# The WAGASCI-BabyMIND detector of the upgraded T2K experiment

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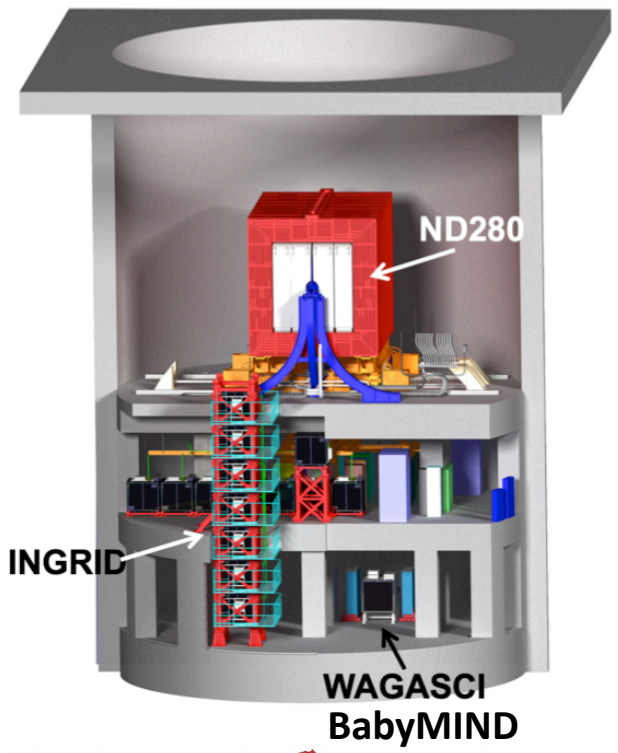
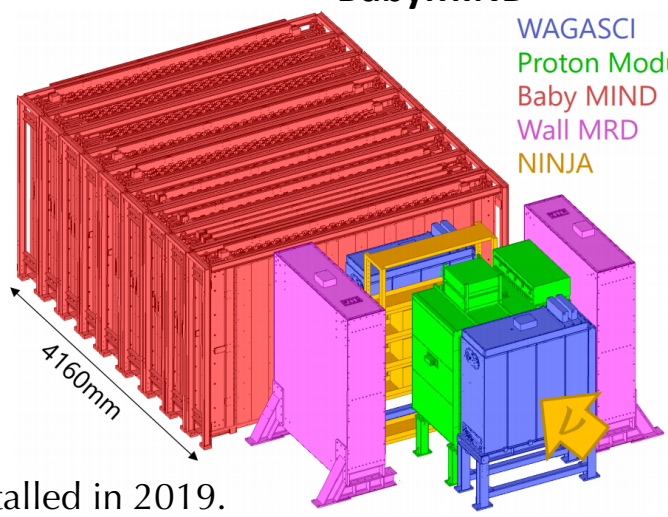
## T2K Near Detectors

