

Simulation Status of IceCube in Chiba

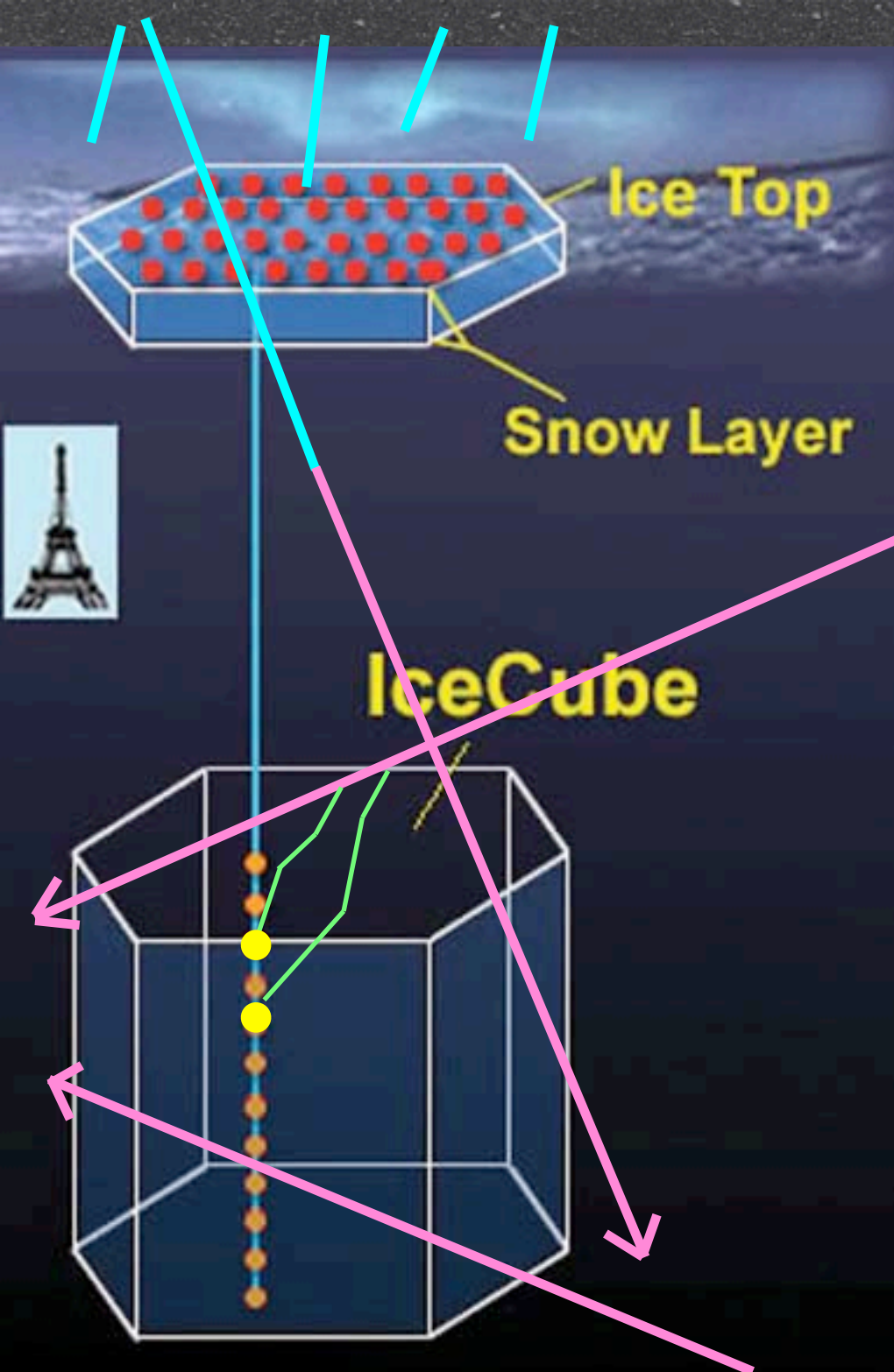
ICEPP 2005 in Hakuba

Feb. 21, 2005

Kotoyo Hoshina

Chiba University

- Simulation procedures ~ ROMEO meets JULIeT!
- ROMEO ~ Root based OM EmuratOr
- JULIeT ~ Java based Ultra-high energy Lepton Integral transporter
- Summary



Simulation procedure: JULieT meets ROMEIO!

