

Overview of software development toward Hyper-K

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1. Introduction

- Letter of Intent for **Hyper-Kamiokande**
Physics potential ← Use the current
Super-K analysis tools
 - Base of the **Super-K** tools;
 - Language: **Fortran77**
 - Data: **ZBS**
 - Simulation: **GEANT3**
- **Galapagos ! Out of date, already.**

- **Hyper-K** analysis should use;

- Language: **Fortran77** → **C++**
- Data: **ZBS** → **ROOT**
- Simulation: **GEANT3** → **GEANT4**

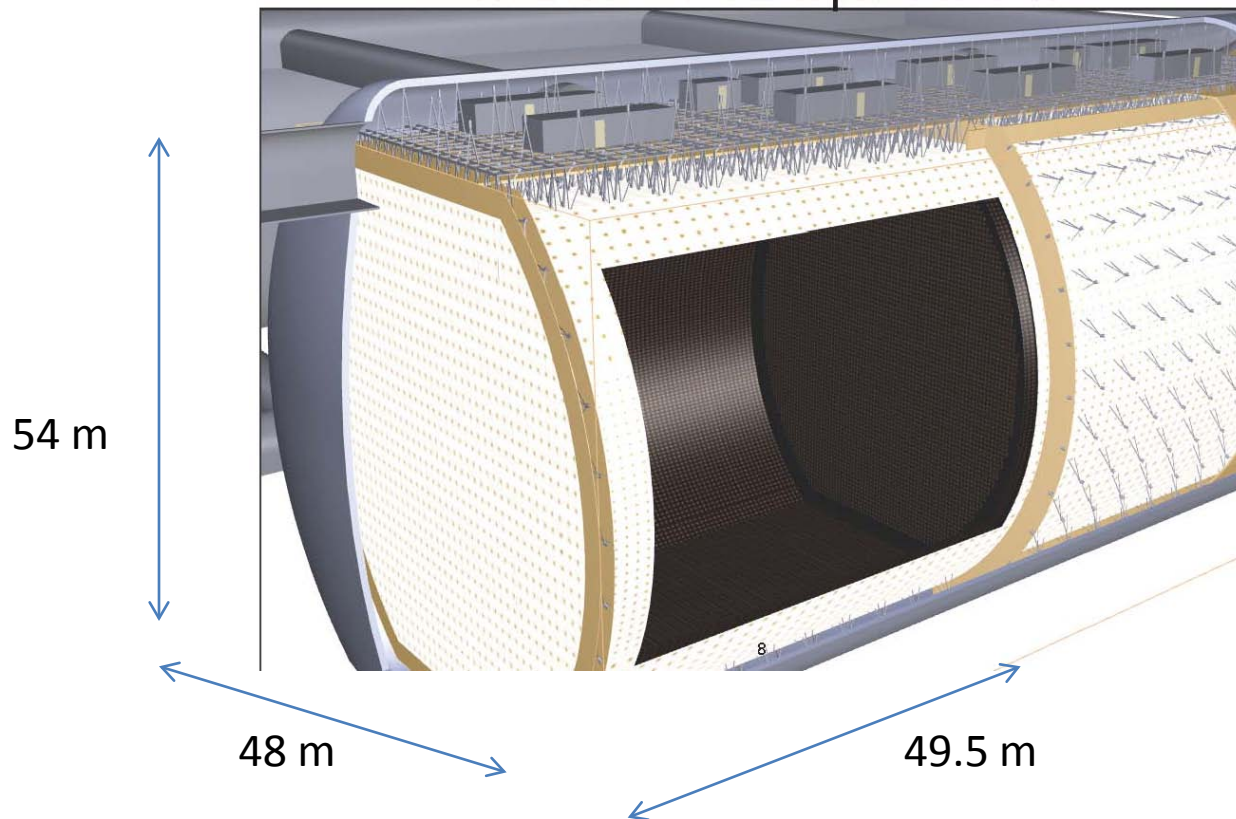
- Easier maintenance than using old CERN tools.
- Easier for young people to join.

2. Detector simulation

- **WCsim**: **GEANT4 base** Water Cherekov detector simulator developed by DUKE Univ.
→ **Chris's talk**
- **Milestones**
 - Install custom made routines in SK
(cherenkov light generation, light propagation in water, hadron interactions, e.t.c.)
 - Reproduce SK simulation.