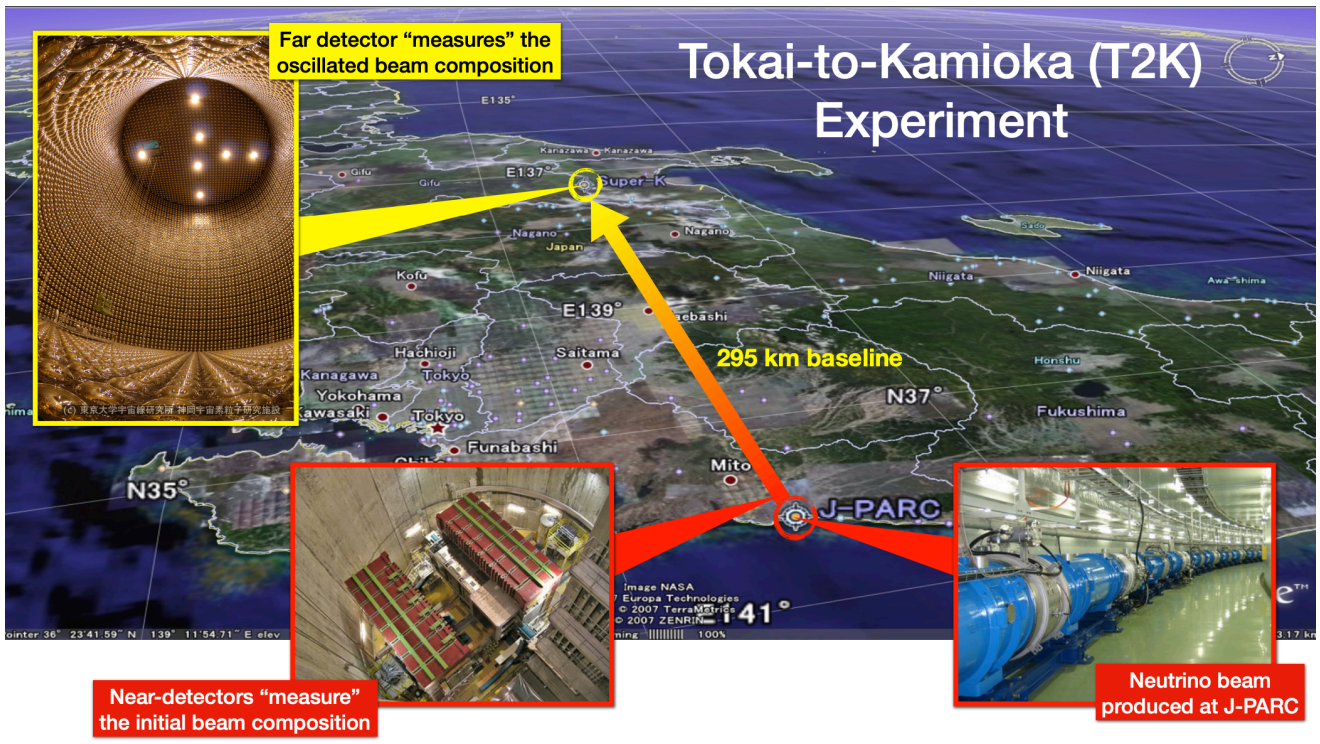



Installed in 2019.

Complementing primary ND, which is ND280

Will collect most of its data from 2024 onwards.




**T2K neutrino oscillation analysis:**

SK Data / What we want to know

$$\frac{N^{far}_{events}(\vec{x})}{N^{near}_{events}(\vec{x})} = \frac{\sigma(E_\nu,\vec{x}) \otimes \Phi(E_\nu) \otimes D^{far}(\vec{x}) \otimes P_{osc}(E_\nu)}{\sigma(E_\nu,\vec{x}) \otimes \Phi(E_\nu) \otimes D^{near}(\vec{x})}$$

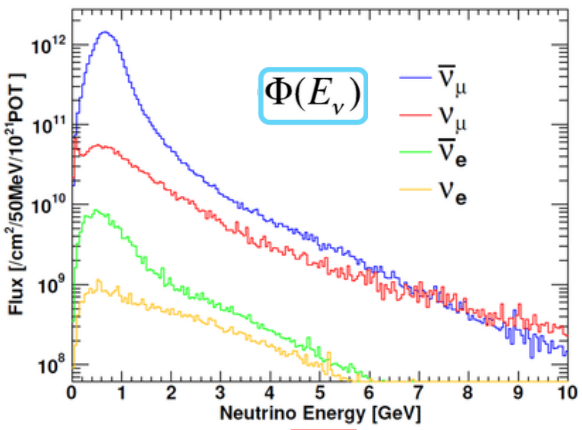
ND Data / Cross Section / Flux

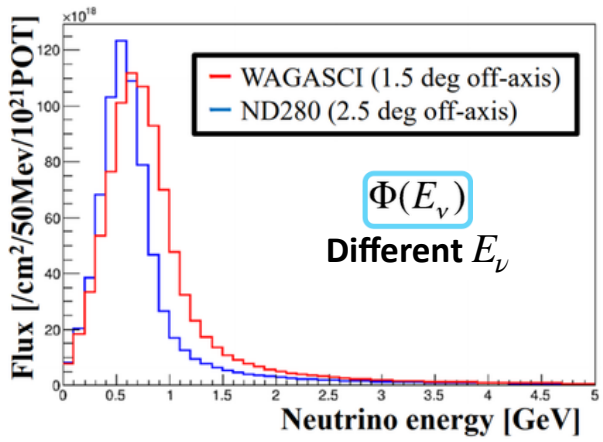
Near Detector (ND) data is crucial to constrain uncertainties in Cross Section and Flux parameters.

**Goals of Wagasci-BabyMIND:**

1) Better understand neutrino interaction cross section in C and O.
2) Reduce flux and cross section parameters uncertainty using correlated $E_\nu$ spectra.
3) Contribute to enhance T2K sensitivity to oscillation parameters.