Cosmological
source

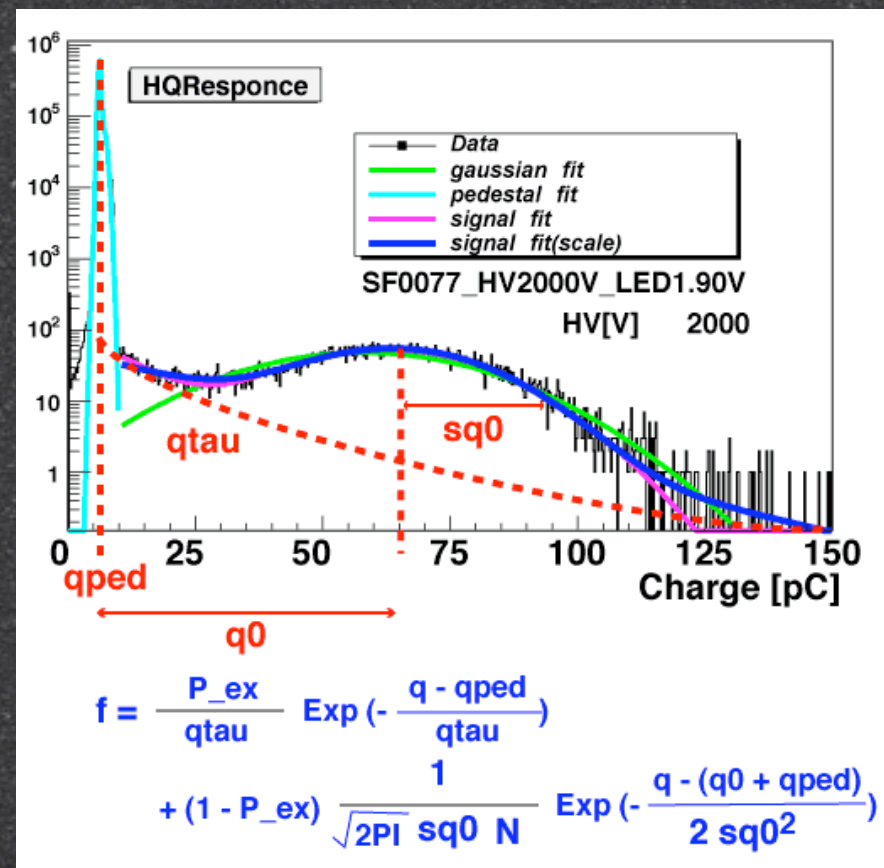
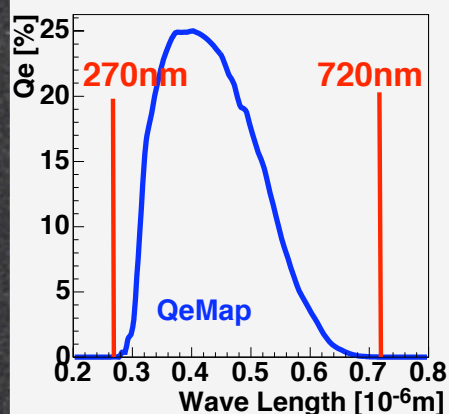
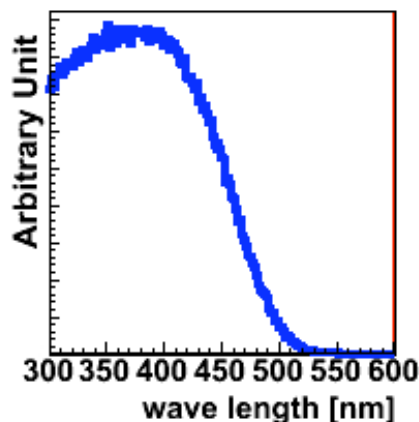
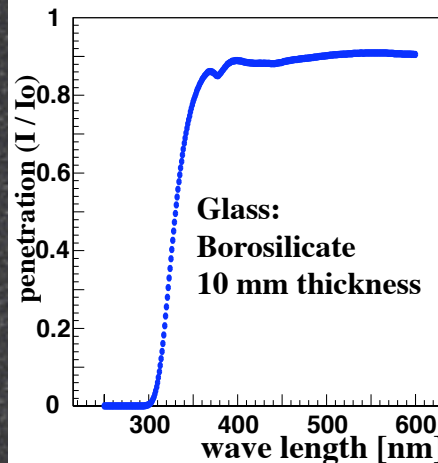
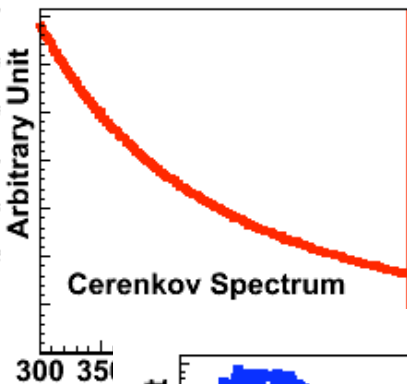
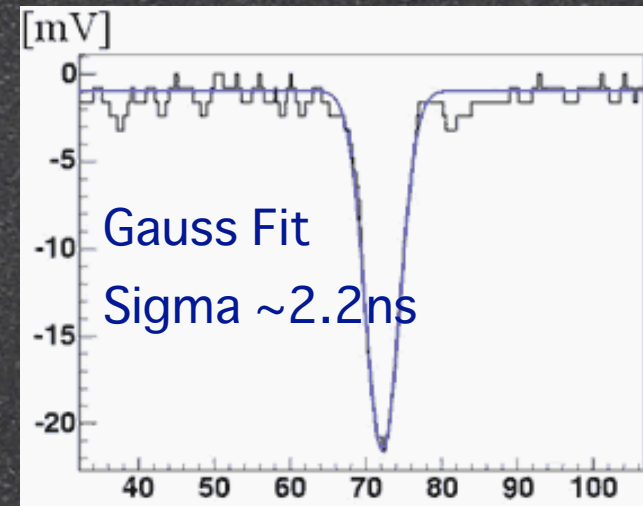
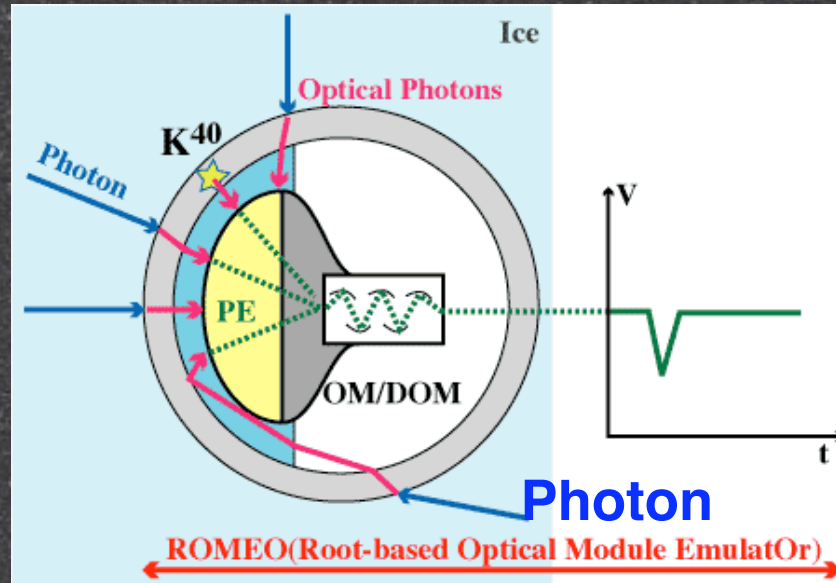
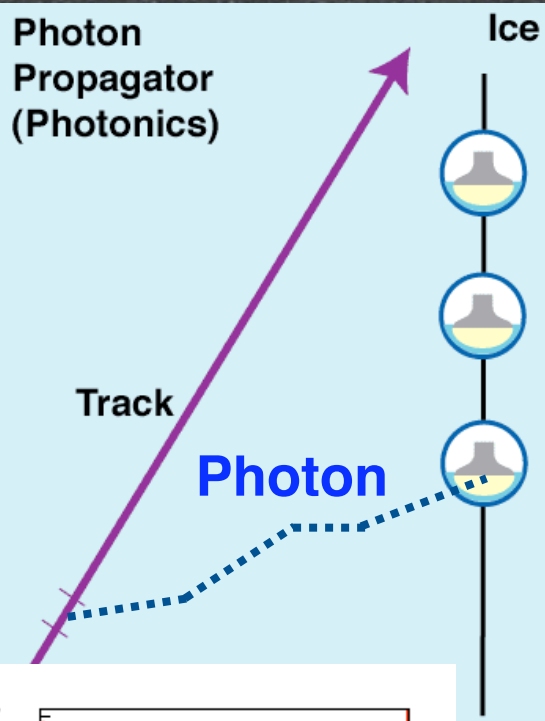
Corsika
(Atmospheric
Cosmic Ray sim)

JULieT
(Lepton Propagator)

