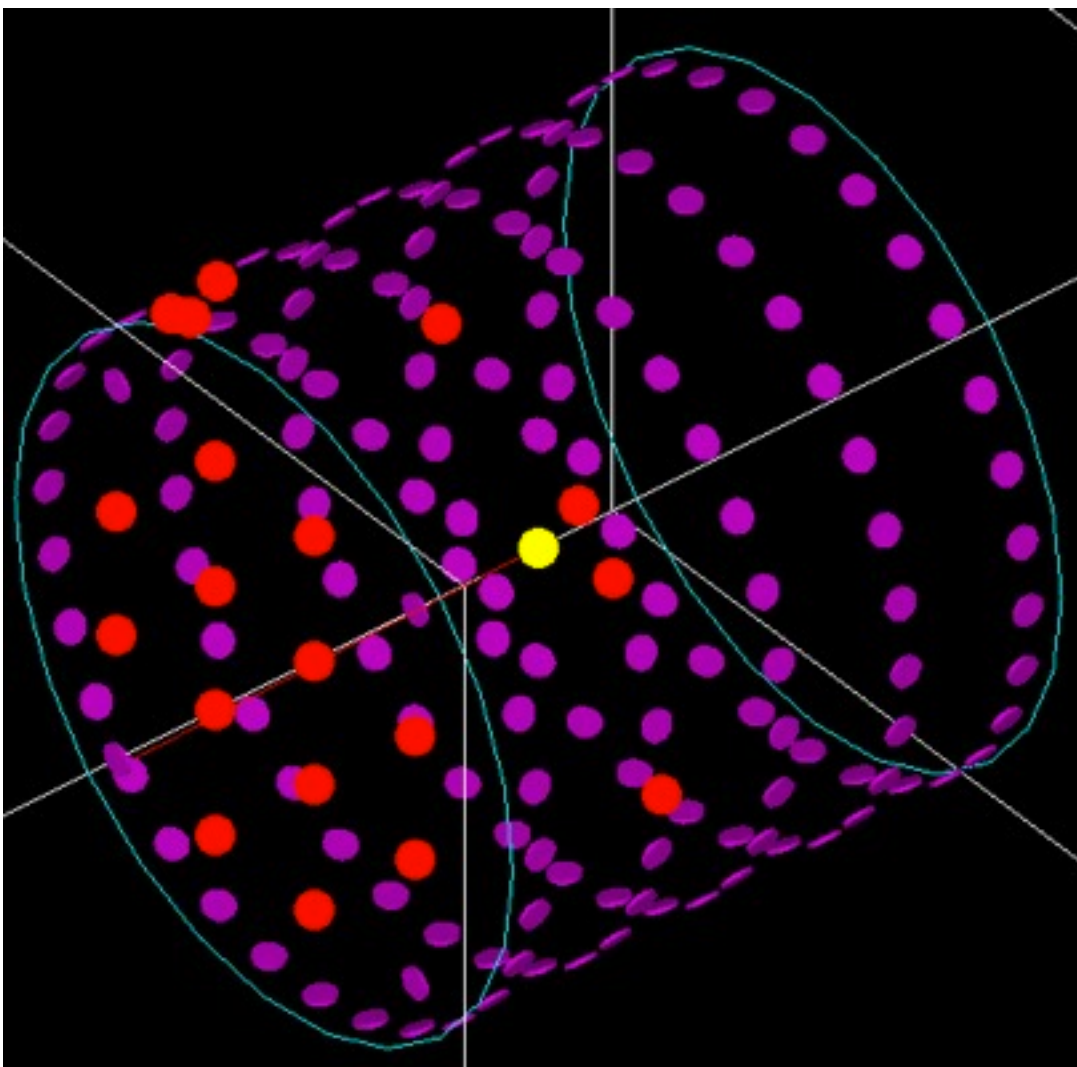
Number of optical photons produced in this event : 36616
 Number of photo-electrons produced in this event : 1115

Print hit information in this Event

PMT ID: 15	# of hits: 1	PMT pos [cm] 45, 45, 67
PMT ID: 23	# of hits: 1	PMT pos [cm] 72.4, 15.4, 0
PMT ID: 109	# of hits: 1	PMT pos [cm] -59.9, -43.5, 30
PMT ID: 123	# of hits: 1	PMT pos [cm] -22.9, -70.4, 0
PMT ID: 4	# of hits: 2	PMT pos [cm] -15, -45, 67
PMT ID: 11	# of hits: 1	PMT pos [cm] 15, 45, 67
PMT ID: 14	# of hits: 2	PMT pos [cm] 45, 15, 67
PMT ID: 13	# of hits: 4	PMT pos [cm] 45, -15, 67
PMT ID: 7	# of hits: 1	PMT pos [cm] -15, 45, 67
PMT ID: 19	# of hits: 2	PMT pos [cm] 74, 0, 30
PMT ID: 64	# of hits: 1	PMT pos [cm] -22.9, 70.4, 30
PMT ID: 10	# of hits: 3	PMT pos [cm] 15, 15, 67
PMT ID: 5	# of hits: 5	PMT pos [cm] -15, -15, 67
PMT ID: 9	# of hits: 3	PMT pos [cm] 15, -15, 67
PMT ID: 6	# of hits: 9	PMT pos [cm] -15, 15, 67
PMT ID: 35	# of hits: 1	PMT pos [cm] 59.9, 43.5, 60
PMT ID: 130	# of hits: 1	PMT pos [cm] -7.74, -73.6, 60

Hit PMTs 17 / Ratio: 0.102
 Total p.e. into PMTs 39
 Efficiency: 0.035



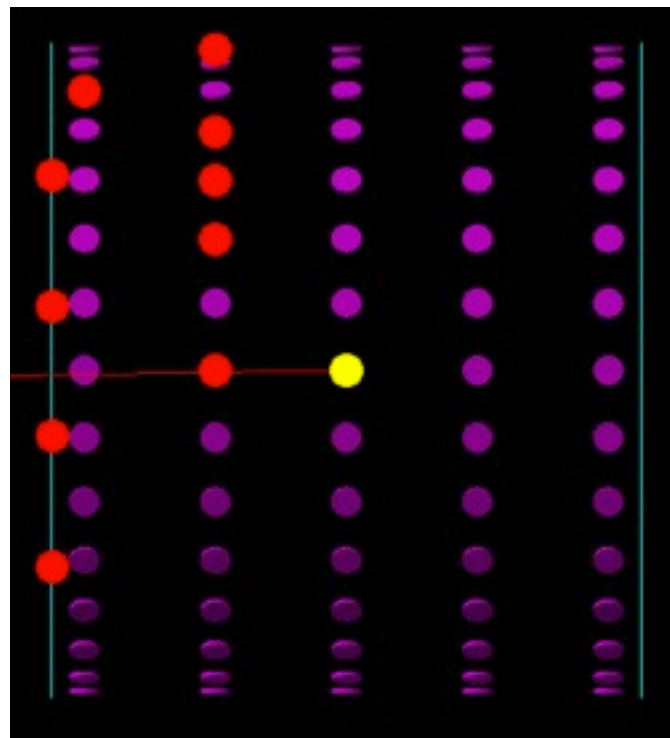
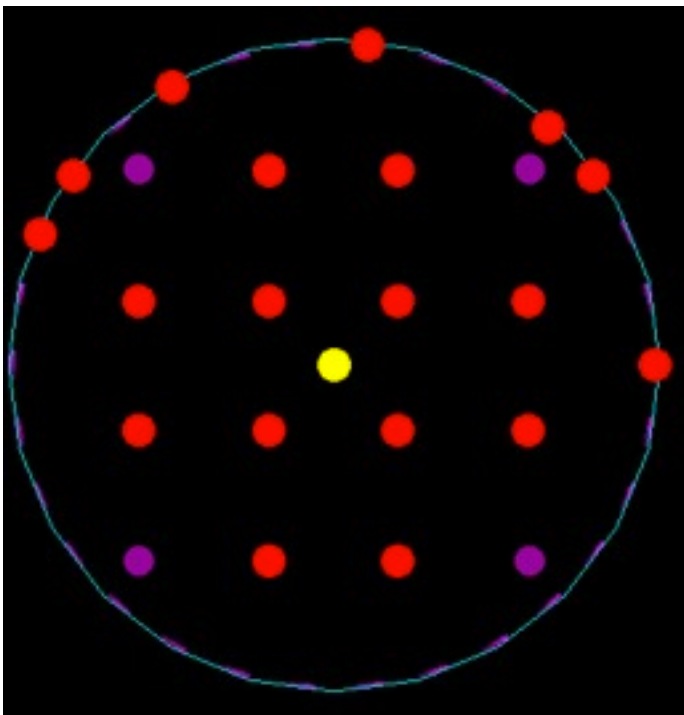


Number of optical photons produced in this event : 31949
 Number of photo-electrons produced in this event : 934

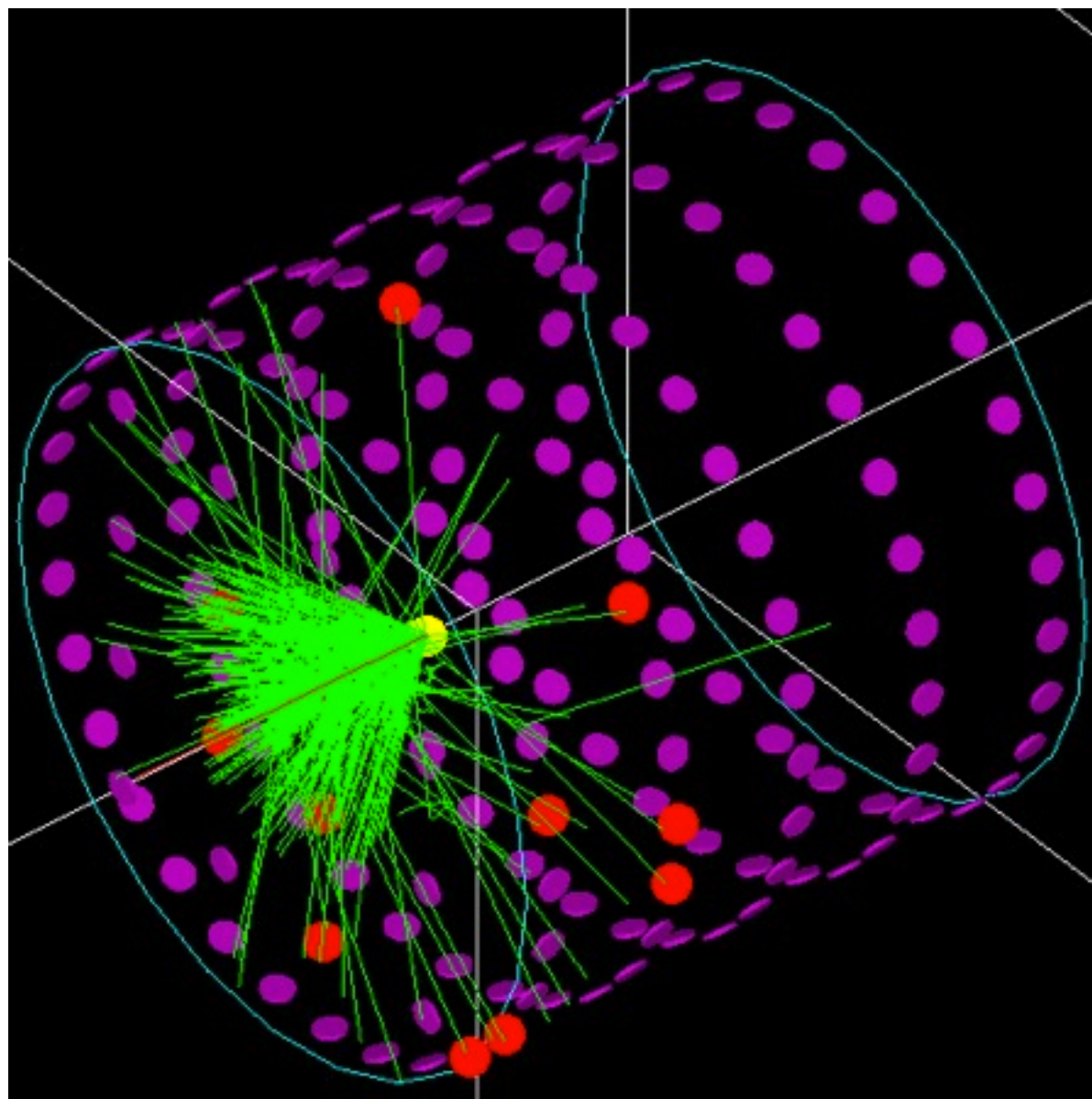
Print hit infomation in this Event

PMT ID: 14	# of hits: 3	PMT pos [cm]	45, 15, 67
PMT ID: 11	# of hits: 5	PMT pos [cm]	15, 45, 67
PMT ID: 7	# of hits: 4	PMT pos [cm]	-15, 45, 67
PMT ID: 2	# of hits: 4	PMT pos [cm]	-45, 15, 67
PMT ID: 1	# of hits: 2	PMT pos [cm]	-45, -15, 67
PMT ID: 4	# of hits: 5	PMT pos [cm]	-15, -45, 67
PMT ID: 13	# of hits: 2	PMT pos [cm]	45, -15, 67
PMT ID: 8	# of hits: 1	PMT pos [cm]	15, -45, 67
PMT ID: 34	# of hits: 1	PMT pos [cm]	59.9, 43.5, 30
PMT ID: 79	# of hits: 1	PMT pos [cm]	-59.9, 43.5, 30
PMT ID: 84	# of hits: 2	PMT pos [cm]	-67.6, 30.1, 30
PMT ID: 54	# of hits: 1	PMT pos [cm]	7.74, 73.6, 30
PMT ID: 19	# of hits: 1	PMT pos [cm]	74, 0, 30
PMT ID: 6	# of hits: 4	PMT pos [cm]	-15, 15, 67
PMT ID: 9	# of hits: 6	PMT pos [cm]	15, -15, 67
PMT ID: 10	# of hits: 3	PMT pos [cm]	15, 15, 67
PMT ID: 5	# of hits: 9	PMT pos [cm]	-15, -15, 67
PMT ID: 39	# of hits: 1	PMT pos [cm]	49.5, 55, 30
PMT ID: 70	# of hits: 1	PMT pos [cm]	-37, 64.1, 60

