Overview of software developments towards HK

2012/01/15 HK open meeting

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Current members

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C.Walter, K.Schulberg, A.Trek, A.Himmel (Duke)

M.Wilking, P.Gumplinger (TRIUMF)

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V.Takahistov, S.Mine, G.Carminati, M.Smy (UCI)

M.Kuze, M.Ishizuka, Y.Okajima (TITECH)

D.Wark (STFC/RAL/ICL)

H.Tanaka, S.Tobayama (UBC)

T.Mueller (LLR)

Y.Takeuchi (Kobe)

M.Ikeda (Kyoto)

Total 21 persons

(Green: non-SK members)

- Aim of the software group: To provide complete simulation and analysis tools.

➔ What is needed ?

Detector design
-Tank design
- Arrangement and number of PMT
- PMT performance (QE, gain, dark rate, Q and T resolution, one pe distribution ….)
- Trigger conditions.
➔To determine design, need MC and analysis tools. Need iteration.

MC tuning (in future)
-Optical property (scattering, absorption in water, reflection on detector surface).
- Energy scale (cosmic ray&Michael electron, pi0 mass, e.t.c.)
➔Collaborate with calib. group.
➔ So far, we use SK parameters

- Important detector parameters;

1) Compartment length: Can we really analyze low E (solar ν, SN ν) events ?

2) Dark rate: Also affect on low E events and trigger. How much dark rate can be allowed?

3) QE: Can higher QE reduce number of PMT ? What performance will be improved ?

4) Time resolution: How much impact on physics?

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Need to provide   several sets of MC to each physics group.

Outline of this session

- ## Simulation: WC sim

  GEANT4 based detector simulator for water cherenkov detector, developped by DUKE.

  ➢ Introduction of WC sim: Chris's talk

  ➢ Need to include egg-shape cross section: Peter's talk.

  ➢ Generate SK geometry and compare with skdetsim.

  ➔ Done and good shape: Alex's and Tarek's talk

  ➢ Next step: generate several set up.

  - Compartment length (urgent for cost estimation)
  - HPD performances (dark rate, QE, e.t.c.)

- Reconstruction: fiTQun, Shimpei's talk

  Simultaneous maximum likelihood fit for track information developed by Canadian group.

  ➢ Developing to apply T2K and SK data.

  ➢ Interface between WC sim is needed.

  ➢ fiTQun is originally aimed for higher energy events. So far we will use Bonsai fitter for low E, merge in future (?)

- Computing for HK: Francesca's talk

- Event display: Kate's talk

Plan for 2013

- ## Until end of April

  - ➤ Include dark hits into WC sim .

  - ➤ Assemble egg shape cross section.

  - ➤ Make interface and apply fiTQun to WC sim.

  - ➤ Generate "particle gun" events with some detector length and apply reconstruction to discuss about compartment length.

- Until end of September
  - Generate Atm ν, Beam ν, Solar ν SN ν and Proton decay events by WC sim. Distribute them to each physics group to study how to use fiTQun.
- Until end of December
  - Include some photo sensor candidates in to WC sim.