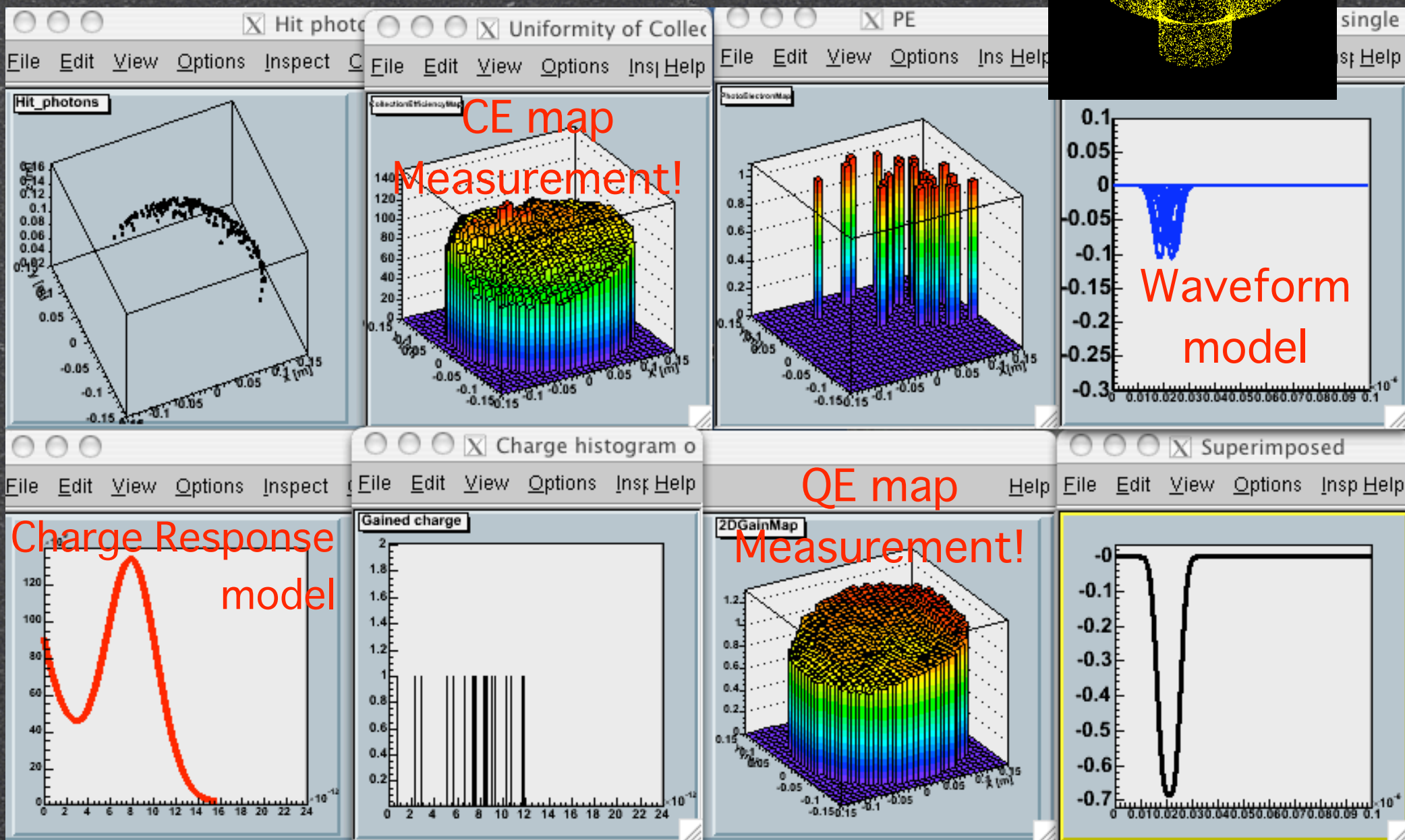
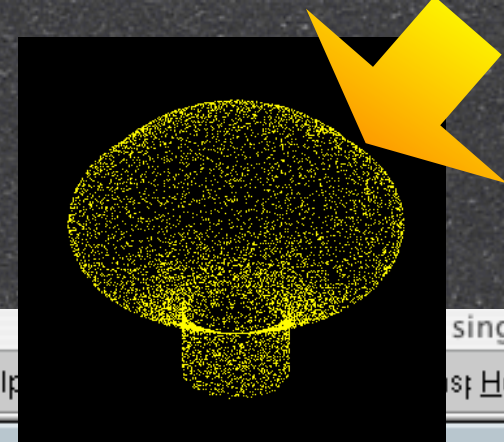
photonics
(In ice photon propagator)

ROMEIO
(DOM response simulator)