Hit PMTs 19 / Ratio: 0.114
 Total p.e. into PMTs 56
 Efficiency: 0.06



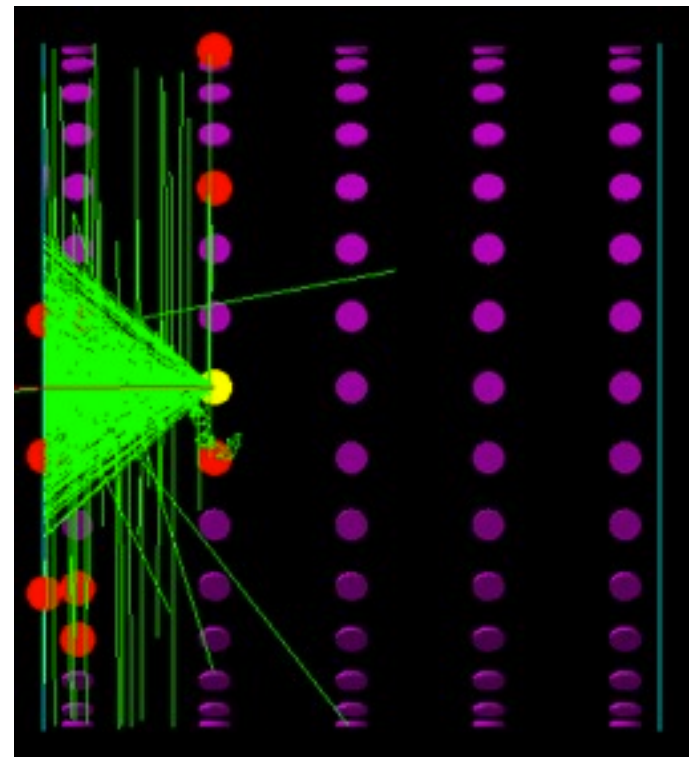
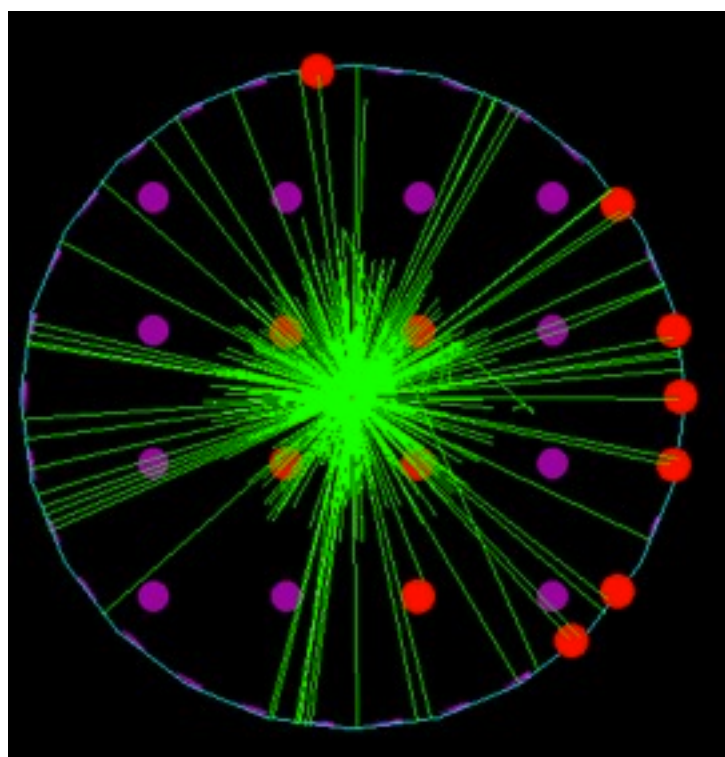
- Muon
 - 1 GeV
 - position : (0,0,30)
 - Direction : (0,0,1)



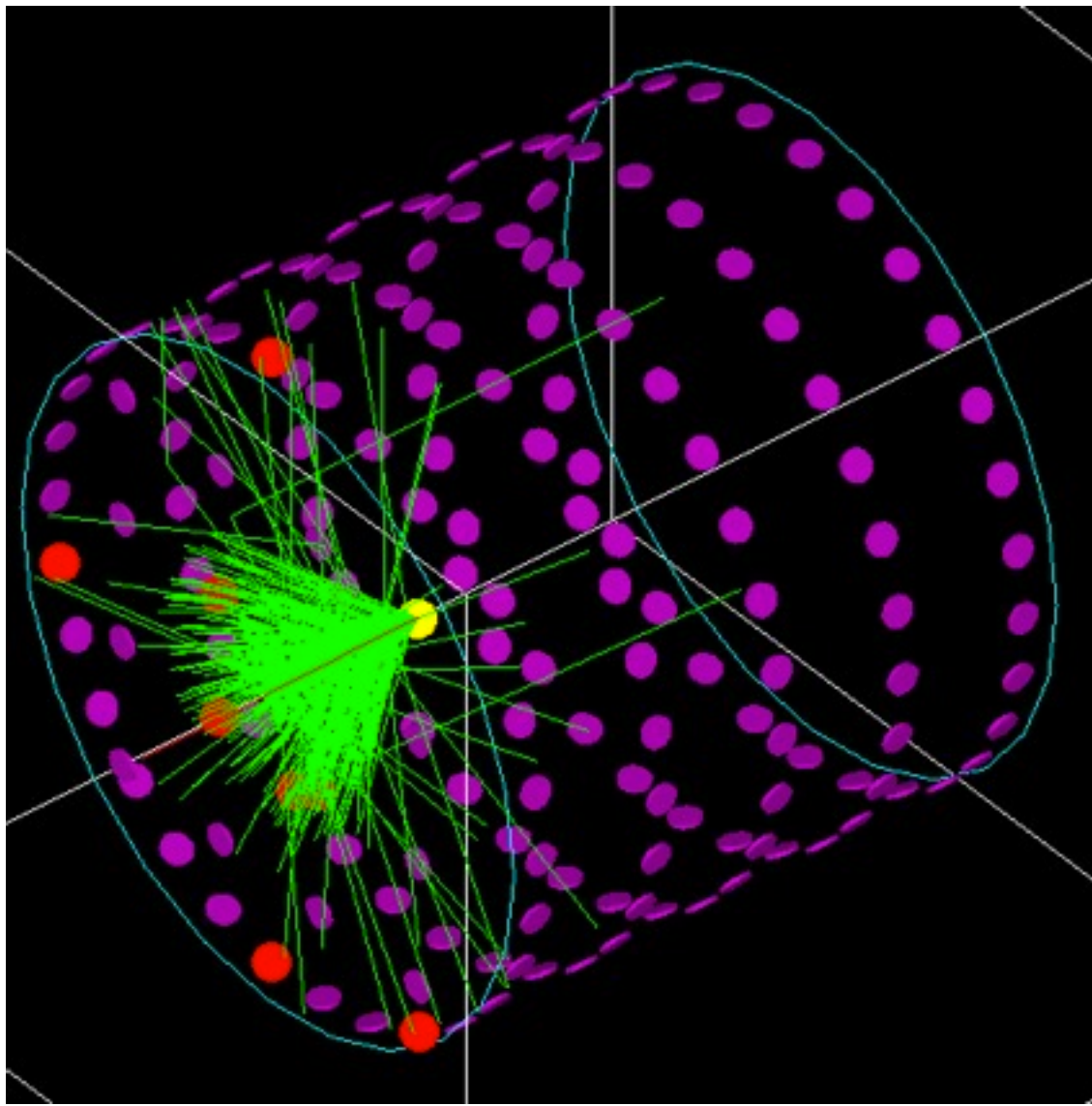
Number of optical photons produced in this event : 19042
 Number of photo-electrons produced in this event : 572

Print hit information in this Event

PMT ID: 164	# of hits: 1	PMT pos [cm]	72.4, -15.4, 30
PMT ID: 59	# of hits: 1	PMT pos [cm]	-7.74, 73.6, 30
PMT ID: 34	# of hits: 1	PMT pos [cm]	59.9, 43.5, 30
PMT ID: 19	# of hits: 1	PMT pos [cm]	74, 0, 30
PMT ID: 9	# of hits: 2	PMT pos [cm]	15, -15, 67
PMT ID: 10	# of hits: 8	PMT pos [cm]	15, 15, 67
PMT ID: 5	# of hits: 7	PMT pos [cm]	-15, -15, 67
PMT ID: 6	# of hits: 1	PMT pos [cm]	-15, 15, 67
PMT ID: 150	# of hits: 1	PMT pos [cm]	49.5, -55, 60
PMT ID: 25	# of hits: 1	PMT pos [cm]	72.4, 15.4, 60
PMT ID: 155	# of hits: 1	PMT pos [cm]	59.9, -43.5, 60
PMT ID: 8	# of hits: 1	PMT pos [cm]	15, -45, 67



Hit PMTs 12 / Ratio: 0.0723
 Total p.e. into PMTs 26
 Efficiency: 0.0455

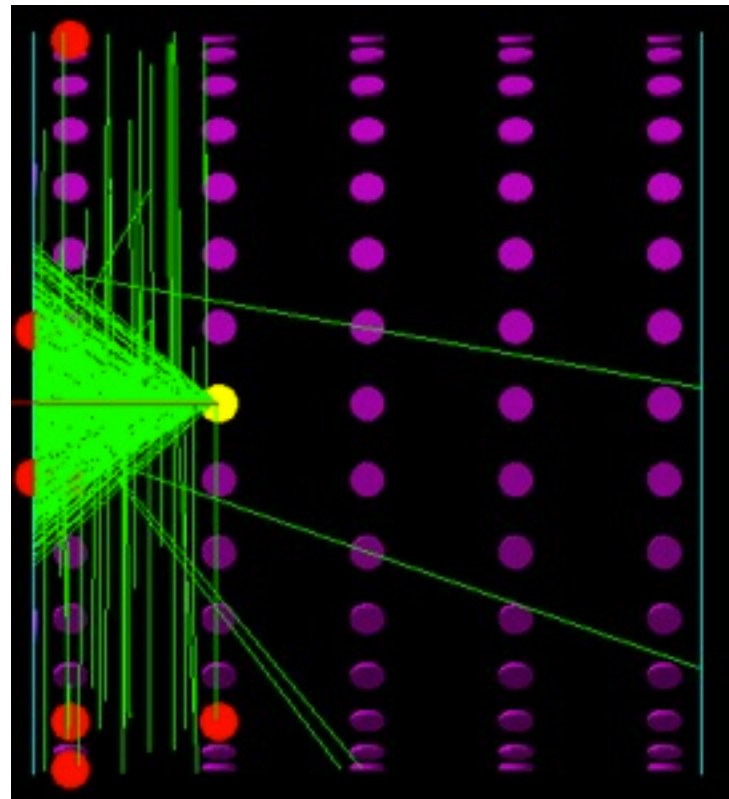
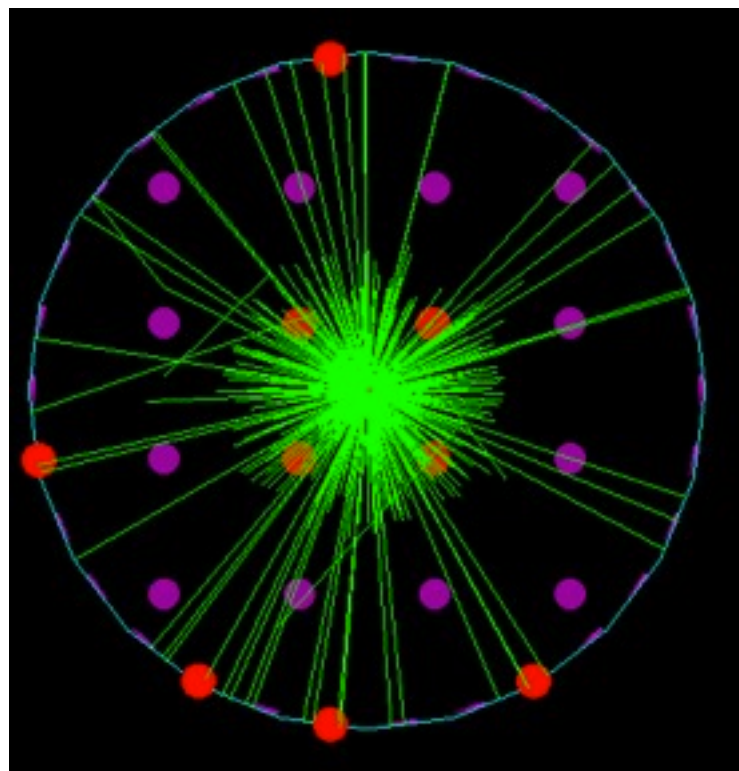


Number of optical photons produced in this event : 18100
 Number of photo-electrons produced in this event : 551

Print hit information in this Event

PMT ID: 119	# of hits: 1	PMT pos [cm] -37, -64.1, 30
PMT ID: 9	# of hits: 8	PMT pos [cm] 15, -15, 67
PMT ID: 6	# of hits: 9	PMT pos [cm] -15, 15, 67
PMT ID: 5	# of hits: 5	PMT pos [cm] -15, -15, 67
PMT ID: 10	# of hits: 3	PMT pos [cm] 15, 15, 67
PMT ID: 130	# of hits: 1	PMT pos [cm] -7.74, -73.6, 60
PMT ID: 60	# of hits: 1	PMT pos [cm] -7.74, 73.6, 60
PMT ID: 145	# of hits: 1	PMT pos [cm] 37, -64.1, 60
PMT ID: 100	# of hits: 1	PMT pos [cm] -72.4, -15.4, 60

Hit PMTs 9 / Ratio: 0.0542
 Total p.e. into PMTs 30
 Efficiency: 0.0544



- Muon
 - 1 GeV
 - position : (0,0,-30)
 - Direction : (0,0,1)