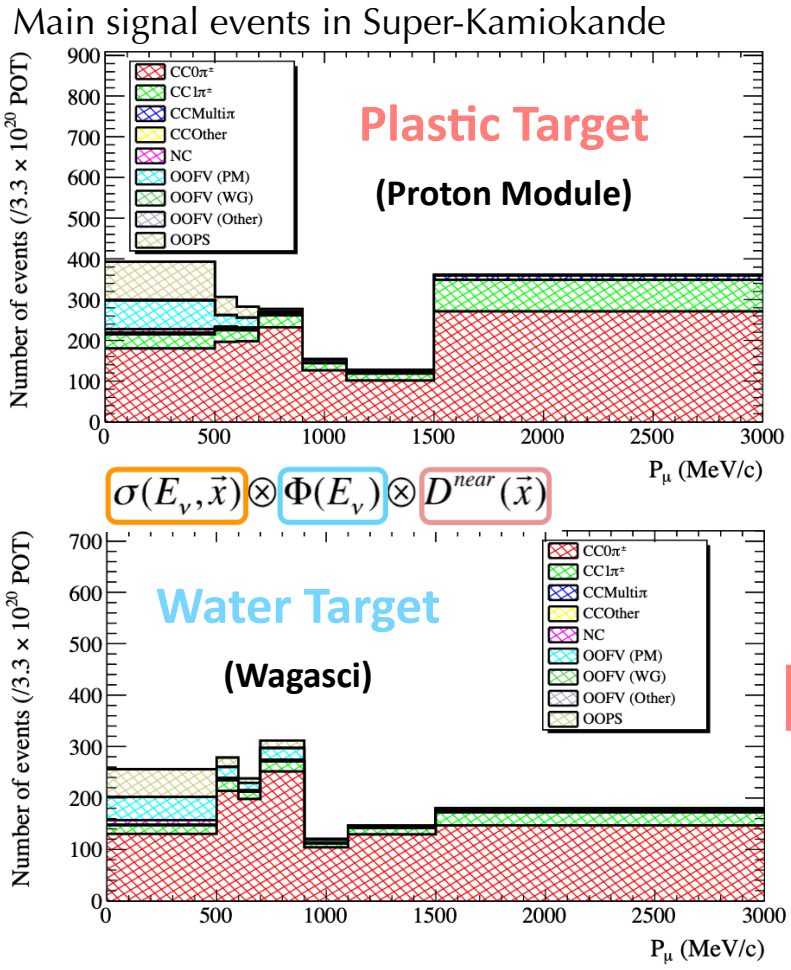
## Neutrino Flux



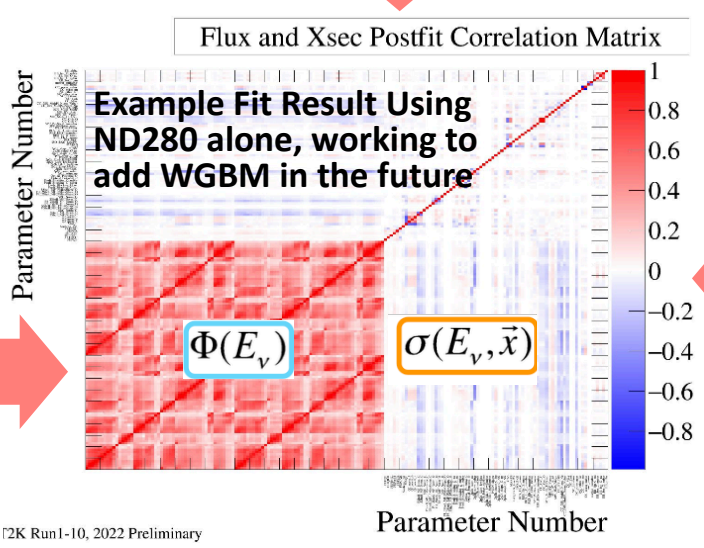

## New Data 0π Samples

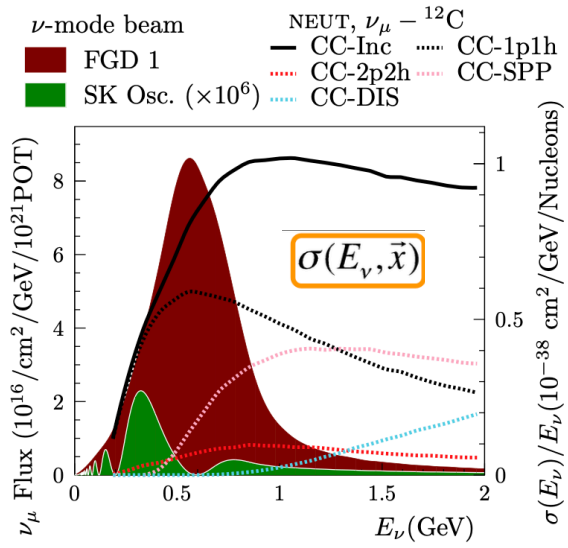
Main signal events in Super-Kamiokande




$\sigma(E_\nu,\vec{x}) \otimes \Phi(E_\nu) \otimes D^{near}(\vec{x})$

## Cross Section




First C & O cross section measurement with Wagasci-BabyMIND in preparation.

Studies in combination with ND280 using correlated neutrino spectra are ongoing.