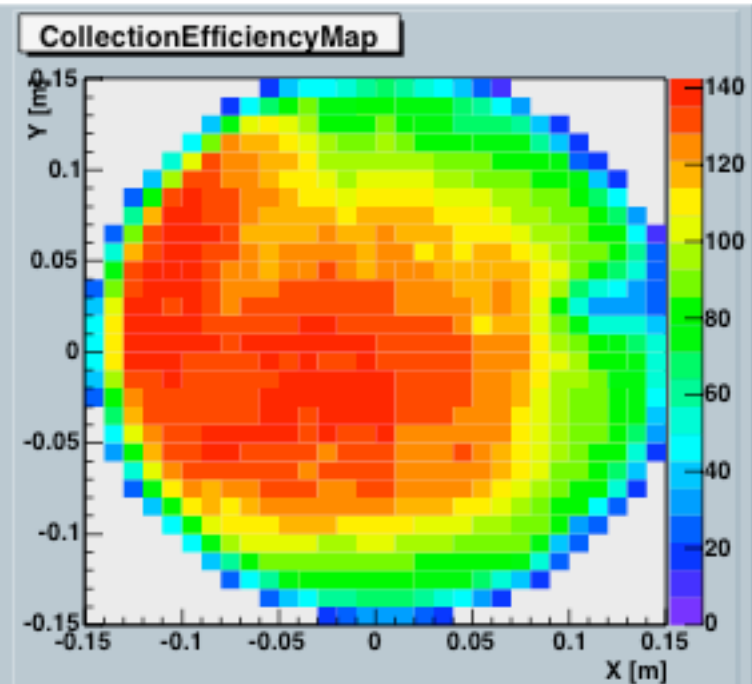
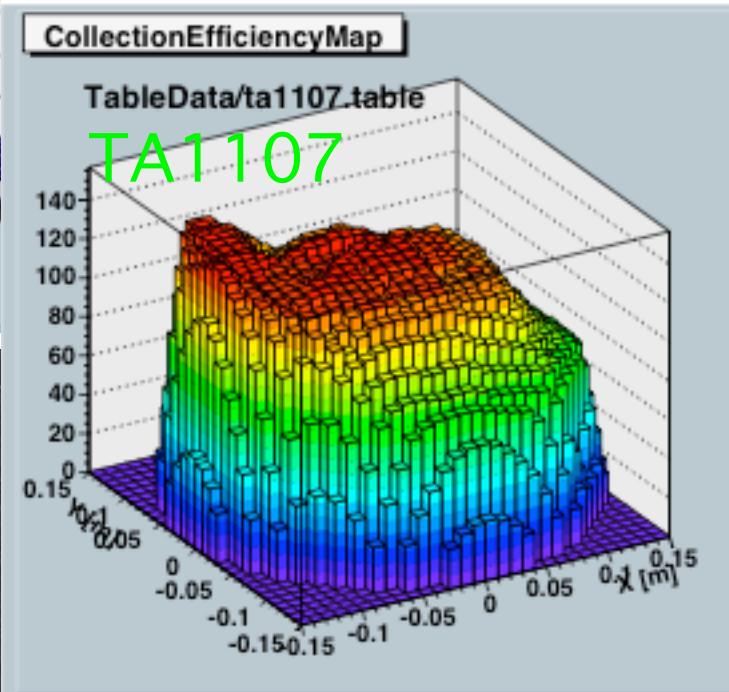
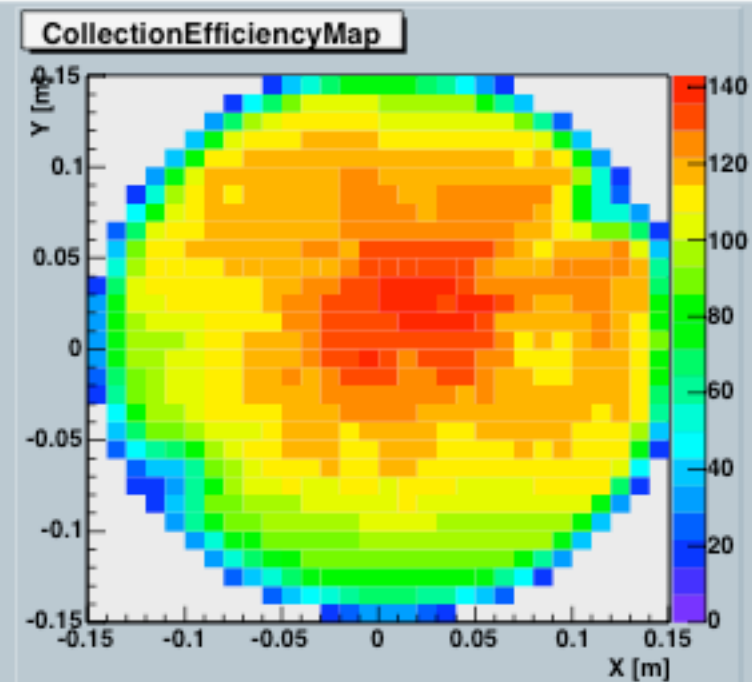
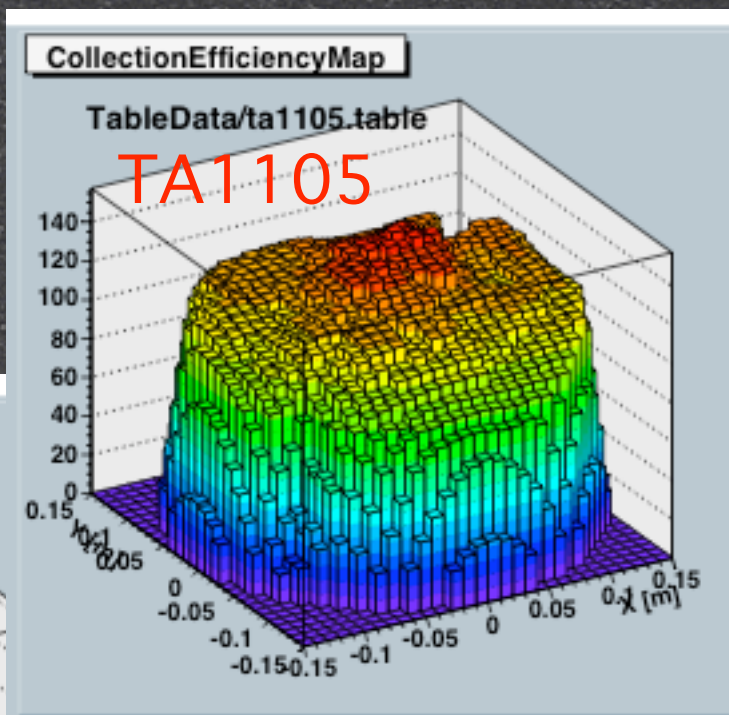
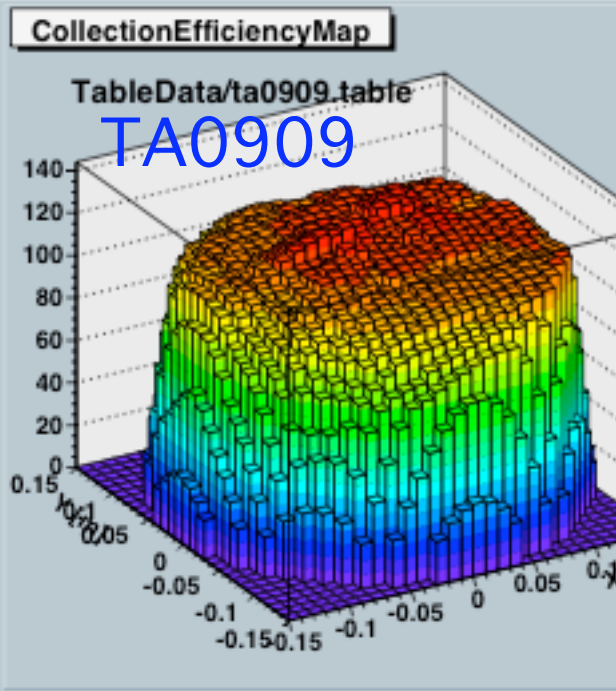
ROMEEO Simulation Procedure