Number of optical photons produced in this event : 49128

Number of photo-electrons produced in this event : 1438

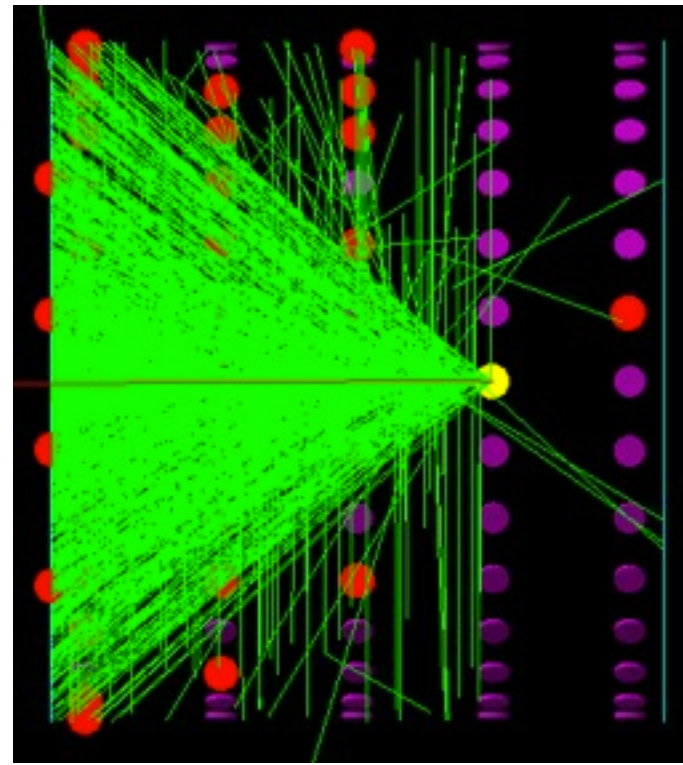
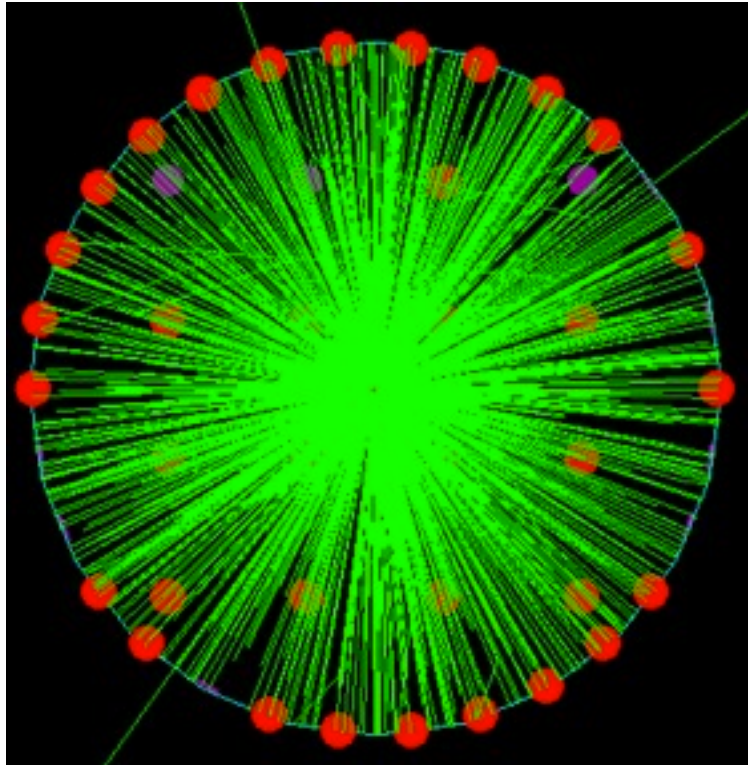
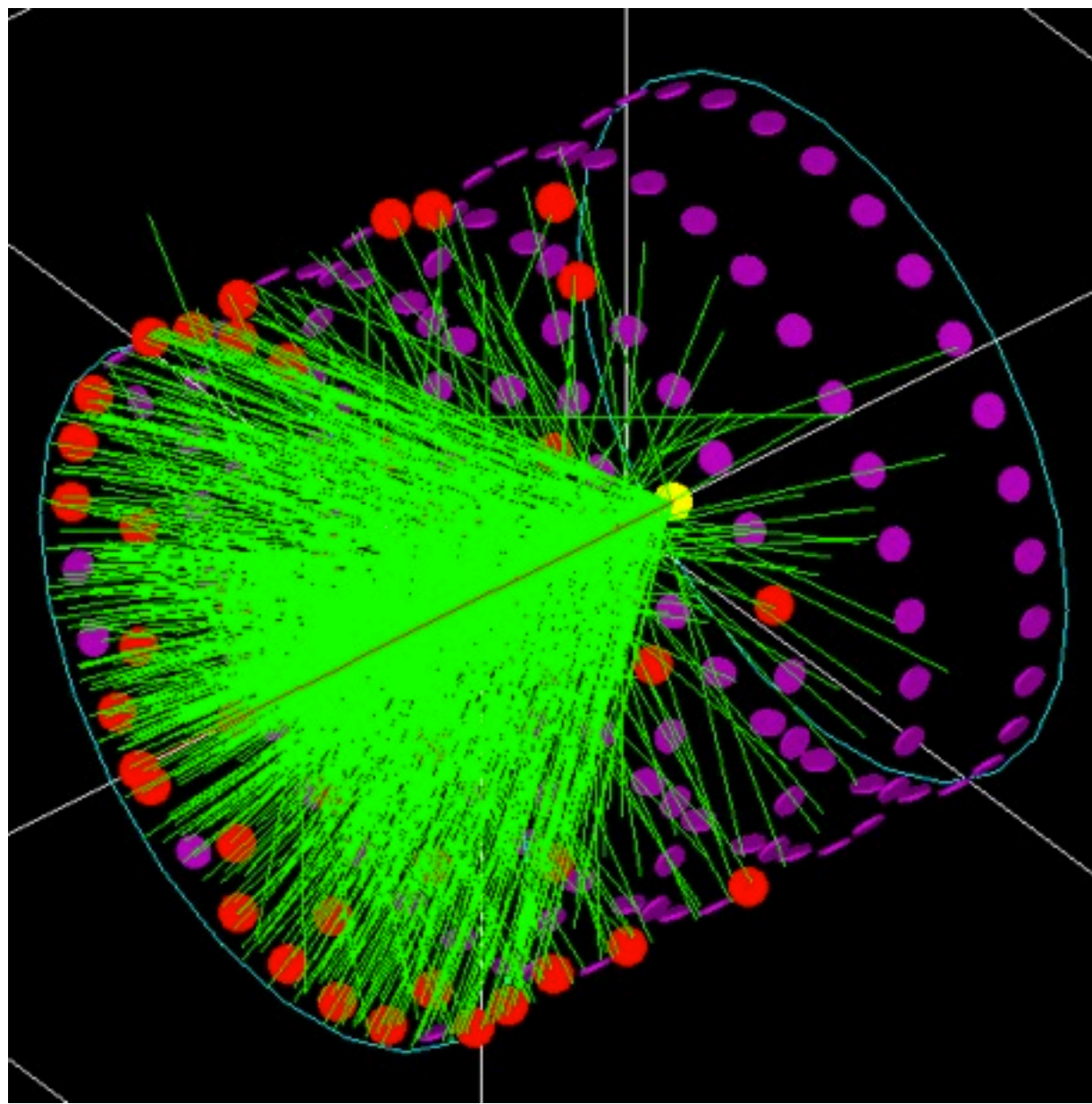
Print hit information in this Event

PMT ID: 125	# of hits: 3	PMT pos [cm] -22.9, -70.4, 60
PMT ID: 130	# of hits: 1	PMT pos [cm] -7.74, -73.6, 60
PMT ID: 115	# of hits: 1	PMT pos [cm] -49.5, -55, 60
PMT ID: 135	# of hits: 1	PMT pos [cm] 7.74, -73.6, 60
PMT ID: 150	# of hits: 2	PMT pos [cm] 49.5, -55, 60
PMT ID: 155	# of hits: 2	PMT pos [cm] 59.9, -43.5, 60
PMT ID: 85	# of hits: 2	PMT pos [cm] -67.6, 30.1, 60
PMT ID: 75	# of hits: 2	PMT pos [cm] -49.5, 55, 60
PMT ID: 50	# of hits: 3	PMT pos [cm] 22.9, 70.4, 60
PMT ID: 45	# of hits: 6	PMT pos [cm] 37, 64.1, 60
PMT ID: 40	# of hits: 2	PMT pos [cm] 49.5, 55, 60
PMT ID: 20	# of hits: 2	PMT pos [cm] 74, 0, 60
PMT ID: 70	# of hits: 1	PMT pos [cm] -37, 64.1, 60
PMT ID: 110	# of hits: 3	PMT pos [cm] -59.9, -43.5, 60
PMT ID: 140	# of hits: 2	PMT pos [cm] 22.9, -70.4, 60
PMT ID: 95	# of hits: 1	PMT pos [cm] -74, -2.38e-14, 60
PMT ID: 60	# of hits: 4	PMT pos [cm] -7.74, 73.6, 60
PMT ID: 90	# of hits: 1	PMT pos [cm] -72.4, 15.4, 60
PMT ID: 65	# of hits: 2	PMT pos [cm] -22.9, 70.4, 60
PMT ID: 86	# of hits: 1	PMT pos [cm] -72.4, 15.4, -60
PMT ID: 28	# of hits: 1	PMT pos [cm] 67.6, 30.1, 0
PMT ID: 44	# of hits: 2	PMT pos [cm] 37, 64.1, 30
PMT ID: 13	# of hits: 2	PMT pos [cm] 45, -15, 67
PMT ID: 79	# of hits: 1	PMT pos [cm] -59.9, 43.5, 30
PMT ID: 0	# of hits: 2	PMT pos [cm] -45, -45, 67
PMT ID: 12	# of hits: 2	PMT pos [cm] 45, -45, 67
PMT ID: 153	# of hits: 1	PMT pos [cm] 59.9, -43.5, 0
PMT ID: 68	# of hits: 1	PMT pos [cm] -37, 64.1, 0
PMT ID: 53	# of hits: 2	PMT pos [cm] 7.74, 73.6, 0
PMT ID: 73	# of hits: 1	PMT pos [cm] -49.5, 55, 0
PMT ID: 29	# of hits: 1	PMT pos [cm] 67.6, 30.1, 30
PMT ID: 11	# of hits: 3	PMT pos [cm] 15, 45, 67
PMT ID: 14	# of hits: 3	PMT pos [cm] 45, 15, 67
PMT ID: 8	# of hits: 2	PMT pos [cm] 15, -45, 67
PMT ID: 2	# of hits: 2	PMT pos [cm] -45, 15, 67
PMT ID: 4	# of hits: 1	PMT pos [cm] -15, -45, 67
PMT ID: 1	# of hits: 2	PMT pos [cm] -45, -15, 67
PMT ID: 39	# of hits: 1	PMT pos [cm] 49.5, 55, 30
PMT ID: 154	# of hits: 1	PMT pos [cm] 59.9, -43.5, 30
PMT ID: 144	# of hits: 1	PMT pos [cm] 37, -64.1, 30
PMT ID: 10	# of hits: 8	PMT pos [cm] 15, 15, 67
PMT ID: 6	# of hits: 3	PMT pos [cm] -15, 15, 67
PMT ID: 9	# of hits: 5	PMT pos [cm] 15, -15, 67
PMT ID: 5	# of hits: 4	PMT pos [cm] -15, -15, 67

Hit PMTs 44 / Ratio: 0.265

Total p.e. into PMTs 94

Efficiency: 0.0654



Number of optical photons produced in this event : 48528

Number of photo-electrons produced in this event : 1364

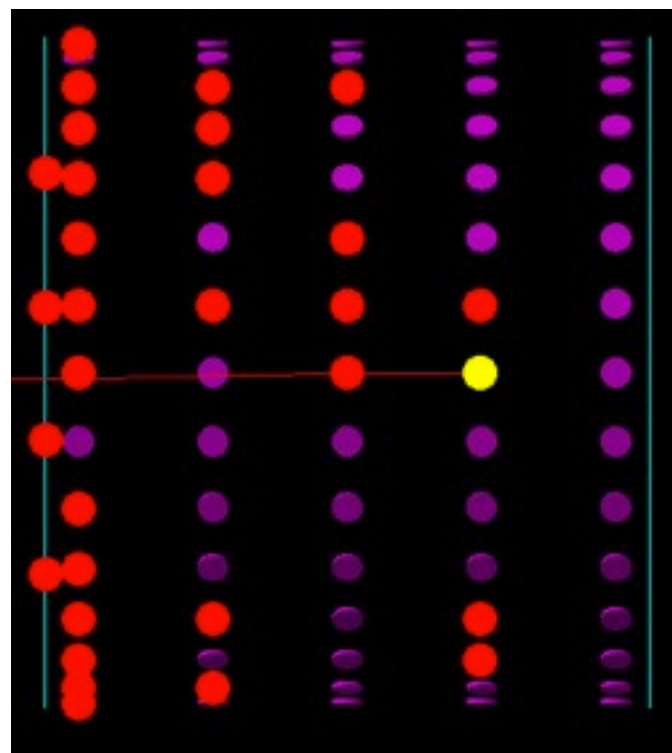
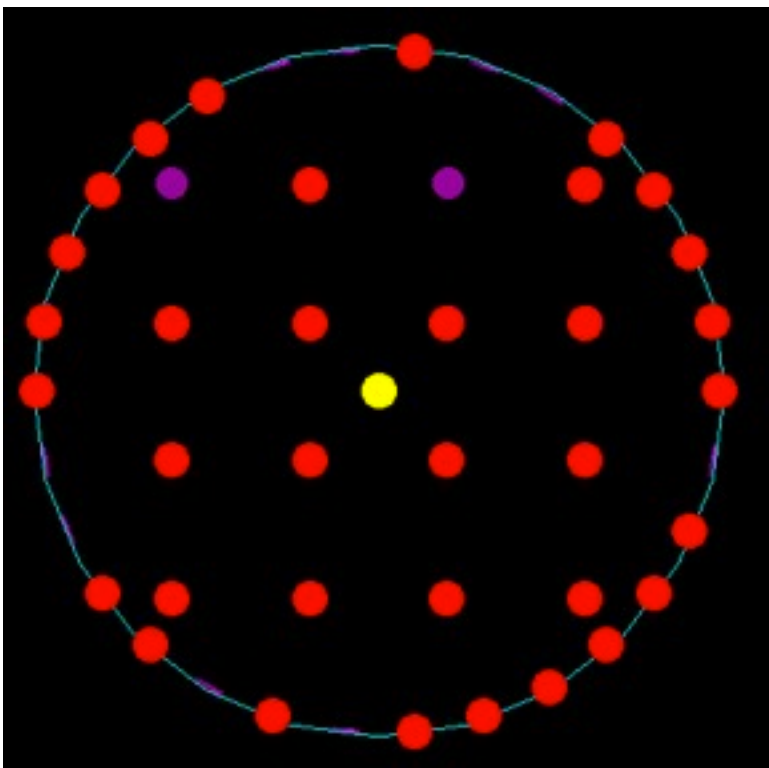
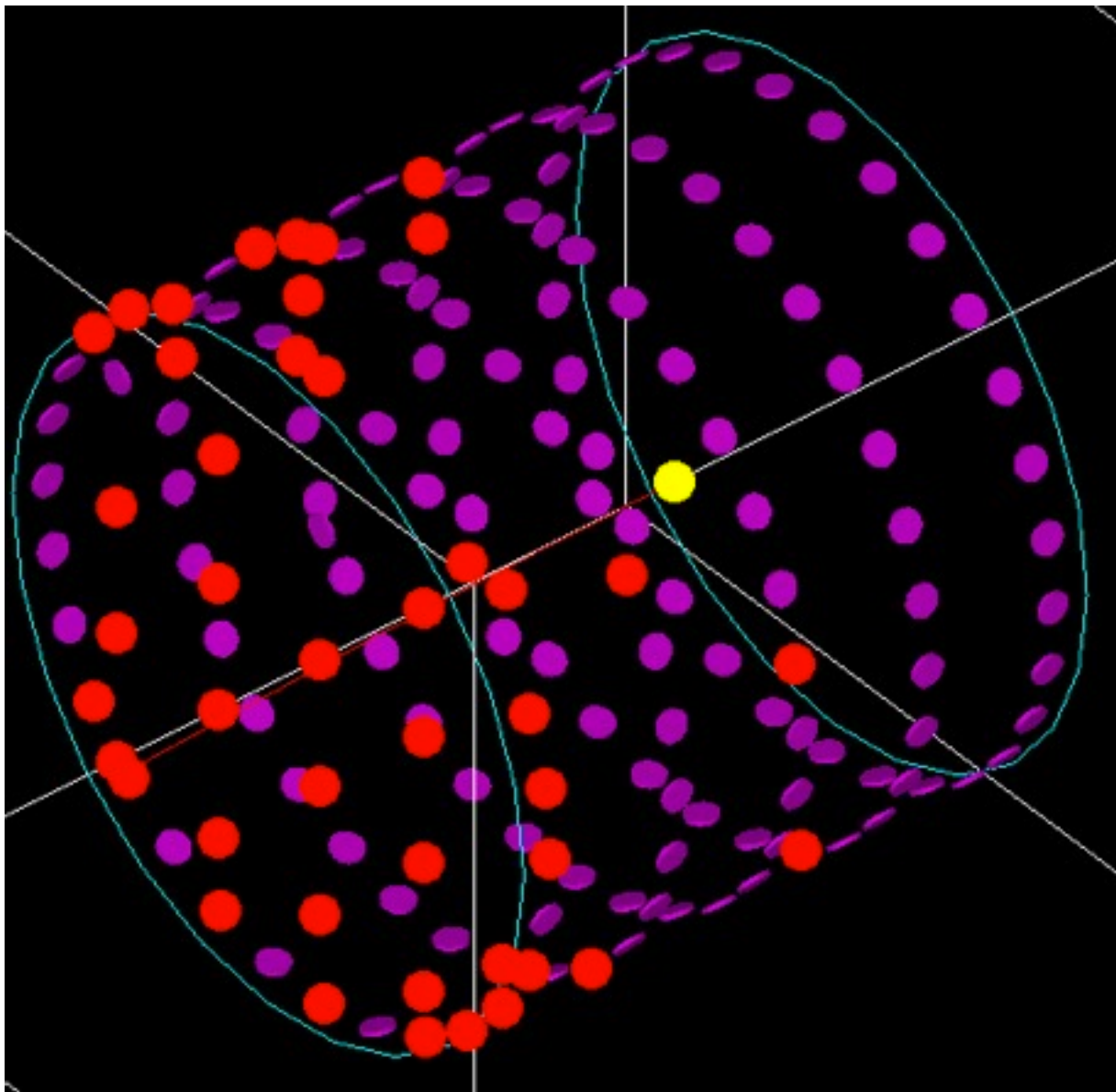
Print hit information in this Event

