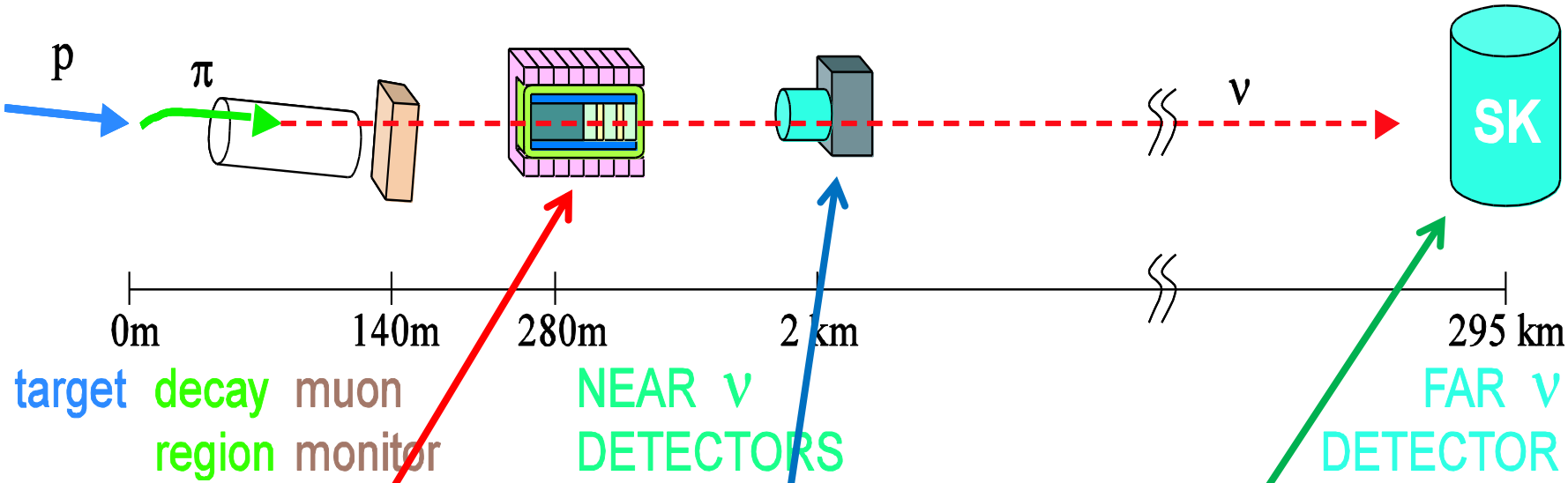
A detector to measure neutrino beam asymmetry at the T2K ND280 hall

Hiroshi Kaji

Research Center for Cosmic Neutrinos,
Institute for Cosmic Ray Research,
The University of Tokyo