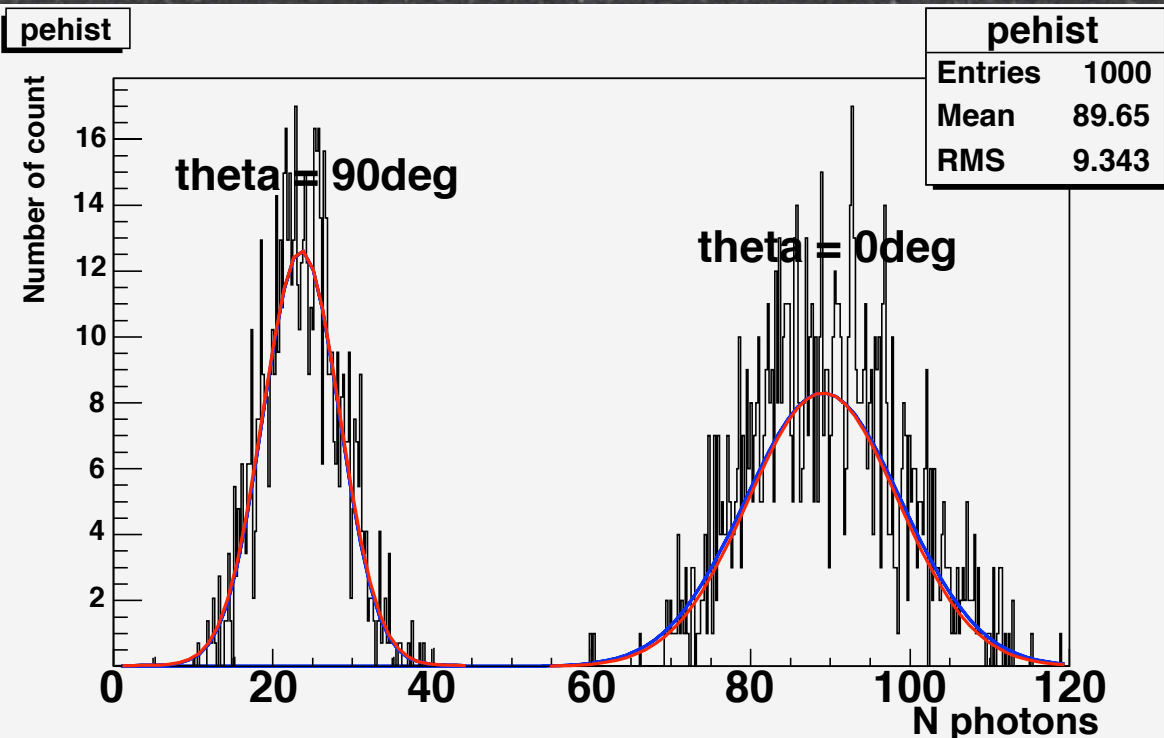
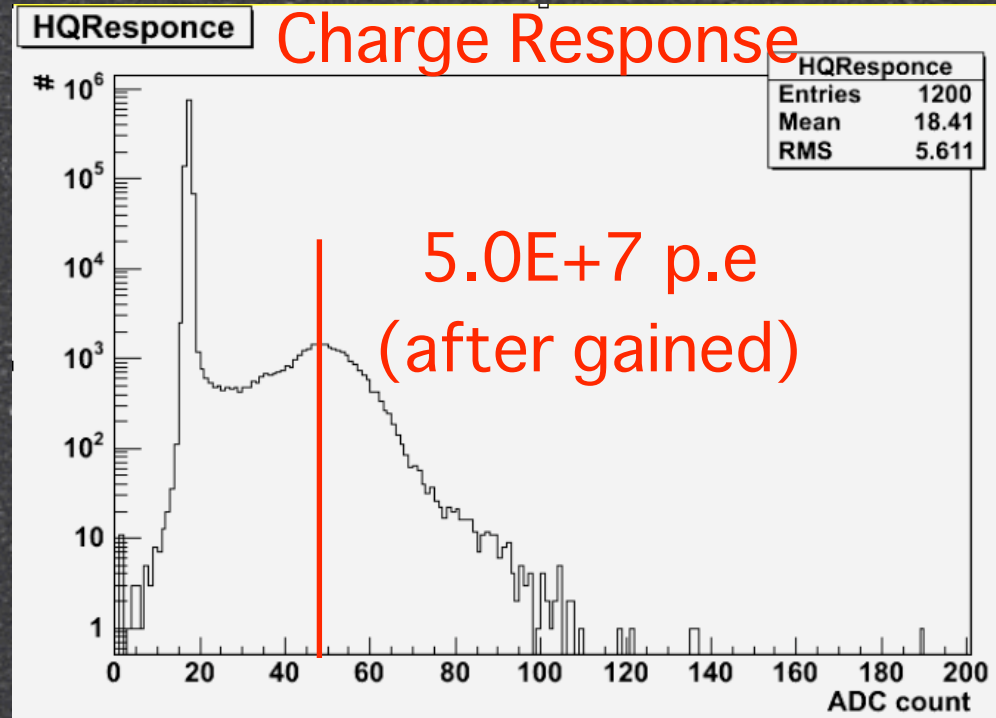
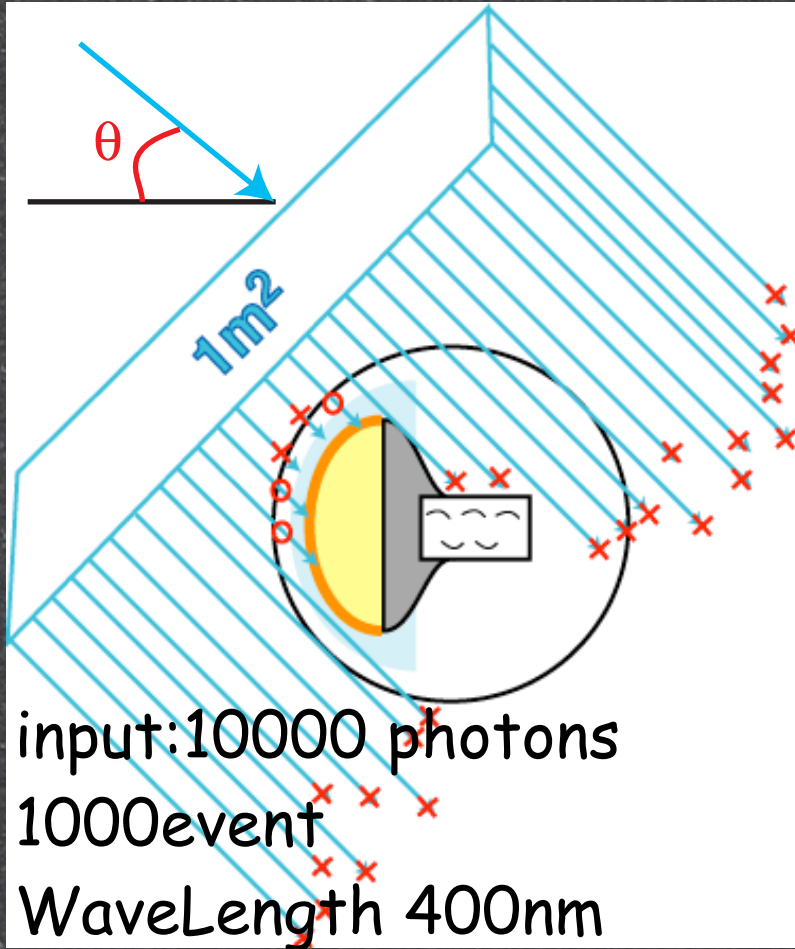
200 photons
beam direction $(-1, -1, 0)$