PMT ID: 139	# of hits: 1	PMT pos [cm] 22.9, -70.4, 30
PMT ID: 87	# of hits: 1	PMT pos [cm] -72.4, 15.4, -30
PMT ID: 142	# of hits: 1	PMT pos [cm] 37, -64.1, -30
PMT ID: 55	# of hits: 2	PMT pos [cm] 7.74, 73.6, 60
PMT ID: 150	# of hits: 1	PMT pos [cm] 49.5, -55, 60
PMT ID: 25	# of hits: 3	PMT pos [cm] 72.4, 15.4, 60
PMT ID: 40	# of hits: 3	PMT pos [cm] 49.5, 55, 60
PMT ID: 155	# of hits: 4	PMT pos [cm] 59.9, -43.5, 60
PMT ID: 30	# of hits: 2	PMT pos [cm] 67.6, 30.1, 60
PMT ID: 160	# of hits: 1	PMT pos [cm] 67.6, -30.1, 60
PMT ID: 125	# of hits: 1	PMT pos [cm] -22.9, -70.4, 60
PMT ID: 70	# of hits: 1	PMT pos [cm] -37, 64.1, 60
PMT ID: 20	# of hits: 2	PMT pos [cm] 74, 0, 60
PMT ID: 75	# of hits: 1	PMT pos [cm] -49.5, 55, 60
PMT ID: 115	# of hits: 2	PMT pos [cm] -49.5, -55, 60
PMT ID: 135	# of hits: 1	PMT pos [cm] 7.74, -73.6, 60
PMT ID: 68	# of hits: 2	PMT pos [cm] -37, 64.1, 0
PMT ID: 110	# of hits: 1	PMT pos [cm] -59.9, -43.5, 60
PMT ID: 145	# of hits: 1	PMT pos [cm] 37, -64.1, 60
PMT ID: 112	# of hits: 1	PMT pos [cm] -49.5, -55, -30
PMT ID: 15	# of hits: 2	PMT pos [cm] 45, 45, 67
PMT ID: 0	# of hits: 2	PMT pos [cm] -45, -45, 67
PMT ID: 83	# of hits: 1	PMT pos [cm] -67.6, 30.1, 0
PMT ID: 12	# of hits: 2	PMT pos [cm] 45, -45, 67
PMT ID: 88	# of hits: 1	PMT pos [cm] -72.4, 15.4, 0
PMT ID: 23	# of hits: 1	PMT pos [cm] 72.4, 15.4, 0
PMT ID: 93	# of hits: 1	PMT pos [cm] -74, -2.38e-14, 0
PMT ID: 10	# of hits: 7	PMT pos [cm] 15, 15, 67
PMT ID: 149	# of hits: 1	PMT pos [cm] 49.5, -55, 30
PMT ID: 7	# of hits: 1	PMT pos [cm] -15, 45, 67
PMT ID: 4	# of hits: 3	PMT pos [cm] -15, -45, 67
PMT ID: 14	# of hits: 2	PMT pos [cm] 45, 15, 67
PMT ID: 13	# of hits: 1	PMT pos [cm] 45, -15, 67
PMT ID: 8	# of hits: 1	PMT pos [cm] 15, -45, 67
PMT ID: 9	# of hits: 7	PMT pos [cm] 15, -15, 67
PMT ID: 69	# of hits: 3	PMT pos [cm] -37, 64.1, 30
PMT ID: 74	# of hits: 1	PMT pos [cm] -49.5, 55, 30
PMT ID: 89	# of hits: 1	PMT pos [cm] -72.4, 15.4, 30
PMT ID: 34	# of hits: 1	PMT pos [cm] 59.9, 43.5, 30
PMT ID: 1	# of hits: 1	PMT pos [cm] -45, -15, 67
PMT ID: 2	# of hits: 1	PMT pos [cm] -45, 15, 67
PMT ID: 6	# of hits: 6	PMT pos [cm] -15, 15, 67
PMT ID: 5	# of hits: 5	PMT pos [cm] -15, -15, 67
PMT ID: 80	# of hits: 1	PMT pos [cm] -59.9, 43.5, 60

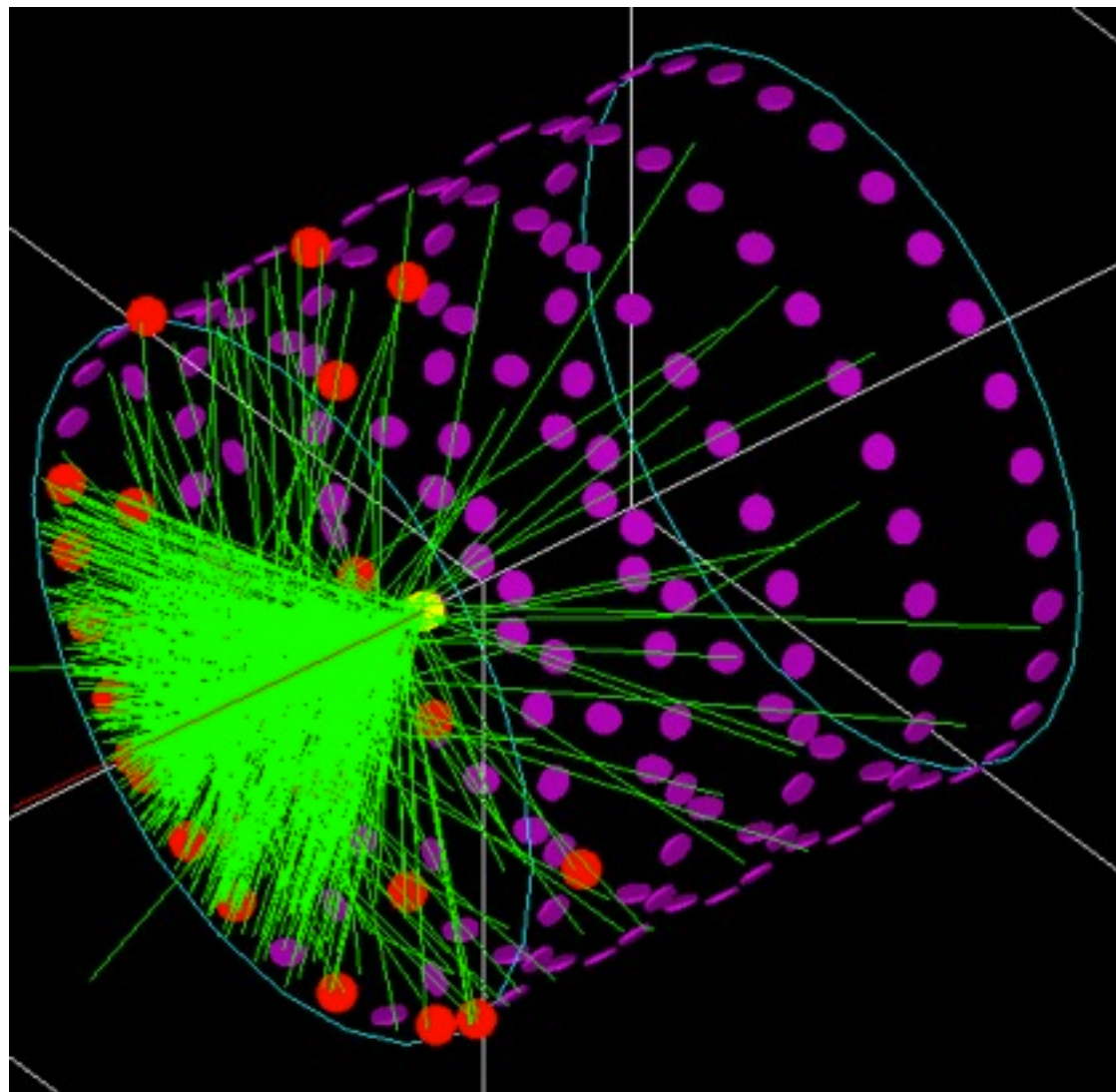
Hit PMTs 44 / Ratio: 0.265

Total p.e. into PMTs 85

Efficiency: 0.0623



- Muon
 - 1 GeV
 - position : $(-40, -40, 0) \rightarrow r \sim 57\text{cm}$
 - Direction : $(0, 0, 1)$



Number of optical photons produced in this event : 35760
 Number of photo-electrons produced in this event : 1084

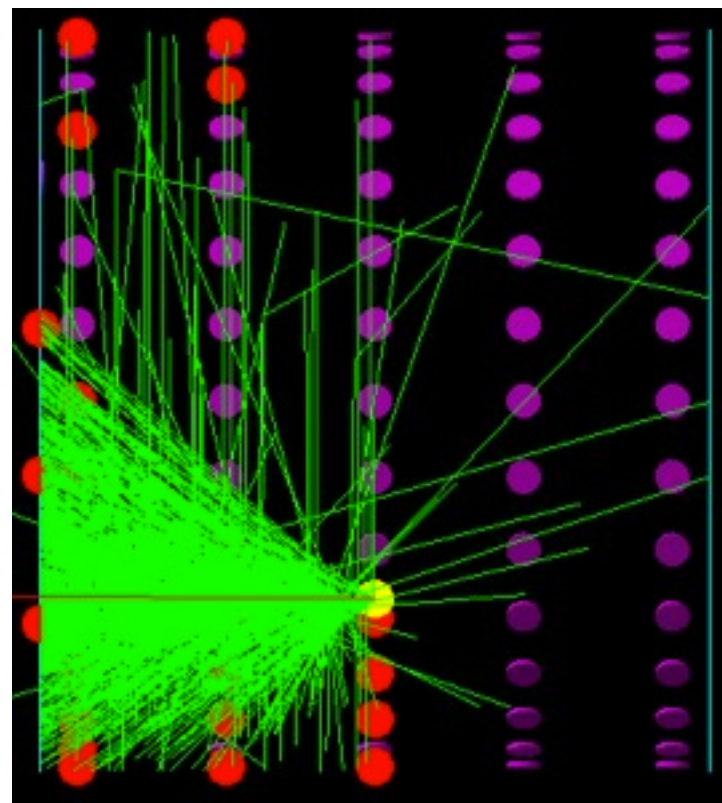
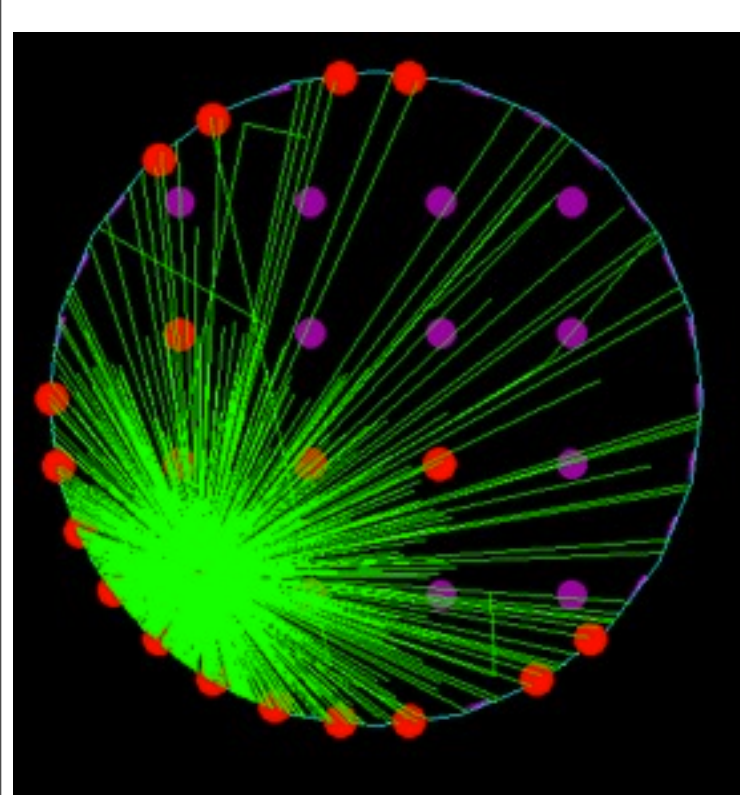
Print hit information in this Event