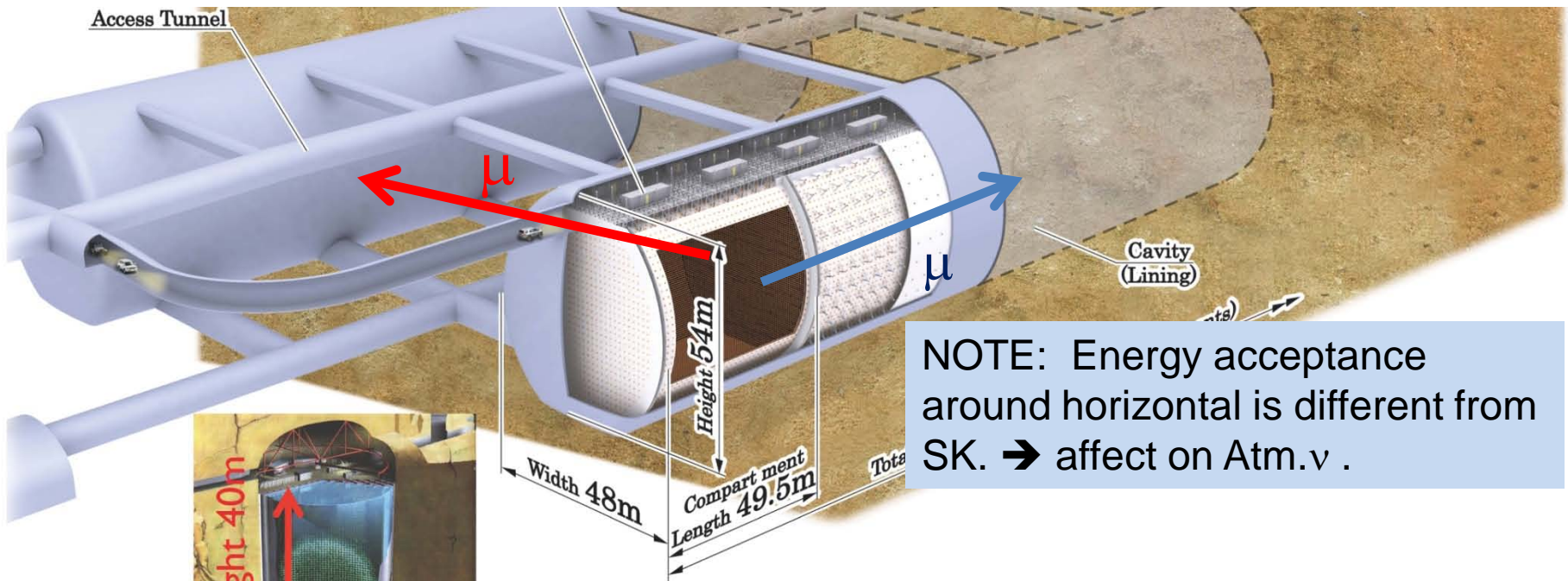
Detector simulation(cont'd)

- Make one compartment



Detector simulation(cont'd)

- Make one tank (5 compartments), can deal particles pass several compartments.



- Entire volume (challenging?): μ passing both tank.

3. Reconstruction tool

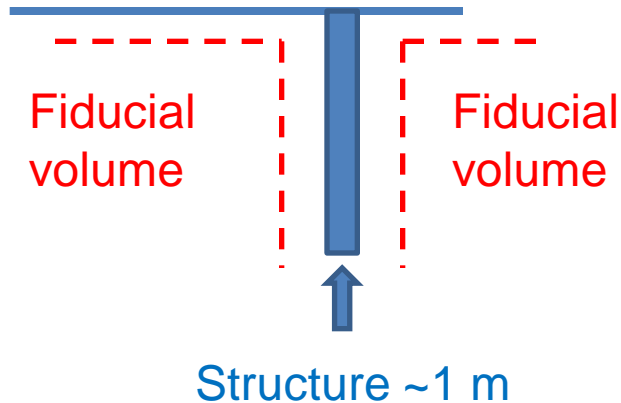
- Difficult to re-write all Super-K reconstruction tools by c++
- New reconstruction tool, **fiTQun**: Simultaneous maximum likelihood fit for track information developed by Canadian group, written in **C++**, for ATMPD and T2K data. → **Mike's talk**
- **Milestones**
 - Install in Super-K analysis and check performance.

Reconstruction tool (cont'd)

- Does **fiTQun** work for Low E events? If no, need to export the current Low E fitter to Hyper-K.
- Apply for one compartment.
- How treat particles which pass multiple compartments?

4. Detail Design of HK

- Compartments



- 10 compartments guarantee same performance as SK.
- Dead space
~ 1 m structure + 2 m fiducial x2
→ 5 m x 4 x 2 (tank) x cross section
~ **SK volume!**
- Can we reduce number of compartment ?
→ Increase fiducial volume
→ Reduce costs.

MC study is important and urgent !

4. Summary

- Software development is really important and urgent.
- There are a lot of work.
- Let's hear the current status in following two talks .
- If you get interest in, **please sign up and join to parallel session !**