T2K experiment and goal of this work

T2K experiment ⇒ Long Baseline neutrino oscillation analysis

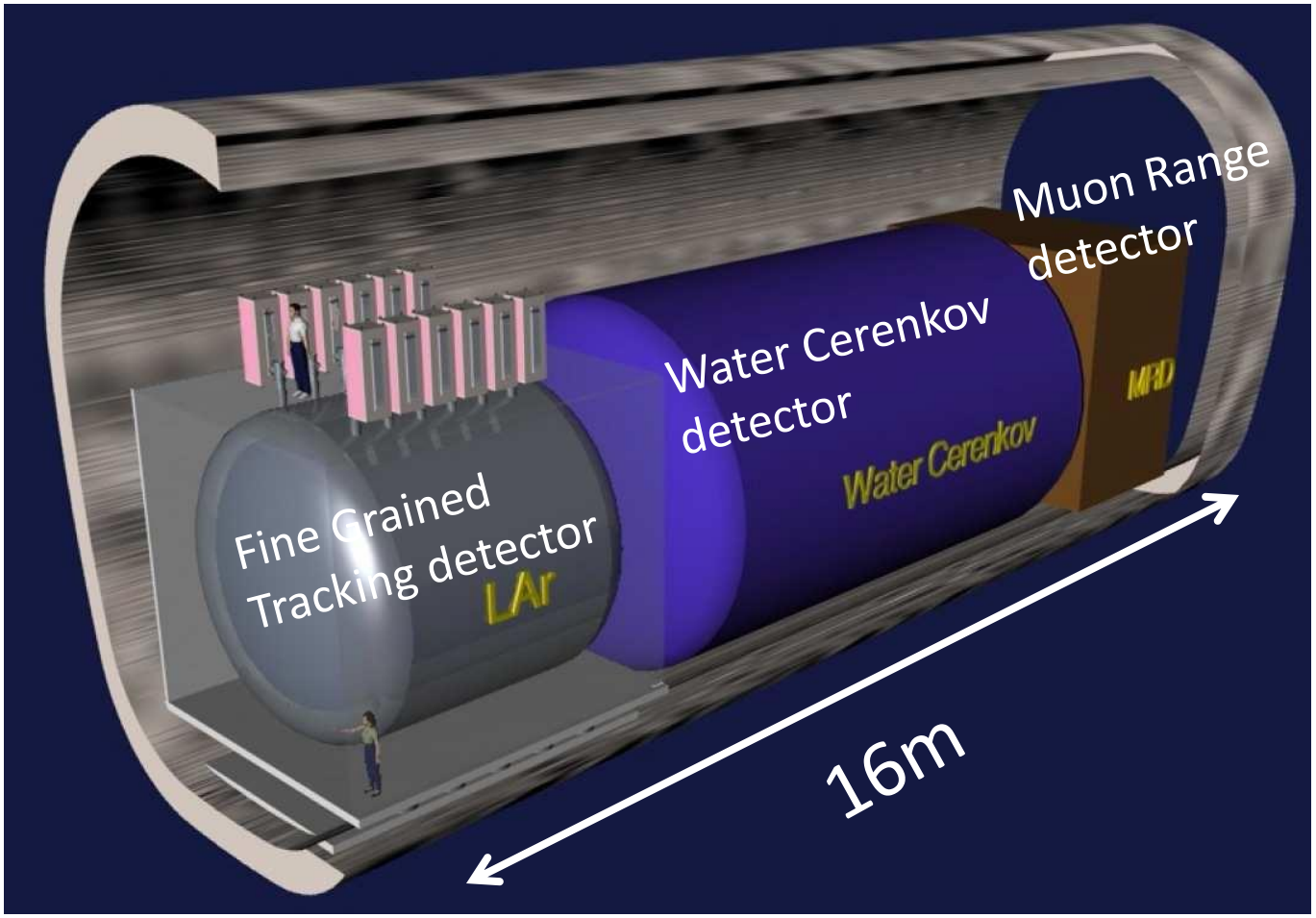


ν-flux before oscillation is measured by near detectors at the ND280 hall.

ν-flux after oscillation is measured by SuperKamiokande.

Ultimate goal of this work is the construction of 2KM detector which is one of the most important project at the T2K experiment.

2KM detector



Not only measurement of ν-flux before oscillation

But also estimation of backgrounds at SuperKamiokande

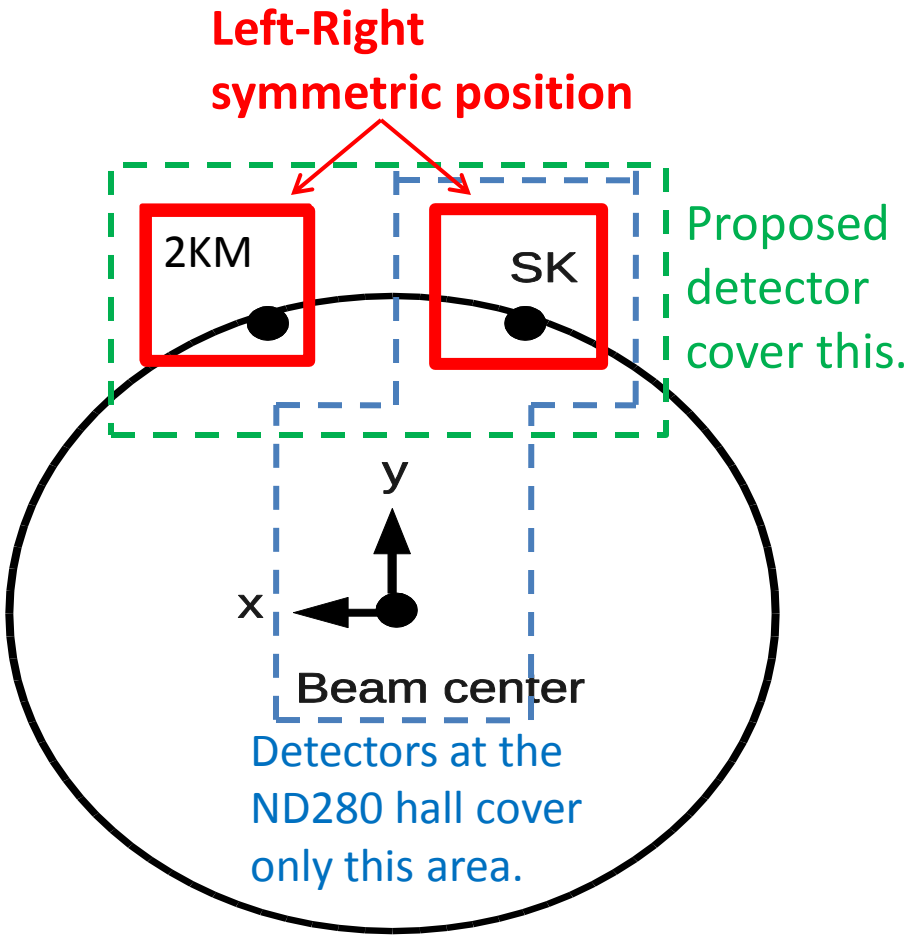
Measurements done by using Water Cerenkov detector

⇒ same system as SK detector

⇒ suppress systematic uncertainties in the oscillation analysis

Left-Right monitor

2KM project needs measurement of flux asymmetry of ν-beam.