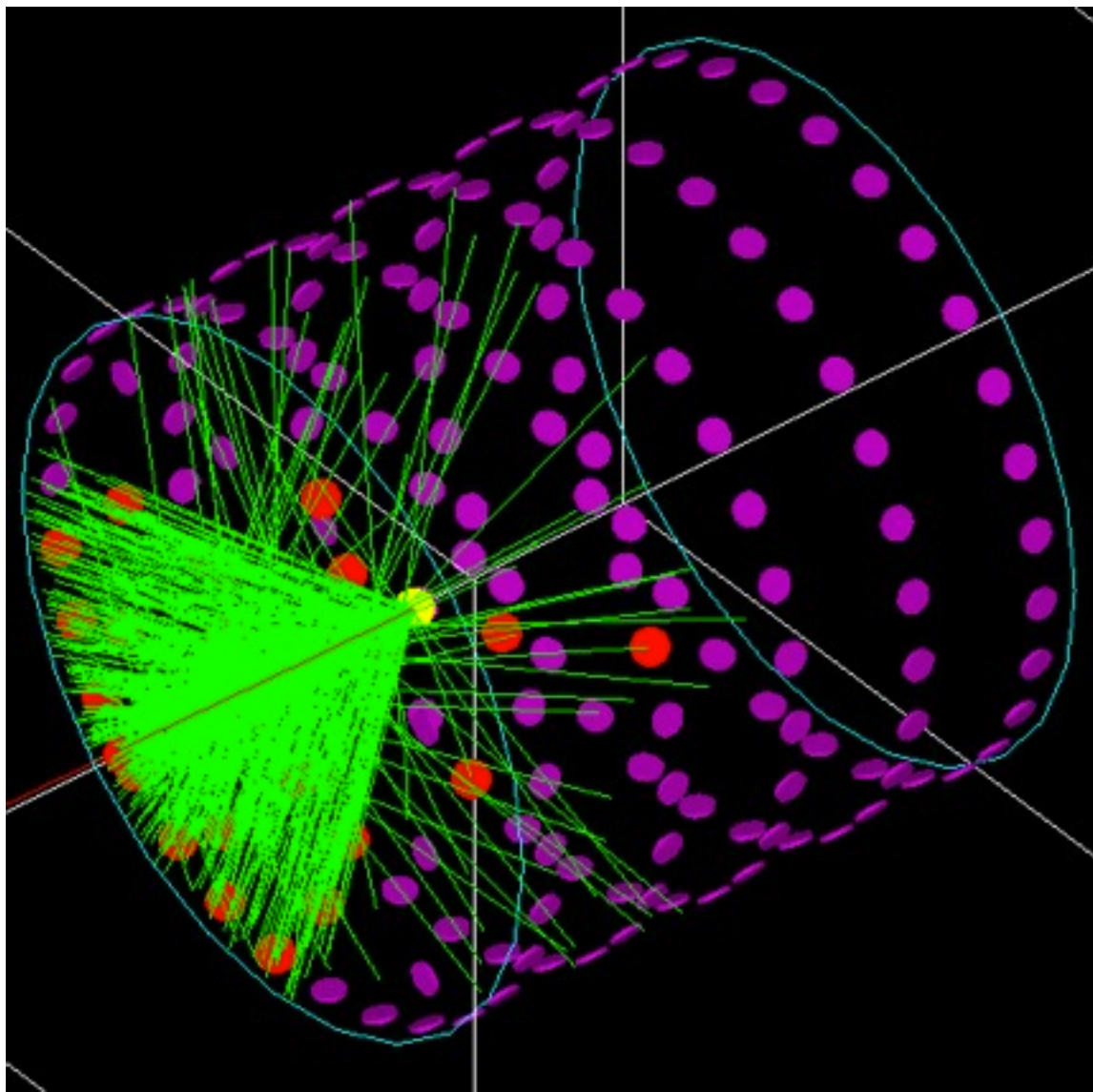
PMT ID: 9	# of hits: 1	PMT pos [cm]	15, -15, 67
PMT ID: 95	# of hits: 1	PMT pos [cm]	-74, -2.38e-14, 60
PMT ID: 108	# of hits: 2	PMT pos [cm]	-59.9, -43.5, 0
PMT ID: 133	# of hits: 1	PMT pos [cm]	7.74, -73.6, 0
PMT ID: 119	# of hits: 3	PMT pos [cm]	-37, -64.1, 30
PMT ID: 109	# of hits: 9	PMT pos [cm]	-59.9, -43.5, 30
PMT ID: 145	# of hits: 1	PMT pos [cm]	37, -64.1, 60
PMT ID: 114	# of hits: 10	PMT pos [cm]	-49.5, -55, 30
PMT ID: 118	# of hits: 1	PMT pos [cm]	-37, -64.1, 0
PMT ID: 105	# of hits: 3	PMT pos [cm]	-67.6, -30.1, 60
PMT ID: 1	# of hits: 4	PMT pos [cm]	-45, -15, 67
PMT ID: 129	# of hits: 1	PMT pos [cm]	-7.74, -73.6, 30
PMT ID: 113	# of hits: 1	PMT pos [cm]	-49.5, -55, 0
PMT ID: 0	# of hits: 20	PMT pos [cm]	-45, -45, 67
PMT ID: 2	# of hits: 1	PMT pos [cm]	-45, 15, 67
PMT ID: 100	# of hits: 1	PMT pos [cm]	-72.4, -15.4, 60
PMT ID: 125	# of hits: 2	PMT pos [cm]	-22.9, -70.4, 60
PMT ID: 5	# of hits: 6	PMT pos [cm]	-15, -15, 67
PMT ID: 120	# of hits: 4	PMT pos [cm]	-37, -64.1, 60
PMT ID: 69	# of hits: 1	PMT pos [cm]	-37, 64.1, 30
PMT ID: 59	# of hits: 1	PMT pos [cm]	-7.74, 73.6, 30
PMT ID: 115	# of hits: 9	PMT pos [cm]	-49.5, -55, 60
PMT ID: 110	# of hits: 5	PMT pos [cm]	-59.9, -43.5, 60
PMT ID: 4	# of hits: 2	PMT pos [cm]	-15, -45, 67
PMT ID: 135	# of hits: 1	PMT pos [cm]	7.74, -73.6, 60
PMT ID: 150	# of hits: 2	PMT pos [cm]	49.5, -55, 60
PMT ID: 75	# of hits: 1	PMT pos [cm]	-49.5, 55, 60
PMT ID: 55	# of hits: 1	PMT pos [cm]	7.74, 73.6, 60

Hit PMTs 28 / Ratio: 0.169

Total p.e. into PMTs 95

Efficiency: 0.0876





Number of optical photons produced in this event : 31659
 Number of photo-electrons produced in this event : 995

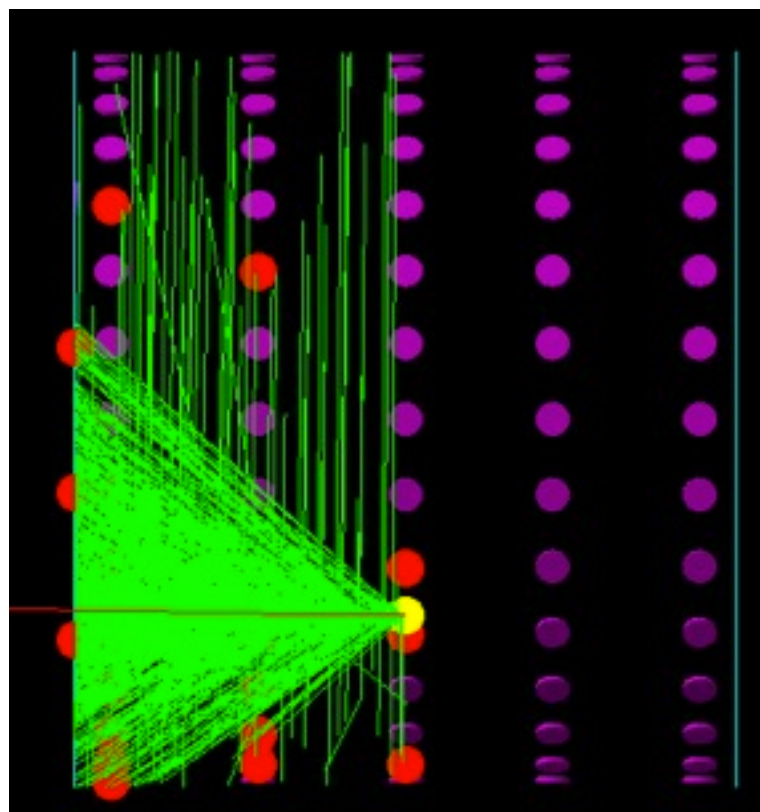
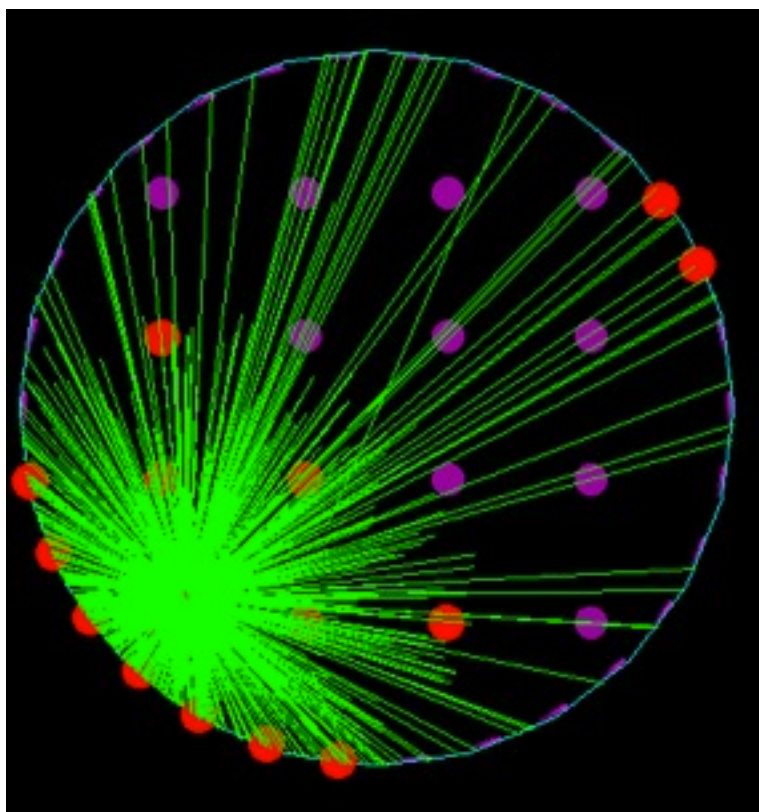
Print hit information in this Event

PMT ID: 123# of hits: 1	PMT pos [cm] -22.9, -70.4, 0
PMT ID: 103# of hits: 1	PMT pos [cm] -67.6, -30.1, 0
PMT ID: 108# of hits: 1	PMT pos [cm] -59.9, -43.5, 0
PMT ID: 119# of hits: 2	PMT pos [cm] -37, -64.1, 30
PMT ID: 2 # of hits: 4	PMT pos [cm] -45, 15, 67
PMT ID: 109# of hits: 2	PMT pos [cm] -59.9, -43.5, 30
PMT ID: 8 # of hits: 1	PMT pos [cm] 15, -45, 67
PMT ID: 130# of hits: 3	PMT pos [cm] -7.74, -73.6, 60
PMT ID: 114# of hits: 7	PMT pos [cm] -49.5, -55, 30
PMT ID: 100# of hits: 3	PMT pos [cm] -72.4, -15.4, 60
PMT ID: 125# of hits: 4	PMT pos [cm] -22.9, -70.4, 60
PMT ID: 105# of hits: 2	PMT pos [cm] -67.6, -30.1, 60
PMT ID: 120# of hits: 7	PMT pos [cm] -37, -64.1, 60
PMT ID: 5 # of hits: 2	PMT pos [cm] -15, -15, 67
PMT ID: 124# of hits: 1	PMT pos [cm] -22.9, -70.4, 30
PMT ID: 29 # of hits: 1	PMT pos [cm] 67.6, 30.1, 30
PMT ID: 110# of hits: 3	PMT pos [cm] -59.9, -43.5, 60
PMT ID: 1 # of hits: 3	PMT pos [cm] -45, -15, 67
PMT ID: 115# of hits: 7	PMT pos [cm] -49.5, -55, 60
PMT ID: 4 # of hits: 3	PMT pos [cm] -15, -45, 67
PMT ID: 0 # of hits: 15	PMT pos [cm] -45, -45, 67
PMT ID: 35 # of hits: 1	PMT pos [cm] 59.9, 43.5, 60

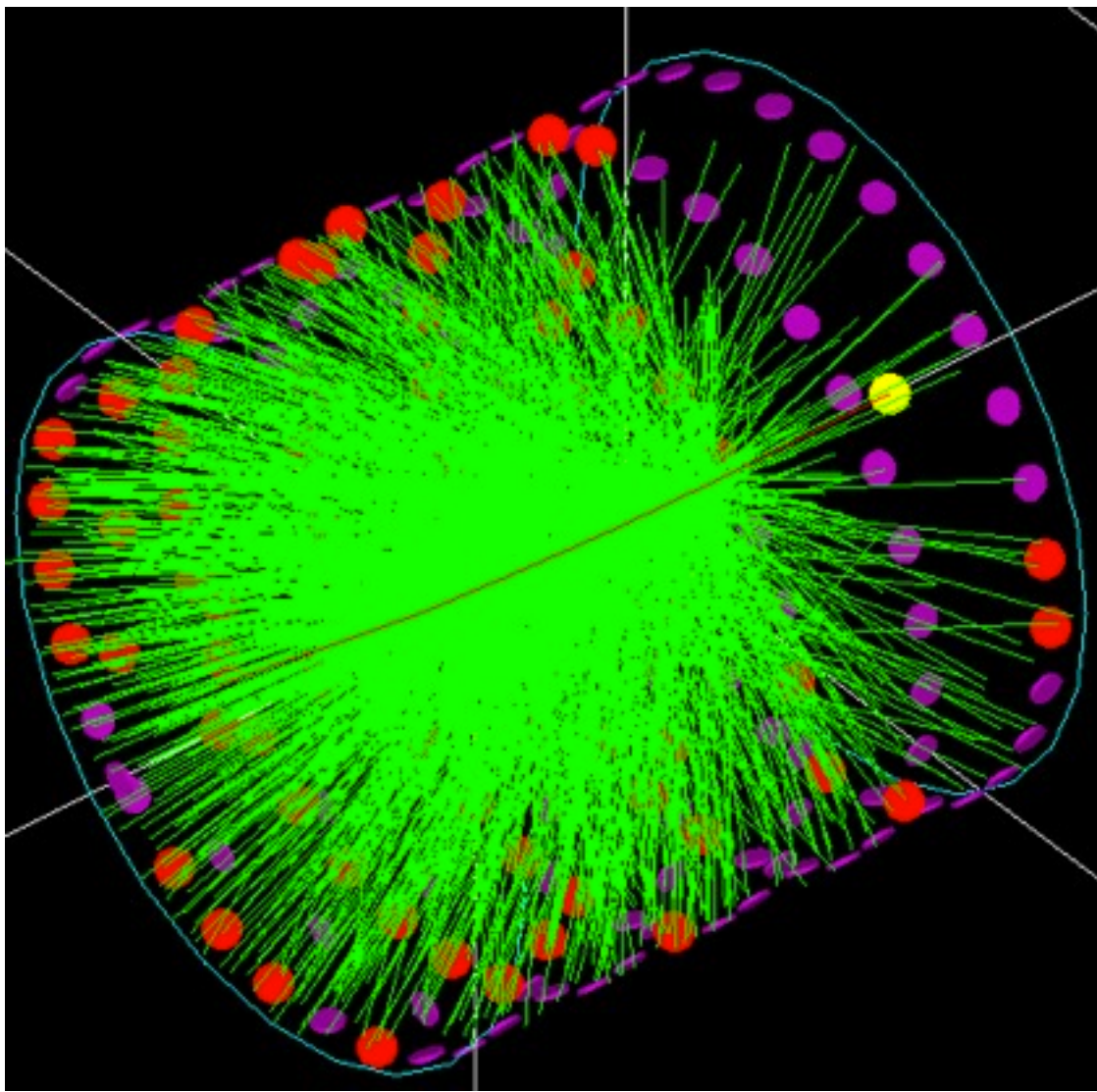
Hit PMTs 22 / Ratio: 0.133

Total p.e. into PMTs 74

Efficiency: 0.0744



- Muon
 - 1 GeV
 - position : (100,100,0)
 - Direction : (-1,-1,0)