QE maps of PMTs

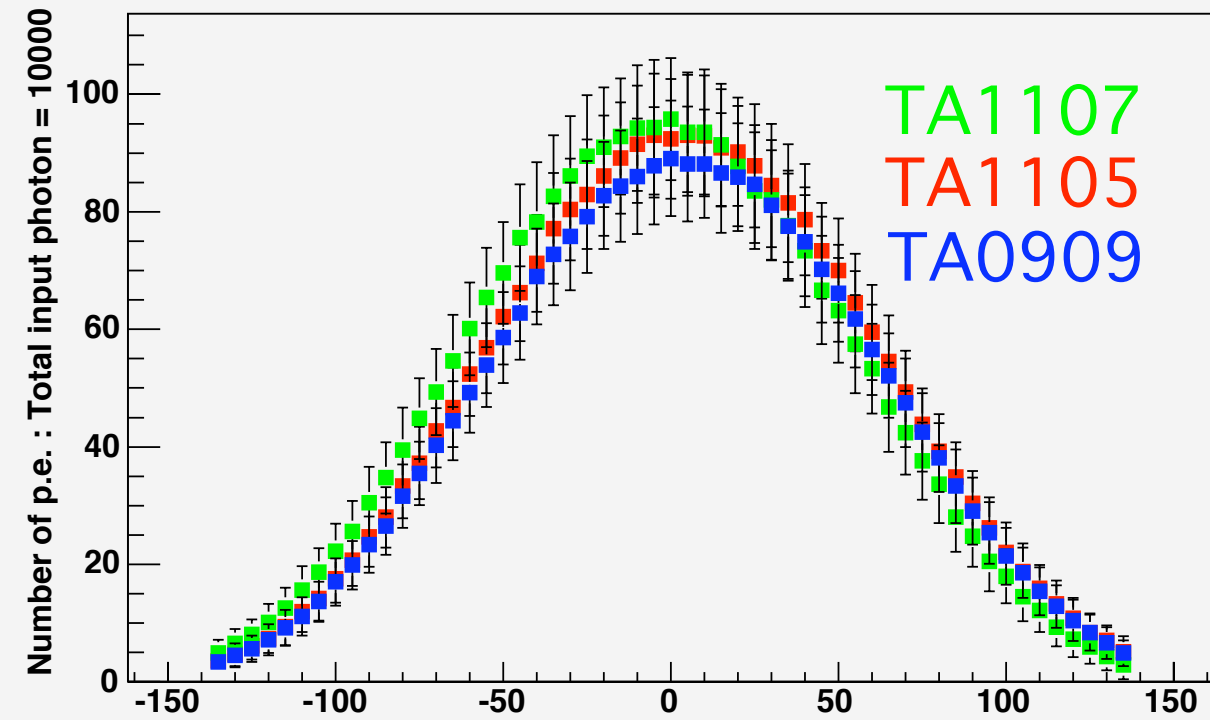


Angle Acceptance of DOM



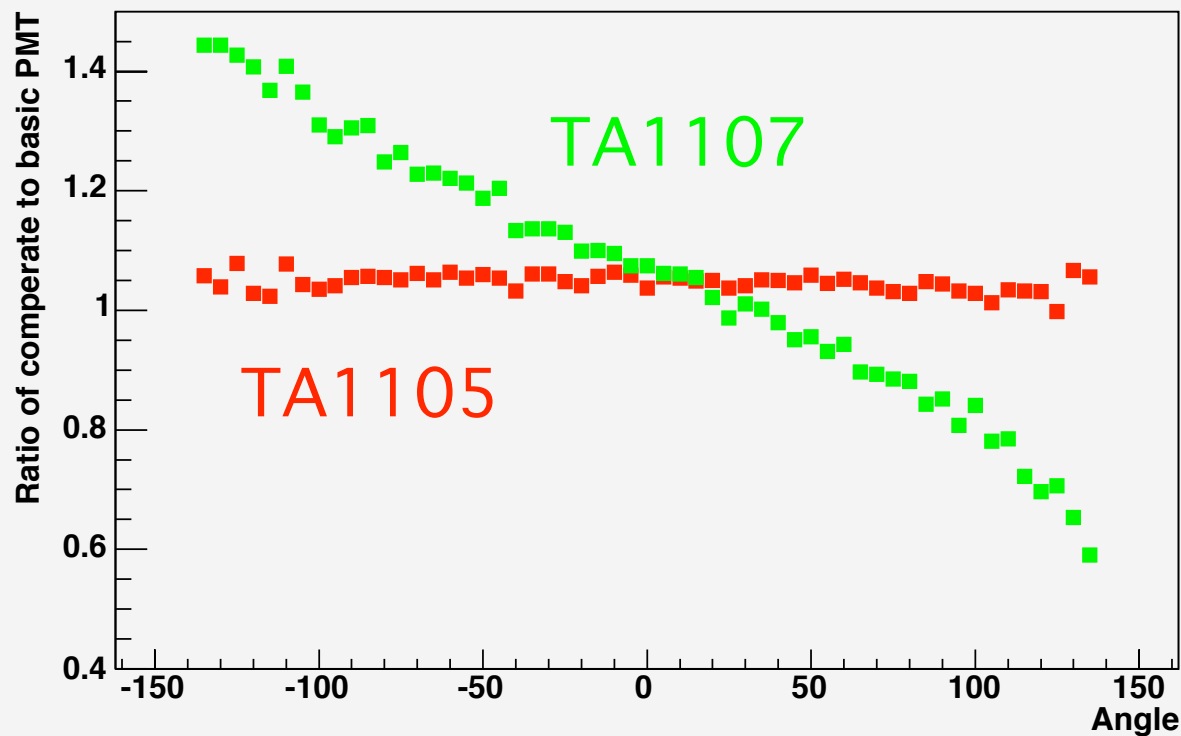
$$N_{\text{photons}} = \frac{\text{Sum up charge}}{5.0\text{E}+7 * 1.6\text{E}-19}$$

