*Č*erenkov Detector GEANT4 Simulation for MICE

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*Č*erenkov Overview

- **The aerogel *Č*erenkov specification:**

  - It is 100 x 100 x 15 cm^3 wall of the aerogel counters, n = 1.01-1.05

  - Each aerogel tile is 10 x 10 x 15 cm^3 with two Fine Mesh PMTs (Hamamatsu)

  - It includes 5 mil window of polyethylene as an entrance
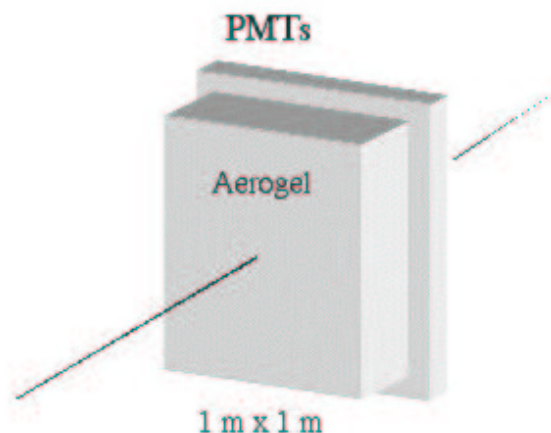
The Aerogel Čerenkov Counter

Fine-mesh PMT

Aerogel

Goretex

Fine-mesh PMT

120 mm

120 mm
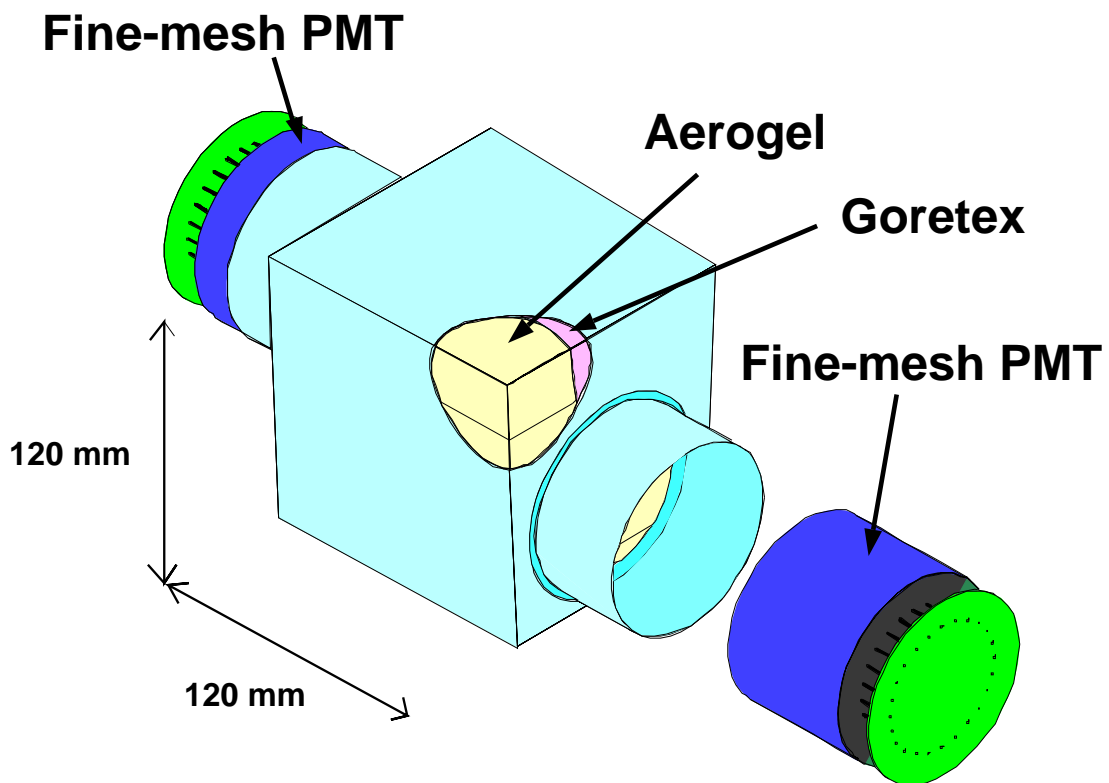
- BELLE Collaboration, [arXiv:hep-ex/9707042] (1997)

Čerenkov Geometry and Material Classes

- **The current geometry is 100 x 100 x 15 cm^3 with 10 x 10 x 15 cm^3 aerogel tiles**

- **Čerenkov Material : (CKOVTracker)**

  - **Aerogel $\rightarrow$ quartz (62.5%) + water (37.5%)**

  - **Refractive index (n) $= 1.0 + 0.25\rho$**

  - **Density $(\rho) = 0.1 - 0.3$ g/cm^3**

TYPE	ρ (g/cm^3)	n
Aerogel101	0.04	1.01
Aerogel102	0.08	1.02
Aerogel103	0.12	1.03
Aerogel104	0.16	1.04
Aerogel105	0.20	1.05

- **Geometry and material had been implemented into CVS MICE repository**

HITS Information and Structure

- **Hits information (part of detector response) ⇒ CKOVHitBank class in MICE/Interface repository**

    ○ position and time of each step

    ○ energy deposition of each step

    ○ momentum and energy of each track

    ○ step length

    ○ geometrical information

- **All hits information could be recorded with respect to the aerogel tile number**

Conclusions

1. Čerenkov material and geometry as well as hits information has been implemented and committed into **CVS MICE repository**

2. Čerenkov digitization coding is on the way

3. The upstream Čerenkov simulation will be implemented yet need to consider its material and dimension

4. Need to have some **optimization**