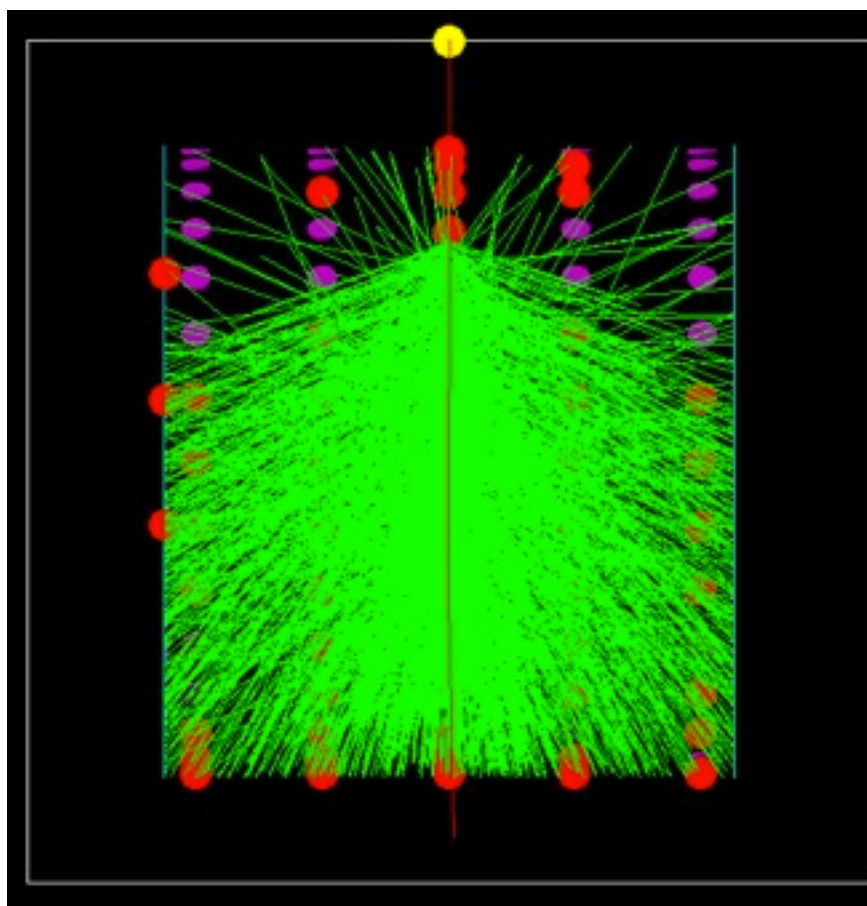
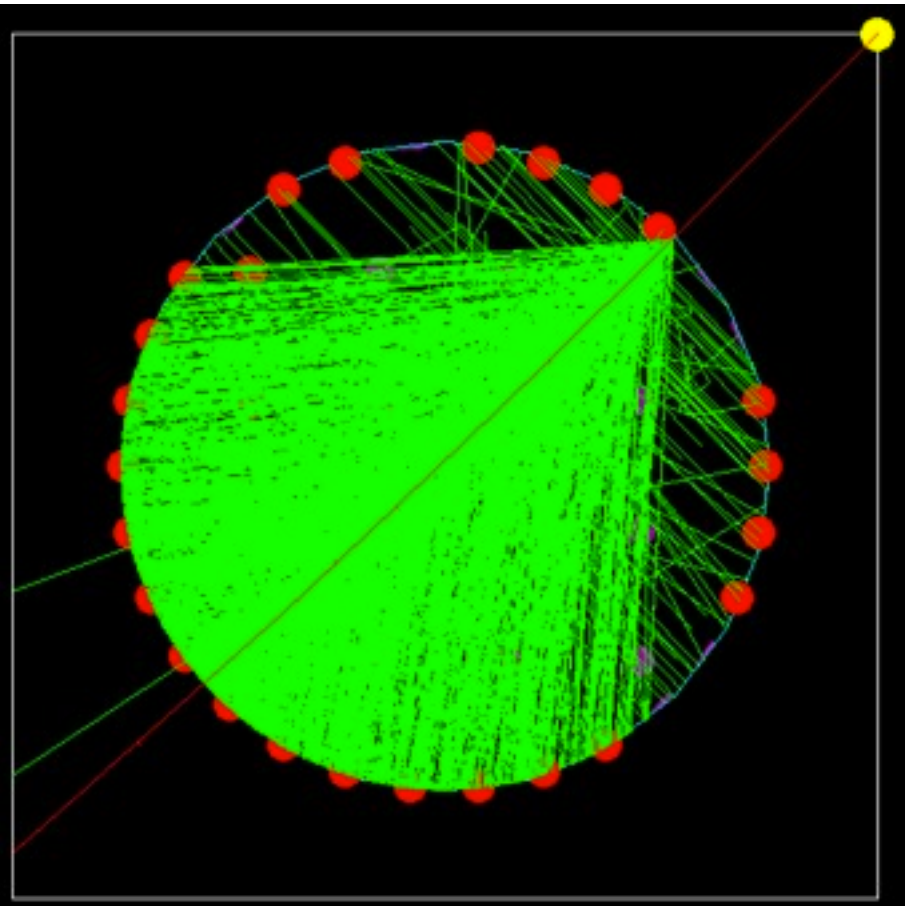


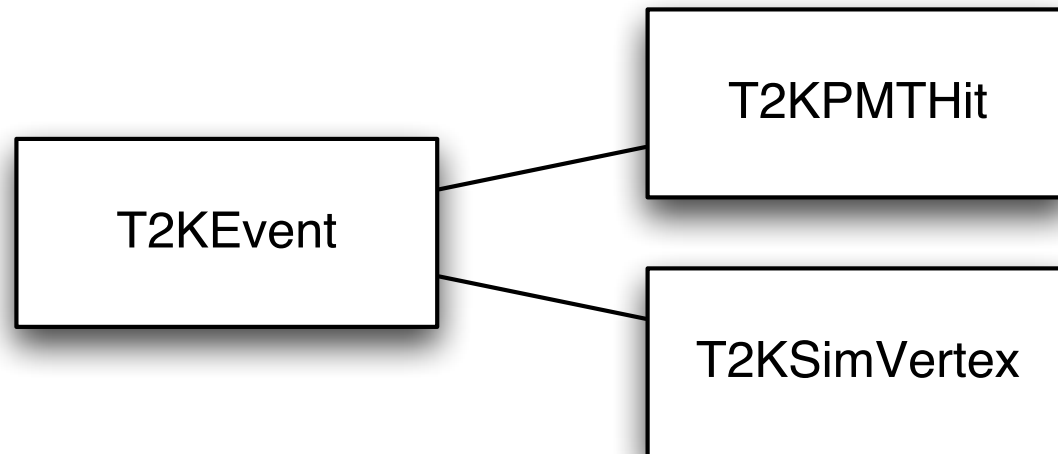
Number of optical photons produced in this event : 75218
 Number of photo-electrons produced in this event : 2202
 Hit PMTs 65 / Ratio: 0.392
 Total p.e. into PMTs 152
 Efficiency: 0.069

Print hit information in this Event

PMT ID: 38# of hits: 4 PMT pos [cm] 49.5, 55, 0
 PMT ID: 6 # of hits: 1 PMT pos [cm] -15, 15, 67
 PMT ID: 43# of hits: 1 PMT pos [cm] 37, 64.1, 0
 PMT ID: 78# of hits: 1 PMT pos [cm] -59.9, 43.5, 0
 PMT ID: 62# of hits: 1 PMT pos [cm] -22.9, 70.4, -30
 PMT ID: 24# of hits: 1 PMT pos [cm] 72.4, 15.4, 30
 PMT ID: 48# of hits: 1 PMT pos [cm] 22.9, 70.4, 0
 PMT ID: 140 # of hits: 1 PMT pos [cm] 22.9, -70.4, 60
 PMT ID: 2 # of hits: 1 PMT pos [cm] -45, 15, 67
 PMT ID: 23# of hits: 3 PMT pos [cm] 72.4, 15.4, 0
 PMT ID: 21# of hits: 1 PMT pos [cm] 72.4, 15.4, -60
 PMT ID: 143 # of hits: 2 PMT pos [cm] 37, -64.1, 0
 PMT ID: 53# of hits: 1 PMT pos [cm] 7.74, 73.6, 0
 PMT ID: 5 # of hits: 4 PMT pos [cm] -15, -15, 67
 PMT ID: 84# of hits: 1 PMT pos [cm] -67.6, 30.1, 30
 PMT ID: 82# of hits: 1 PMT pos [cm] -67.6, 30.1, -30
 PMT ID: 139 # of hits: 2 PMT pos [cm] 22.9, -70.4, 30
 PMT ID: 90# of hits: 1 PMT pos [cm] -72.4, 15.4, 60
 PMT ID: 83# of hits: 2 PMT pos [cm] -67.6, 30.1, 0
 PMT ID: 131 # of hits: 1 PMT pos [cm] 7.74, -73.6, -60
 PMT ID: 119 # of hits: 5 PMT pos [cm] -37, -64.1, 30
 PMT ID: 95# of hits: 4 PMT pos [cm] -74, -2.38e-14, 60
 PMT ID: 89# of hits: 2 PMT pos [cm] -72.4, 15.4, 30

PMT ID: 87# of hits: 2 PMT pos [cm] -72.4, 15.4, -30
 PMT ID: 165 # of hits: 1 PMT pos [cm] 72.4, -15.4, 60
 PMT ID: 1 # of hits: 1 PMT pos [cm] -45, -15, 67
 PMT ID: 157 # of hits: 1 PMT pos [cm] 67.6, -30.1, -30
 PMT ID: 132 # of hits: 1 PMT pos [cm] 7.74, -73.6, -30
 PMT ID: 134 # of hits: 2 PMT pos [cm] 7.74, -73.6, 30
 PMT ID: 130 # of hits: 3 PMT pos [cm] -7.74, -73.6, 60
 PMT ID: 133 # of hits: 3 PMT pos [cm] 7.74, -73.6, 0
 PMT ID: 10# of hits: 1 PMT pos [cm] 15, 15, 67
 PMT ID: 69# of hits: 1 PMT pos [cm] -37, 64.1, 30
 PMT ID: 96# of hits: 3 PMT pos [cm] -72.4, -15.4, -60
 PMT ID: 67# of hits: 1 PMT pos [cm] -37, 64.1, -30
 PMT ID: 100 # of hits: 3 PMT pos [cm] -72.4, -15.4, 60
 PMT ID: 94# of hits: 5 PMT pos [cm] -74, -2.38e-14, 30
 PMT ID: 92# of hits: 3 PMT pos [cm] -74, -2.38e-14, -30
 PMT ID: 125 # of hits: 1 PMT pos [cm] -22.9, -70.4, 60
 PMT ID: 99# of hits: 3 PMT pos [cm] -72.4, -15.4, 30
 PMT ID: 127 # of hits: 1 PMT pos [cm] -7.74, -73.6, -30
 PMT ID: 129 # of hits: 2 PMT pos [cm] -7.74, -73.6, 30
 PMT ID: 16# of hits: 1 PMT pos [cm] 74, 0, -60
 PMT ID: 101 # of hits: 1 PMT pos [cm] -67.6, -30.1, -60
 PMT ID: 116 # of hits: 2 PMT pos [cm] -37, -64.1, -60
 PMT ID: 128 # of hits: 1 PMT pos [cm] -7.74, -73.6, 0
 PMT ID: 105 # of hits: 1 PMT pos [cm] -67.6, -30.1, 60
 PMT ID: 120 # of hits: 2 PMT pos [cm] -37, -64.1, 60
 PMT ID: 111 # of hits: 1 PMT pos [cm] -49.5, -55, -60
 PMT ID: 112 # of hits: 5 PMT pos [cm] -49.5, -55, -30
 PMT ID: 107 # of hits: 4 PMT pos [cm] -59.9, -43.5, -30
 PMT ID: 118 # of hits: 4 PMT pos [cm] -37, -64.1, 0
 PMT ID: 97# of hits: 2 PMT pos [cm] -72.4, -15.4, -30
 PMT ID: 122 # of hits: 4 PMT pos [cm] -22.9, -70.4, -30
 PMT ID: 98# of hits: 7 PMT pos [cm] -72.4, -15.4, 0
 PMT ID: 124 # of hits: 6 PMT pos [cm] -22.9, -70.4, 30
 PMT ID: 102 # of hits: 2 PMT pos [cm] -67.6, -30.1, -30
 PMT ID: 123 # of hits: 2 PMT pos [cm] -22.9, -70.4, 0
 PMT ID: 104 # of hits: 3 PMT pos [cm] -67.6, -30.1, 30
 PMT ID: 109 # of hits: 2 PMT pos [cm] -59.9, -43.5, 30
 PMT ID: 103 # of hits: 4 PMT pos [cm] -67.6, -30.1, 0
 PMT ID: 114 # of hits: 1 PMT pos [cm] -49.5, -55, 30
 PMT ID: 113 # of hits: 7 PMT pos [cm] -49.5, -55, 0
 PMT ID: 3 # of hits: 1 PMT pos [cm] -45, 45, 67
 PMT ID: 108 # of hits: 9 PMT pos [cm] -59.9, -43.5, 0





```

class T2KWCEvent : public TObject
{
private:

    Int_t nhitpmts;           // Total # of hit PMTs
    Int_t nsimvertexes;       // # of vertex
    Int_t nphotons;           // # of optical photons produced in this event
    Int_t npes;               // # of photo-electrons produced in this event
    Int_t npes_pmt;           // # of photo-electrons into PMTs

    TClonesArray* fSimVertex;
    TClonesArray* fPMTHit;

public:
    T2KWCEvent();
    T2KWCEvent(const T2KWCEvent& evt);

    virtual ~T2KWCEvent();

    void NewTClonesArrays();

    void Clear(Option_t* option="");
    void Print(Option_t* option="") const;

    //
    void SetNPhotons(int n)   { nphotons = n; }
    void SetNPES(int n)       { npes = n; }
    void SetNPES_PMT(int n)   { npes_pmt = n; }

    T2KWCPMTHit* AddPMTHit(T2KWCPMTHit* hit);
    T2KWCSimVertex* AddSimVertex(T2KWCSimVertex* simver);

    //
    Int_t NHitPMTs() const    { return nhitpmts;}
    Int_t NSimVertexes() const { return nsimvertexes;}
    Int_t NPhotons() const    { return nphotons;}
    Int_t NPES() const        { return npes; }
    Int_t NPES_PMT() const    { return npes_pmt; }

    T2KWCPMTHit* GetPMTHit(int i) const;
    T2KWCSimVertex* GetSimVertex(int i) const;

    //
    ClassDef(T2KWCEvent, 2) // DST Summary of event

};
  