Graph 1

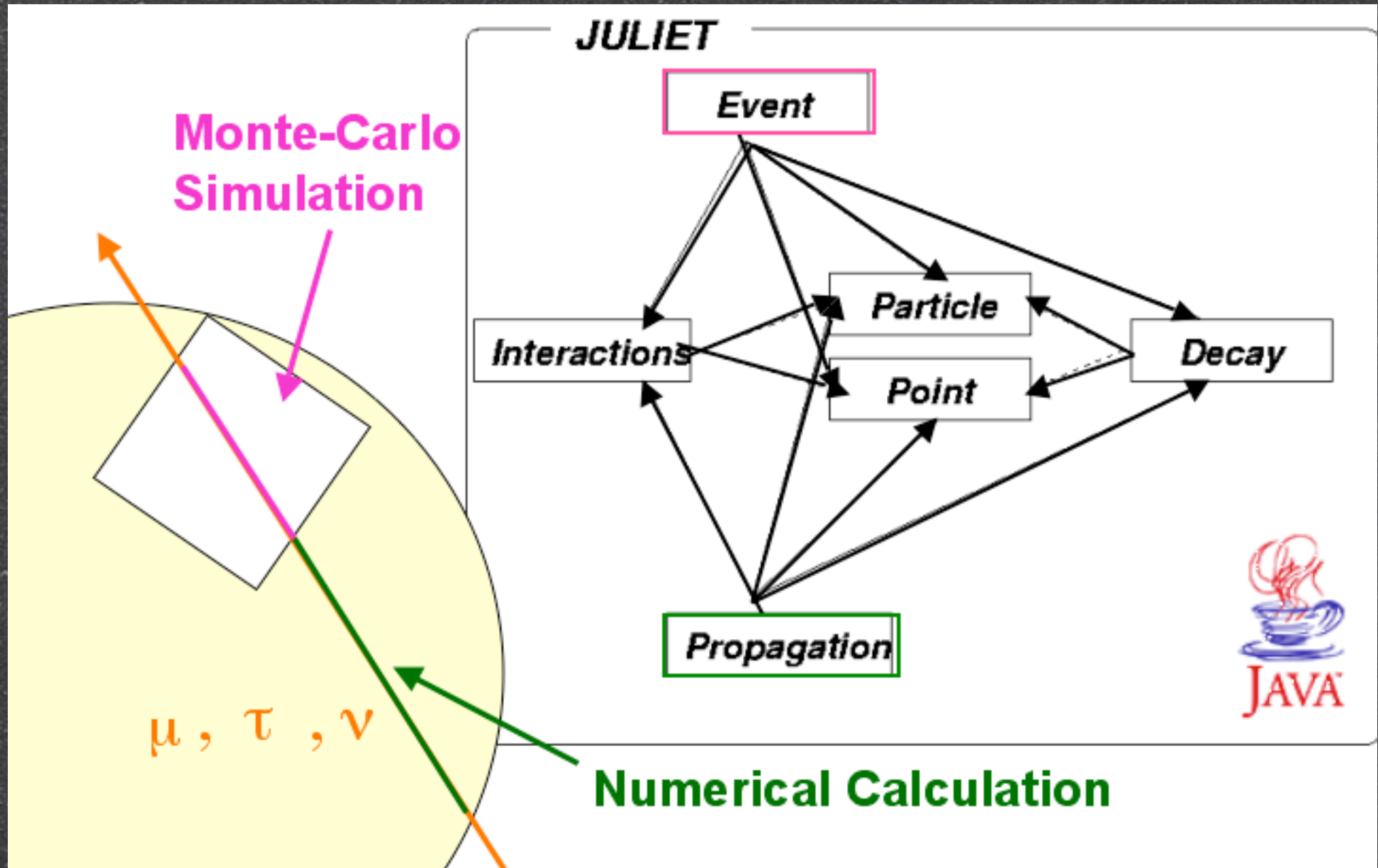


PMT dependence of Acceptance

Graph

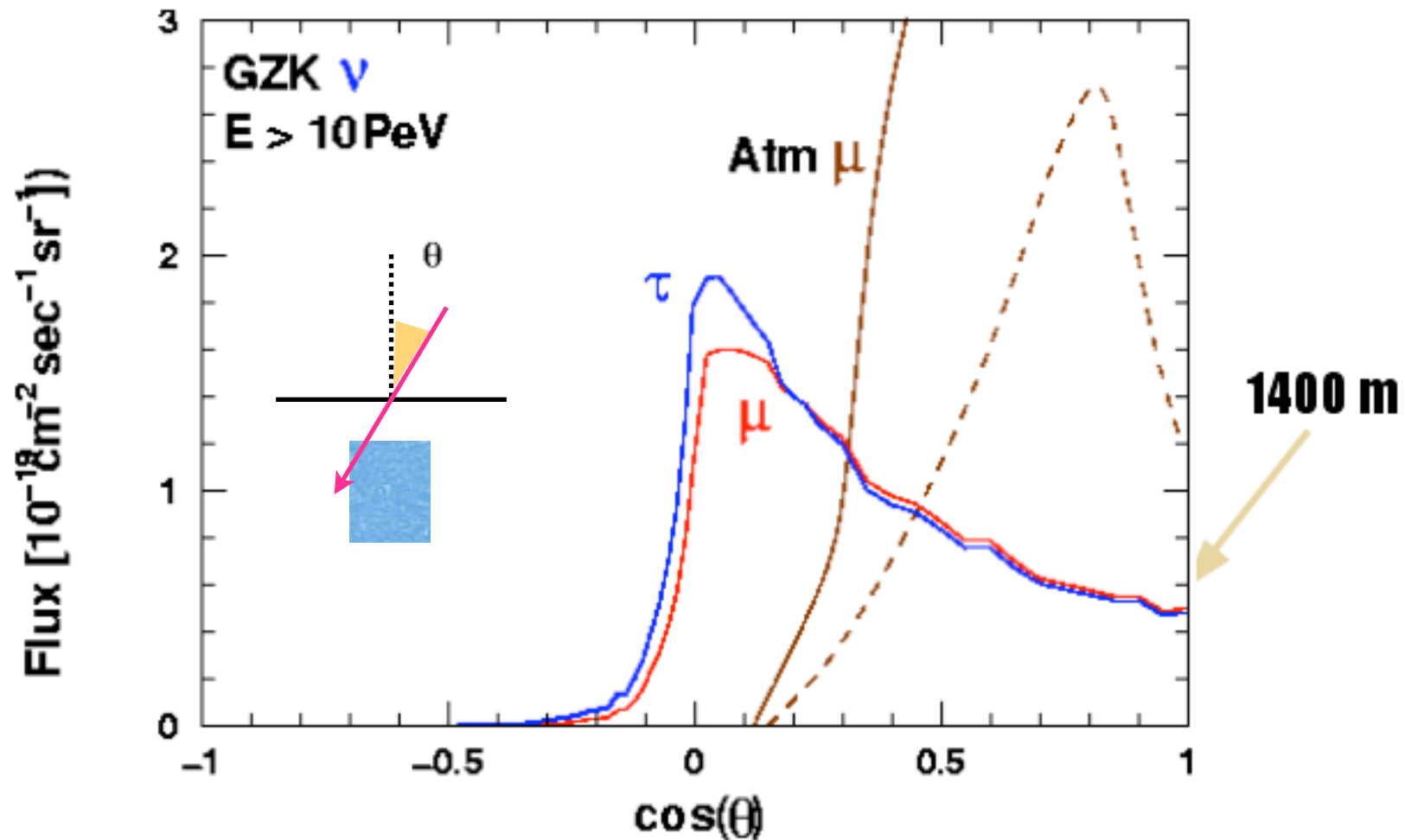


JULieT ~ Java based Ultra-high energy Lepton Integral Transporter



How can we find **EHE** neutrino?

