Performance of the KOTO Sampling Calorimeter

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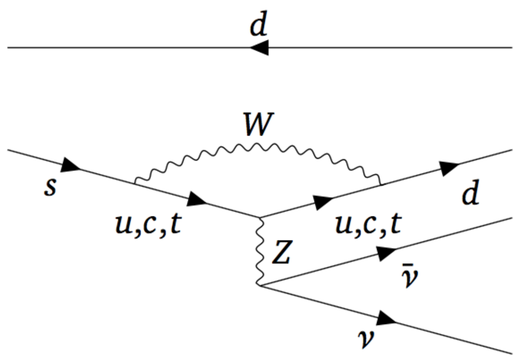
for the KOTO Collaboration

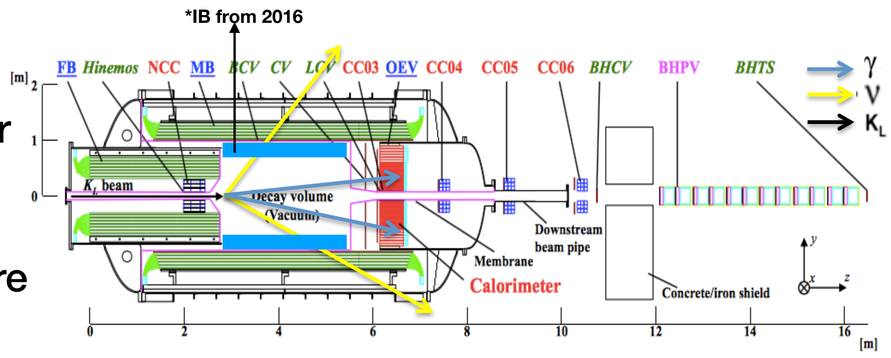
KOTO Experiment at J-PARC

$Br(K_L \to \pi^0\nu\bar{\nu}) = (3.0 \pm 0.3) \times 10^{-11}$

predicted by the Standard Model though the FCNC process.
Small contribution of SM.
Clean mode to explore the New Physics.



Detect
2γ + "Nothing"
CsI calorimeter for γ detection.
Hermetic veto counters to be sure of "Nothing".

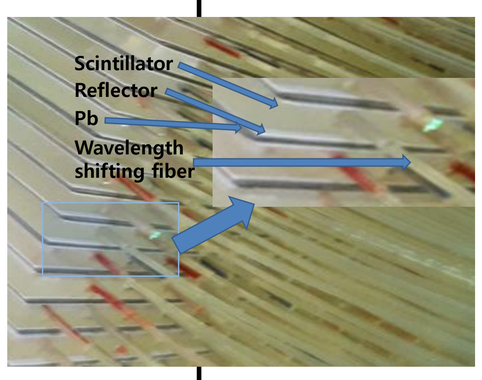


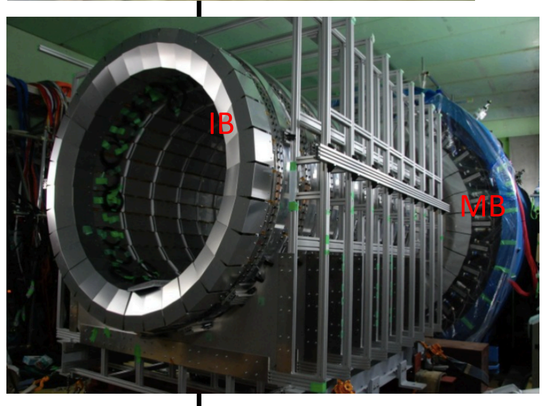
Barrel counters surrounding fiducial decay region : Main Barrel(MB) and Inner Barrel(IB)

Contents	Main Barrel	Inner Barrel
Length	5.5 m	2.8 m
Material budget	5 mm Scint. / 1(2*) mm Pb sheet	5 mm Scint. / 1 mm Pb sheet
No of Modules	64	32
Radius(Outer)	1.4 m	0.9 m
Radiation Length	13.5X_0	5.0X_0

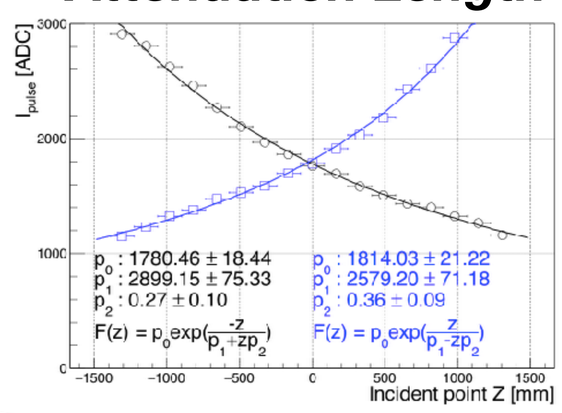
*1 mm for inner side of MB and 2 mm for outer side of MB

- The WLS(Wavelength Shifter) used in scintillator carries photons to PMT.
- Both-end readout system provides us to estimate incident time & position of signal.
- IB provides an additional 5X_0 to reduce inefficiencies that trigger background events.

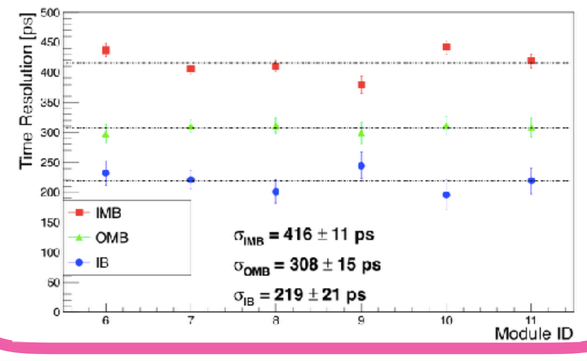




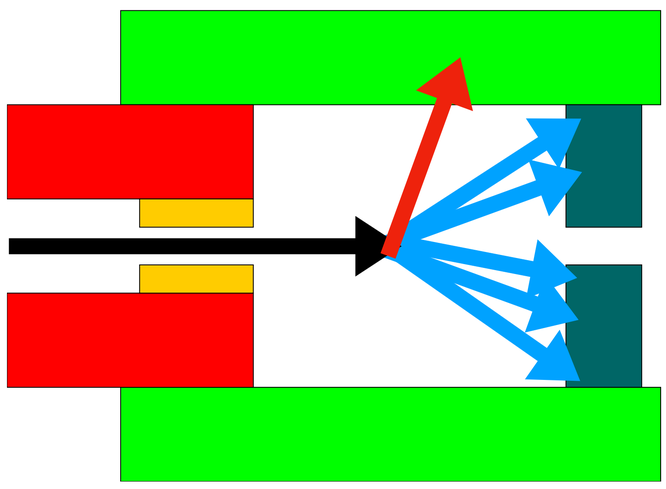
Attenuation Length



Timing Resolution



A novel way to inspect performance : Reconstruction of kaon using barrel counters



Reconstruction of KL3pi0 makes it sure that incoming particle is gamma
This method also provides momentum and energy of incoming gamma
Performance of barrel counter is inspected using known gamma

Conclusion