```



```

class T2KWCPMTHit : public TObject
{
private:

    Int_t      id;          // ID# of this PMT
    Int_t      nhits;       // # of hits on this PMT
    Double_t   pmtpos[3];   // center x-positon of this PMT [cm]

public:

    T2KWCPMTHit();
    T2KWCPMTHit(T2KWCPMTHit* hit);
    virtual ~T2KWCPMTHit();

    void Clear(Option_t* option="");
    void Print(Option_t* option="") const;

    //
    Int_t ID()          { return id; }
    Int_t NHits()       { return nhits; }
    Double_t Pos(int i) { return (i<3) ? pmtpos[i] : -1.e4; }

    //
    void SetID(int i)          { id = i; }
    void SetNHits(int n)       { nhits = n; }
    void SetPos(double p, int i) { if(i<3) pmtpos[i] = p; }

    //
    ClassDef(T2KWCPMTHit, 1)

};

```

```

class T2KWCSimVertex : public TObject
{
private:

    Int_t pdg;
    Double_t energy; // Energy of injected particle[GeV]
    Double_t ipos[3]; // injected point [cm]

public:

    T2KWCSimVertex();
    T2KWCSimVertex(T2KWCSimVertex *simver);
    virtual ~T2KWCSimVertex();

    void Clear(Option_t *option="");
    void Print(Option_t *option="") const;

public:

    Int_t PDG()          { return pdg; }
    Double_t Energy()    { return energy; }
    Double_t Pos(int i) { return (i<3) ? ipos[i] : -1.e4; }

    void SetPDG(int p) { pdg = p; }
    void SetEnergy(double e) { energy = e; }
    void SetPos(double p, int i) { if(i<3) ipos[i] = p; }

    //
    ClassDef(T2KWCSimVertex,1)

};

```

```

root [2] tree->Print()
*****
*Tree      :tree      : tree
*Entries   :      100 : Total =      68845 bytes File Size =      14684 *
*          :          : Tree compression factor =    4.51
*****
*Br   10 :fROOT.fSimVertex.pdg : pdg[fROOT.fSimVertex_]
*Entries :      100 : Total Size=      1531 bytes File Size =      30
*Baskets :        1 : Basket Size=      64000 bytes Compression=    2.96
*
*Br   11 :fROOT.fSimVertex.energy : energy[fROOT.fSimVertex_]
*Entries :      100 : Total Size=      1946 bytes File Size =      28
*Baskets :        1 : Basket Size=      64000 bytes Compression=    4.51
*
*Br   12 :fROOT.fSimVertex.pos[3] : pos[fROOT.fSimVertex_]
*Entries :      100 : Total Size=      3537 bytes File Size =      32
*Baskets :        1 : Basket Size=      64000 bytes Compression=    8.94
*
*Br   13 :fROOT.fPMTHit : fROOT.fPMTHit_
*Entries :      100 : Total Size=      5680 bytes File Size =      22
*Baskets :        1 : Basket Size=      64000 bytes Compression=    2.15
*
*Br   14 :fROOT.fPMTHit.fUniqueID : fUniqueID[fROOT.fPMTHit_]
*Entries :      100 : Total Size=      5132 bytes File Size =      36
*Baskets :        1 : Basket Size=      64000 bytes Compression=   12.23
*
*Br   15 :fROOT.fPMTHit.fBits : fBits[fROOT.fPMTHit_]
*Entries :      100 : Total Size=      5112 bytes File Size =      37
*Baskets :        1 : Basket Size=      64000 bytes Compression=   12.09
*
*Br   16 :fROOT.fPMTHit.id : id[fROOT.fPMTHit_]
*Entries :      100 : Total Size=      5097 bytes File Size =      166
*Baskets :        1 : Basket Size=      64000 bytes Compression=    2.69
*
*Br   17 :fROOT.fPMTHit.nhits : nhits[fROOT.fPMTHit_]
*Entries :      100 : Total Size=      5112 bytes File Size =      105
*Baskets :        1 : Basket Size=      64000 bytes Compression=    4.24
*
*Br   18 :fROOT.fPMTHit.pmtx : pmtx[fROOT.fPMTHit_]
*Entries :      100 : Total Size=      9099 bytes File Size =      197
*Baskets :        1 : Basket Size=      64000 bytes Compression=    4.30
*
*Br   19 :fROOT.fPMTHit.pnty : pnty[fROOT.fPMTHit_]
*Entries :      100 : Total Size=      9099 bytes File Size =      205
*Baskets :        1 : Basket Size=      64000 bytes Compression=    4.12
*
*Br   20 :fROOT.fPMTHit.pmtz : pmtz[fROOT.fPMTHit_]
*Entries :      100 : Total Size=      9099 bytes File Size =      113
*Baskets :        1 : Basket Size=      64000 bytes Compression=    7.50
*
*Br   0 :fROOT.TObject.fUniqueID :
*Entries :      100 : Total Size=      1040 bytes File Size =      113
*Baskets :        1 : Basket Size=      64000 bytes Compression=    4.34
*
*Br   1 :fROOT.TObject.fBits :
*Entries :      100 : Total Size=      1428 bytes File Size =      301
*Baskets :        1 : Basket Size=      64000 bytes Compression=    2.97
*
*Br   2 :fROOT.nhitpmts :
*Entries :      100 : Total Size=      995 bytes File Size =      224
*Baskets :        1 : Basket Size=      64000 bytes Compression=    2.15
*
*Br   3 :fROOT.nsimvertexes :
*Entries :      100 : Total Size=      1015 bytes File Size =      111
*Baskets :        1 : Basket Size=      64000 bytes Compression=    4.37
*
*Br   4 :fROOT.nphotons :
*Entries :      100 : Total Size=      995 bytes File Size =      387
*Baskets :        1 : Basket Size=      64000 bytes Compression=    1.24
*
*Br   5 :fROOT.npes :
*Entries :      100 : Total Size=      975 bytes File Size =      316
*Baskets :        1 : Basket Size=      64000 bytes Compression=    1.51
*
*Br   6 :fROOT.npes_pmt :
*Entries :      100 : Total Size=      995 bytes File Size =      249
*Baskets :        1 : Basket Size=      64000 bytes Compression=    1.93
*
*Br   7 :fROOT.fSimVertex : fROOT.fSimVertex_
*Entries :      100 : Total Size=      4603 bytes File Size =      109
*Baskets :        1 : Basket Size=      64000 bytes Compression=    4.43
*
*Br   8 :fROOT.fSimVertex.fUniqueID : fUniqueID[fROOT.fSimVertex_]
*Entries :      100 : Total Size=      1561 bytes File Size =      307
*Baskets :        1 : Basket Size=      64000 bytes Compression=    2.93
*
*Br   9 :fROOT.fSimVertex.fBits : fBits[fROOT.fSimVertex_]
*Entries :      100 : Total Size=      1541 bytes File Size =      308
*Baskets :        1 : Basket Size=      64000 bytes Compression=    2.91
*

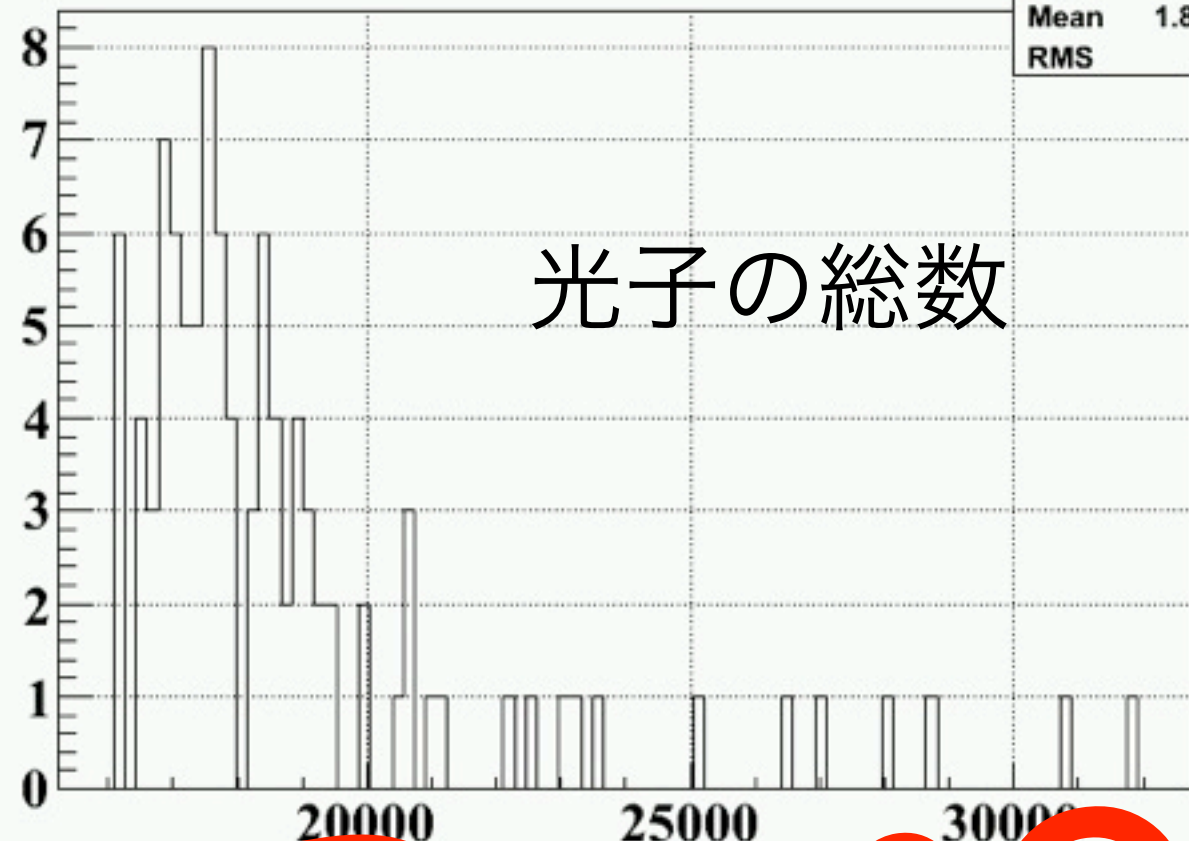
```