Angular Dependence of arrived charged-lepton flux

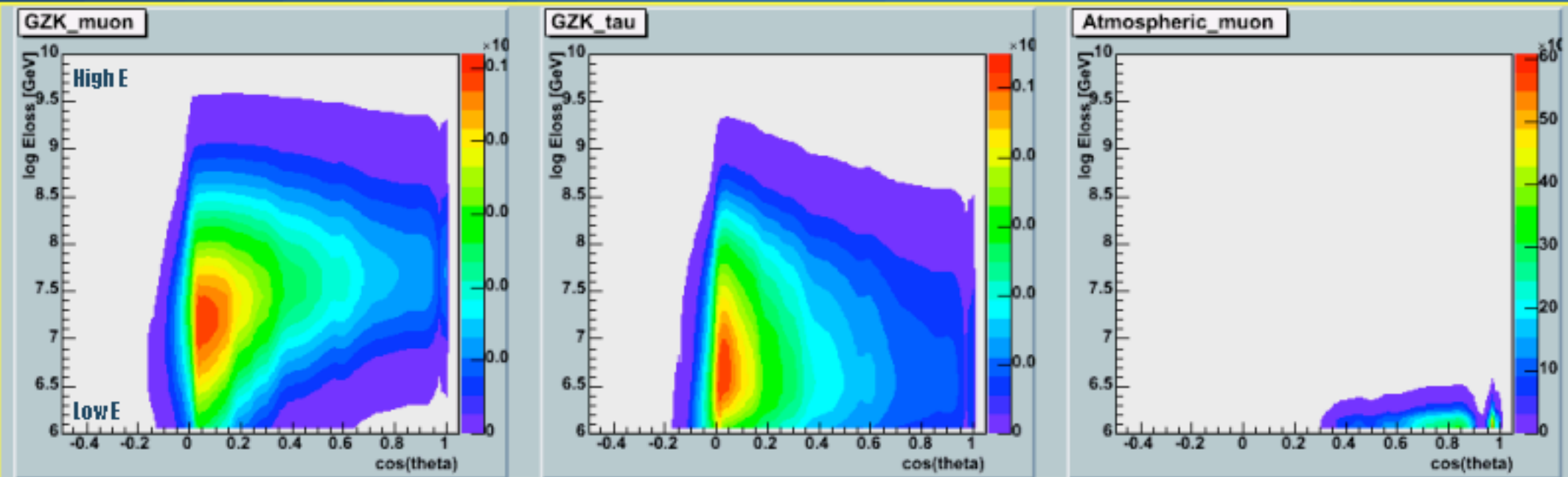


GZK events in Energy - Direction plane

GZK μ

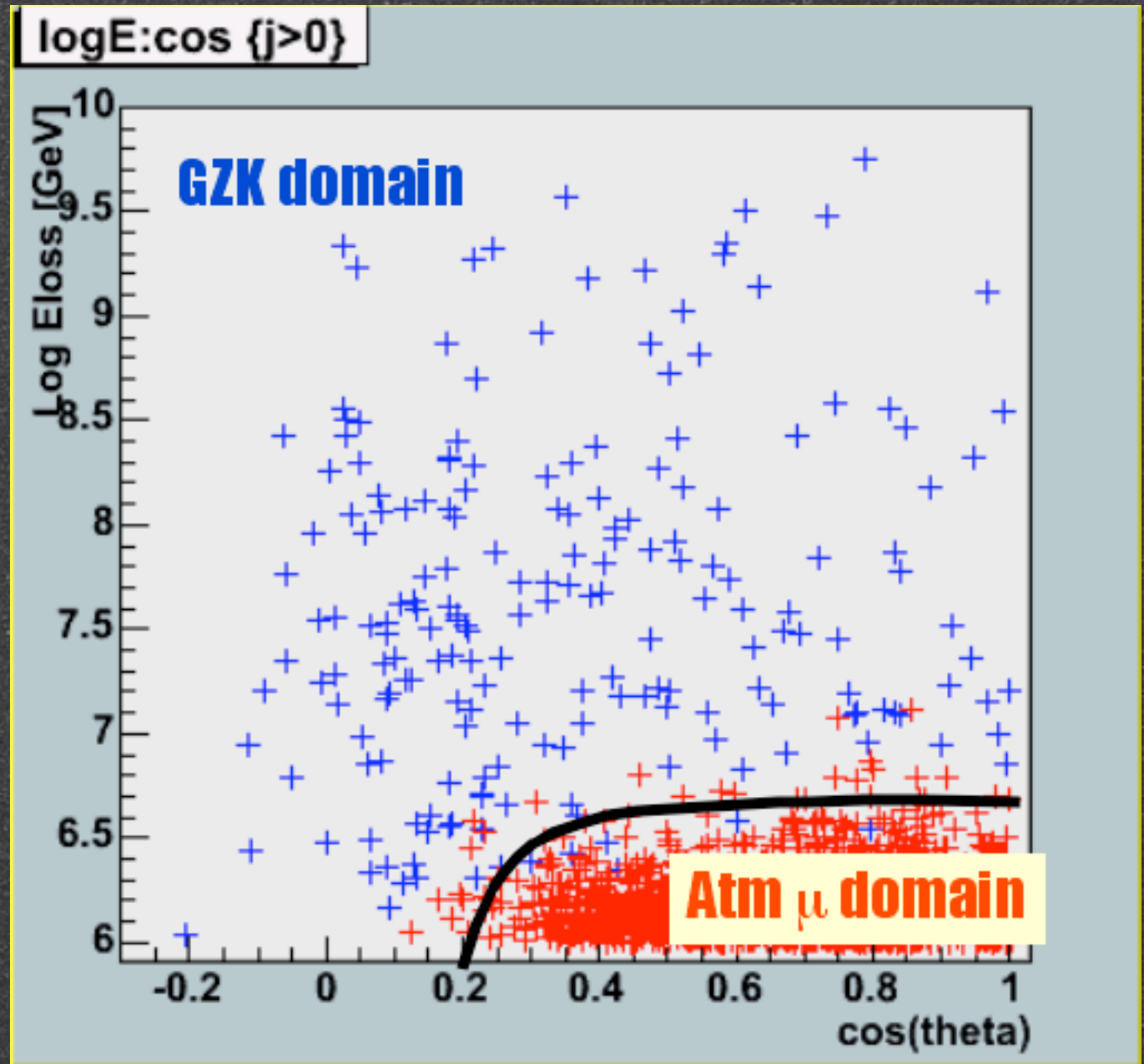
GZK τ

Atmospheric μ



MC events in Energy Loss - Direction plane

Next :
Convolute
Detector
Response
using
ROME0!



Summary

- We developed Optical Module simulator “**ROMEO**”
 - Precise measurement of QE 2D map, Gain map, charge response and waveform are implemented
 - Study about OM systematic errors arise from tube-to-tube difference has begun
- We developed EHE lepton transporter “**JULIeT**”
 - Detection window of the EHE-neutrino-origin leptons will open the horizontal direction!
 - Next : Convolute detector energy resolution using ROMEO: **ROMEO marry JULIeT!**