SK and 2KM detectors sit symmetric direction with same off-axis angle.

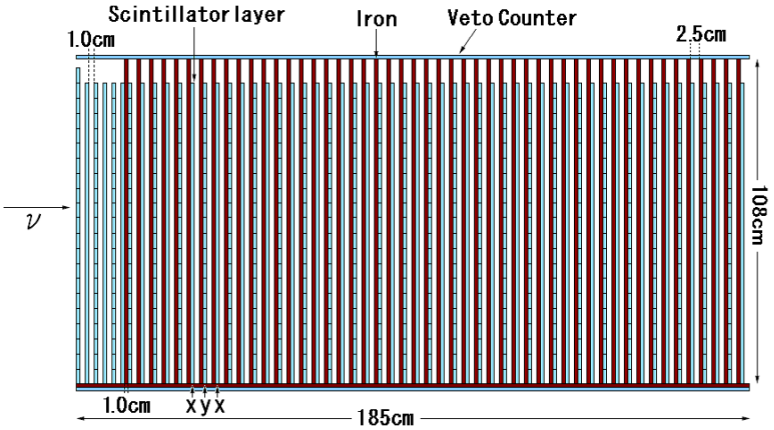
If ν-beam is perfectly symmetric, flux for both direction should be same.

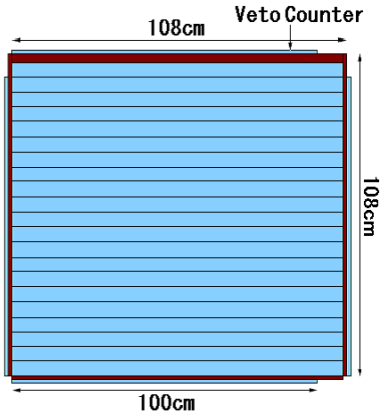
We are proposing to install a new detector (Left-Right monitor) to confirm it.

Design and Expected performance

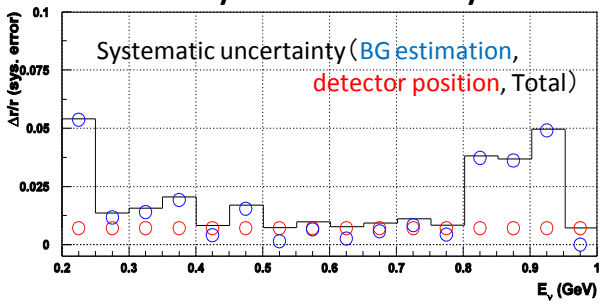
Idea is to measure ν-fluxes for both directions by using identical 2 modules. ⇒ suppression of systematic uncertainty

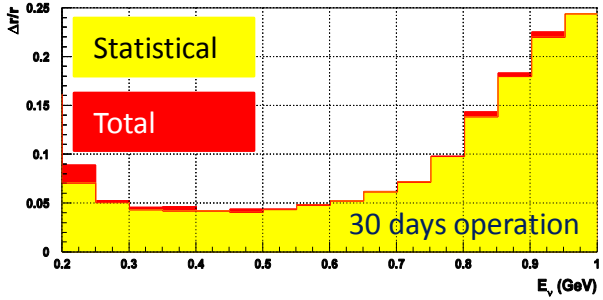
We choose sandwich calorimeter as modules.
— Iron + plastic scintillator (both 1cm thickness)
— Scintillator plane is divided into 20 sections.
⇒ x, y position information

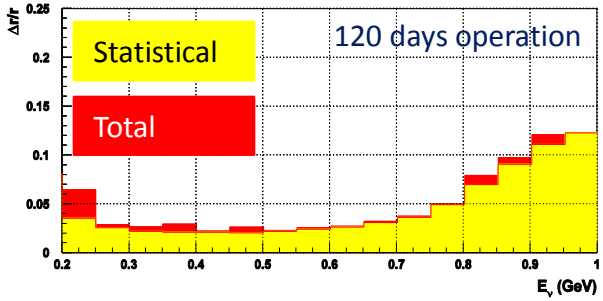




Expected sensitivity to beam asymmetry







Detail of our works are shown in my poster, please have a look if you have interest.