nphotons

htemp	
Entries	100
Mean	1.889e+04
RMS	3070

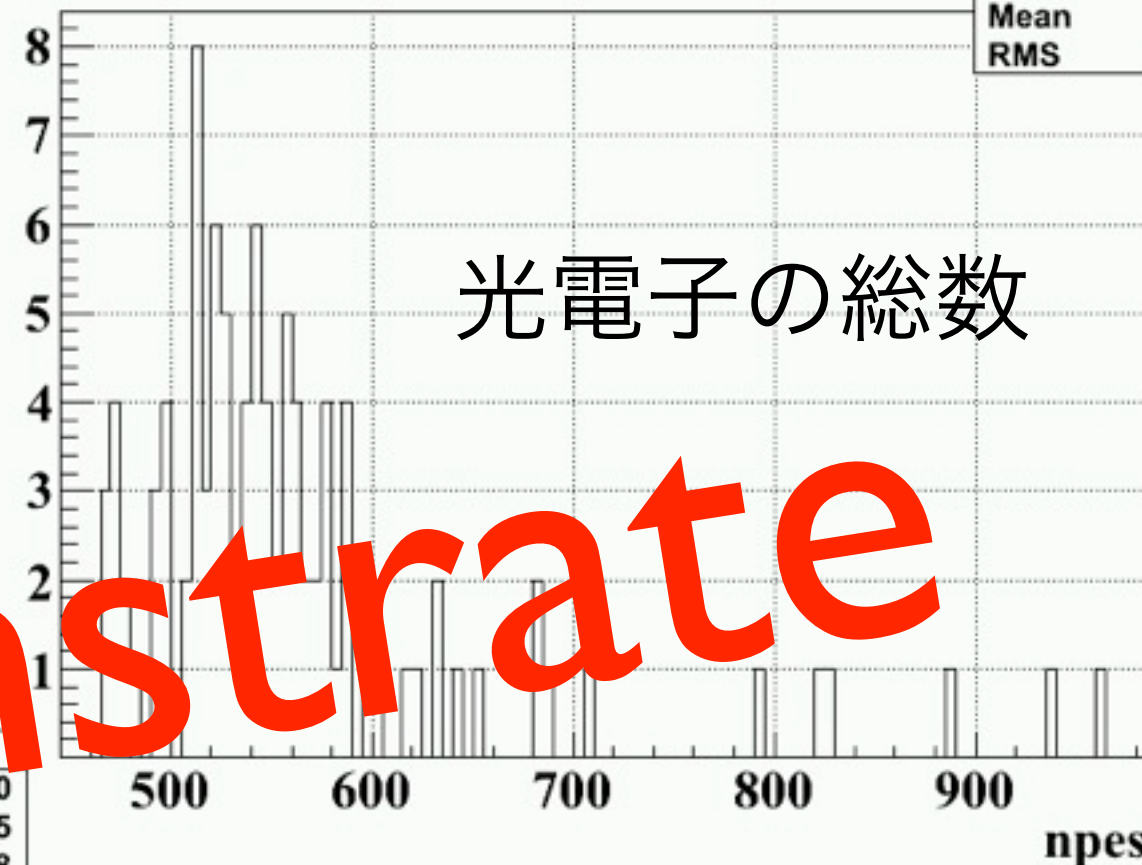
npes

光子の総数



htemp	
Entries	100
Mean	565.1
RMS	93.19

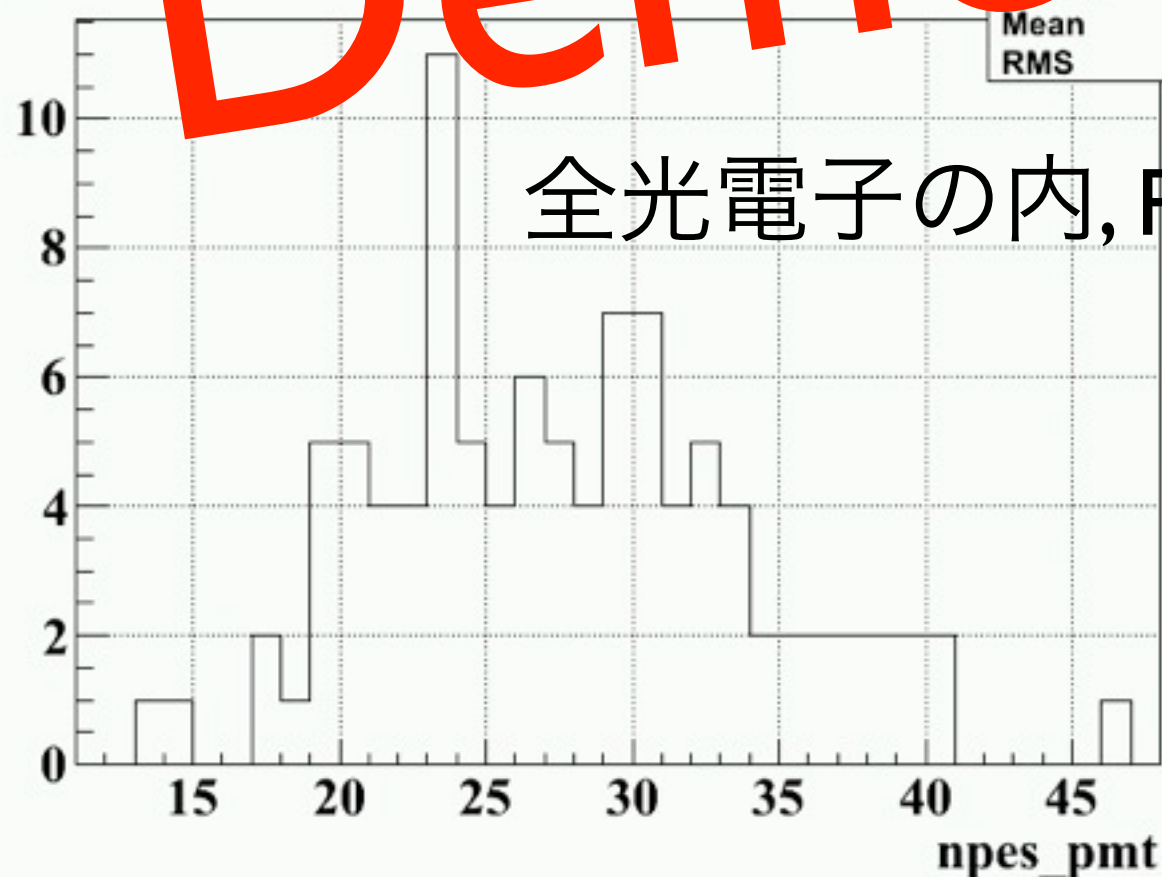
光電子の総数

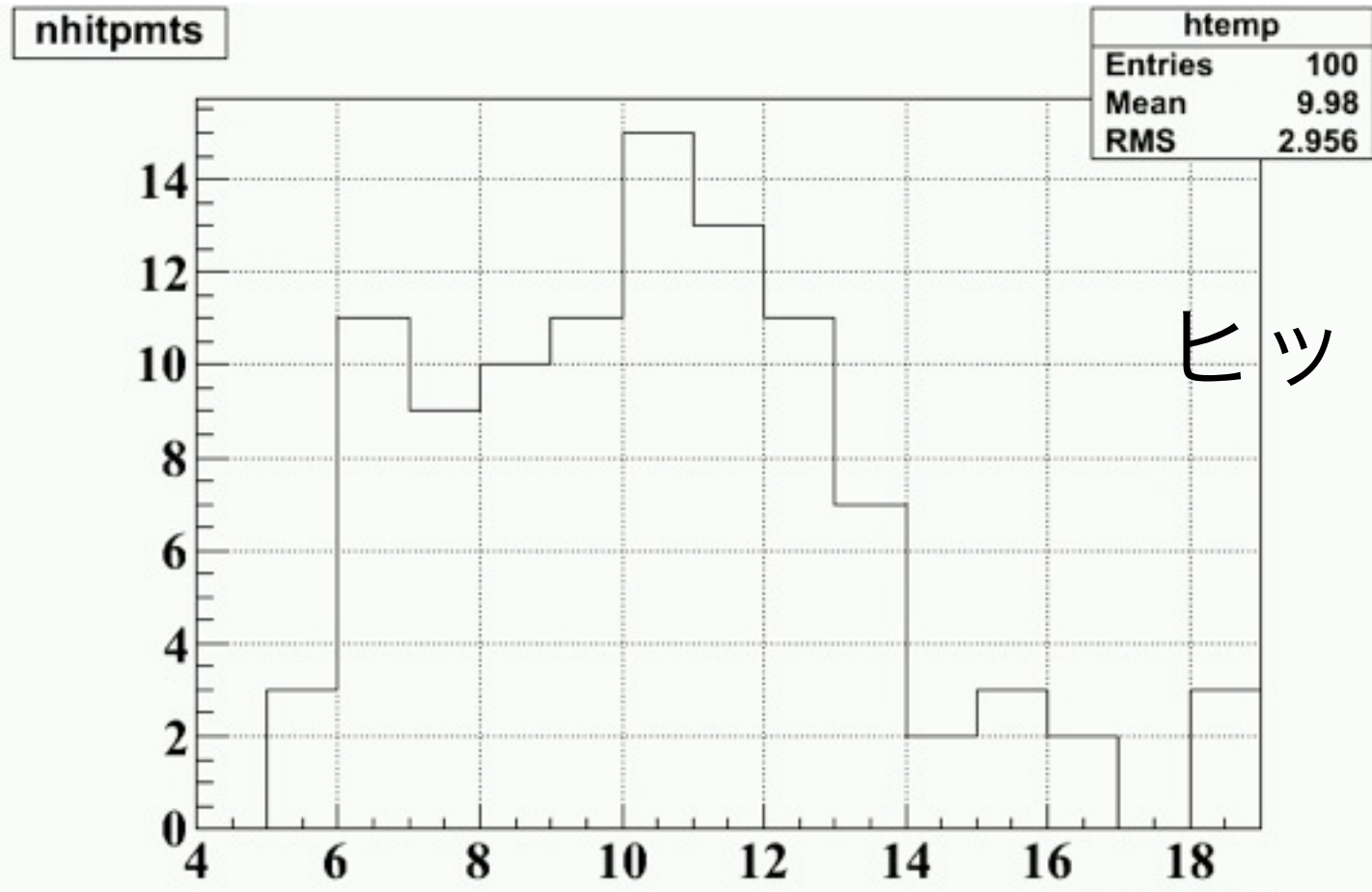


npes_pmt

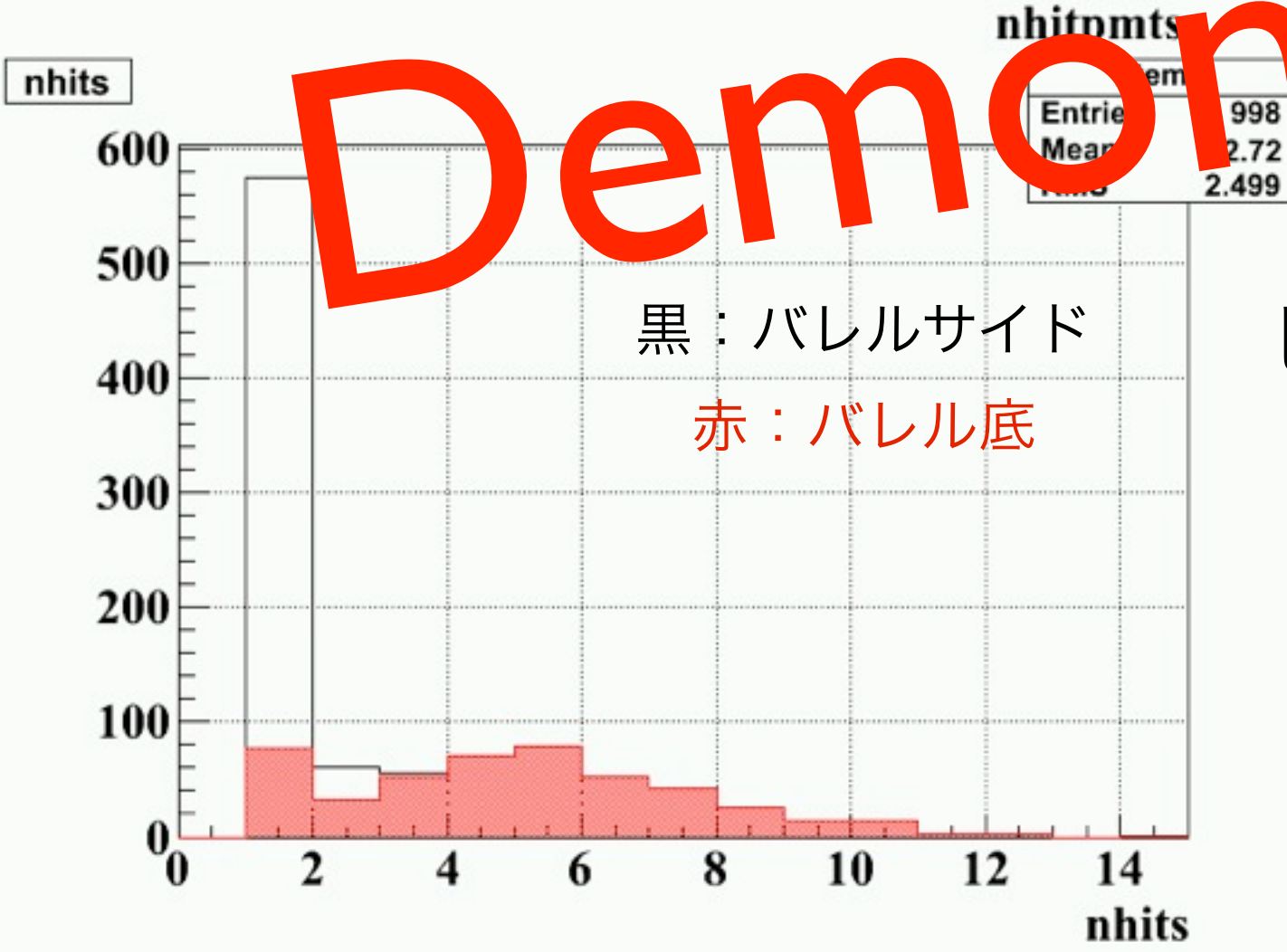
htemp	
Entries	100
Mean	27.15
RMS	6.278

全光電子の内, PMTに入るもの





ヒットがあった(光電子が入った)
PMTの数



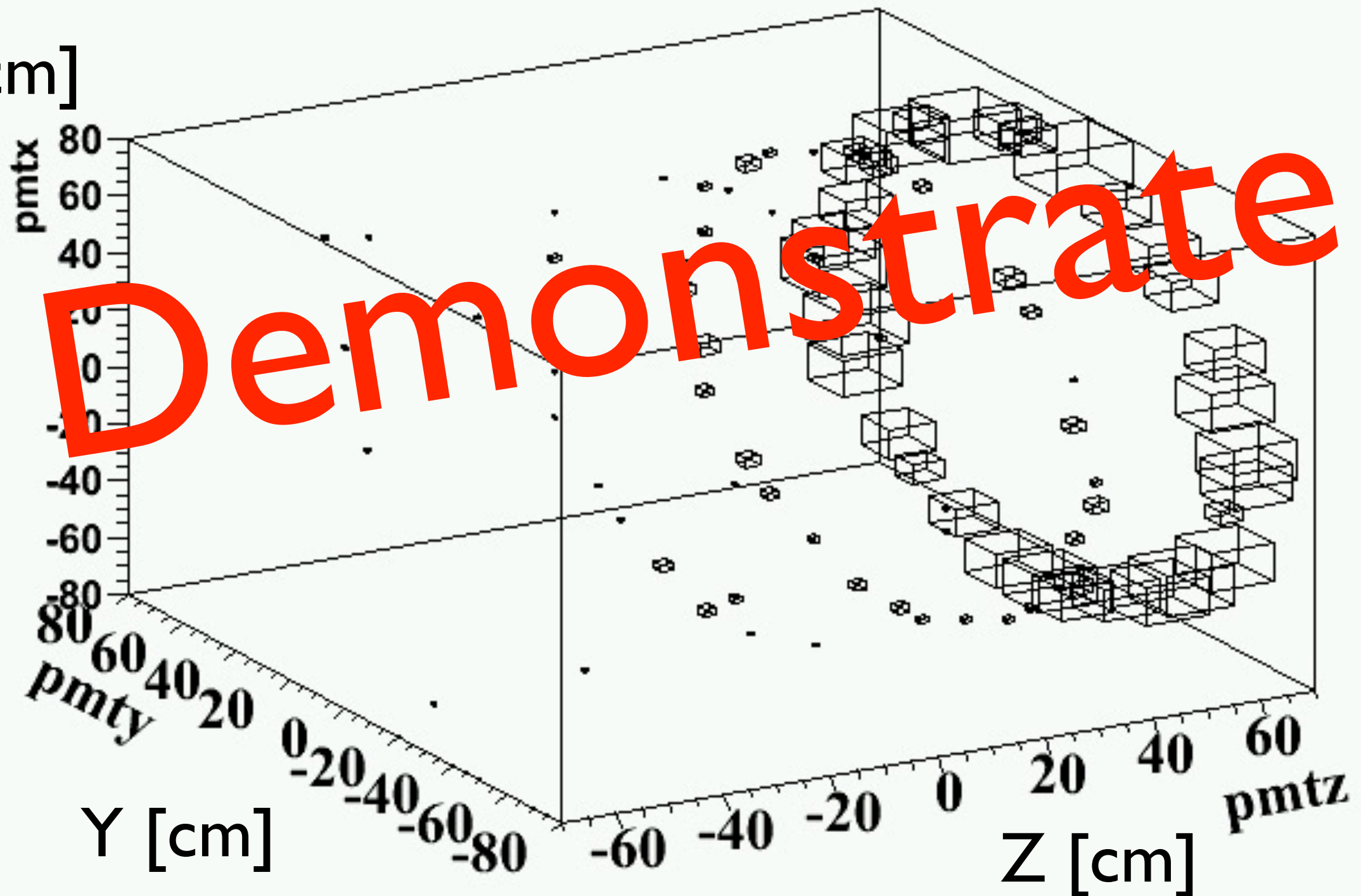
ヒットがあったPMTでの、
ヒットの数

Demonstrate

ヒットがあったPMTの位置
バレルサイドに設置されたものののみ

`pmtx:pmtz:pmtz {pmtz<67}`

X [cm]



Y [cm]

Z [cm]

- よければ、このコードをコミットします