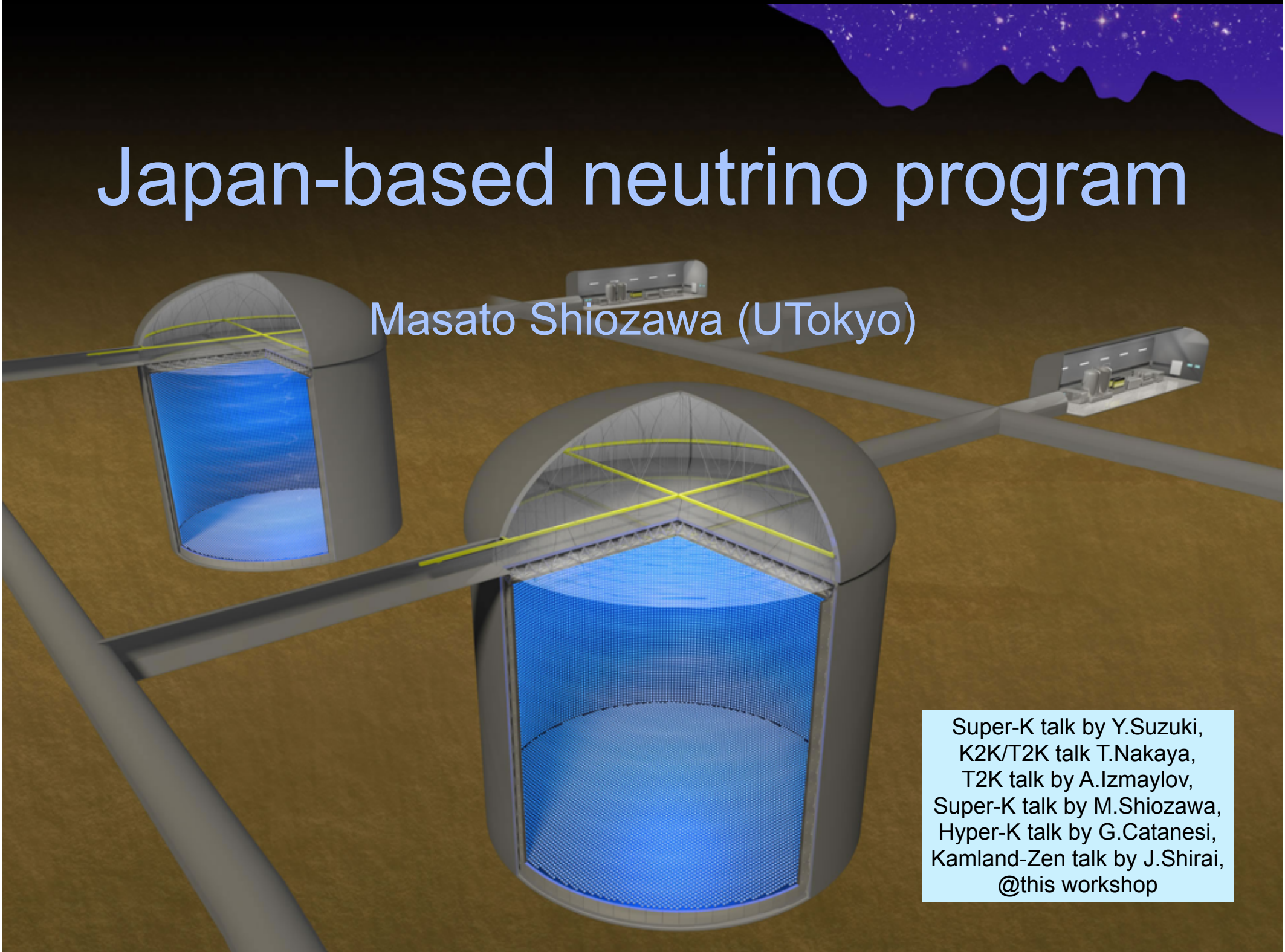
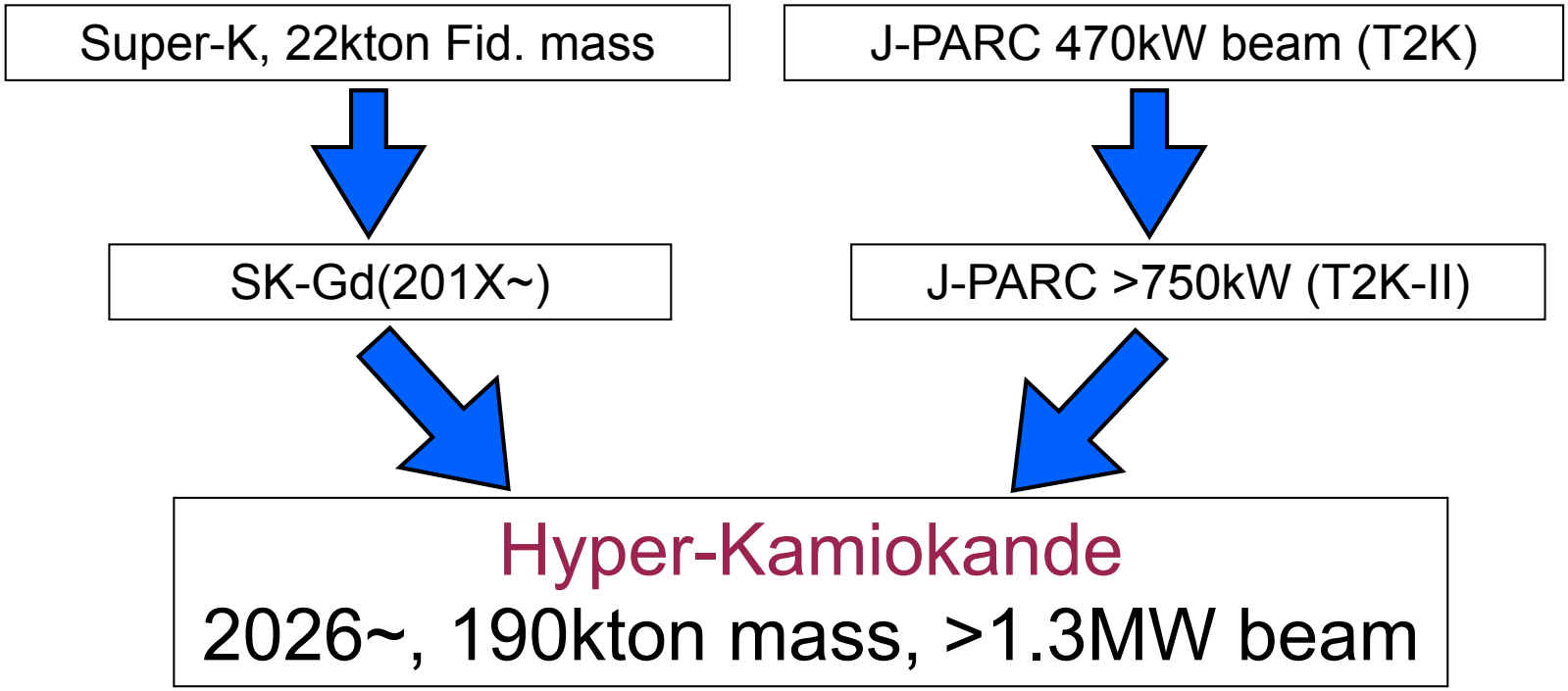
# Japan-based neutrino program

Masato Shiozawa (UTokyo)



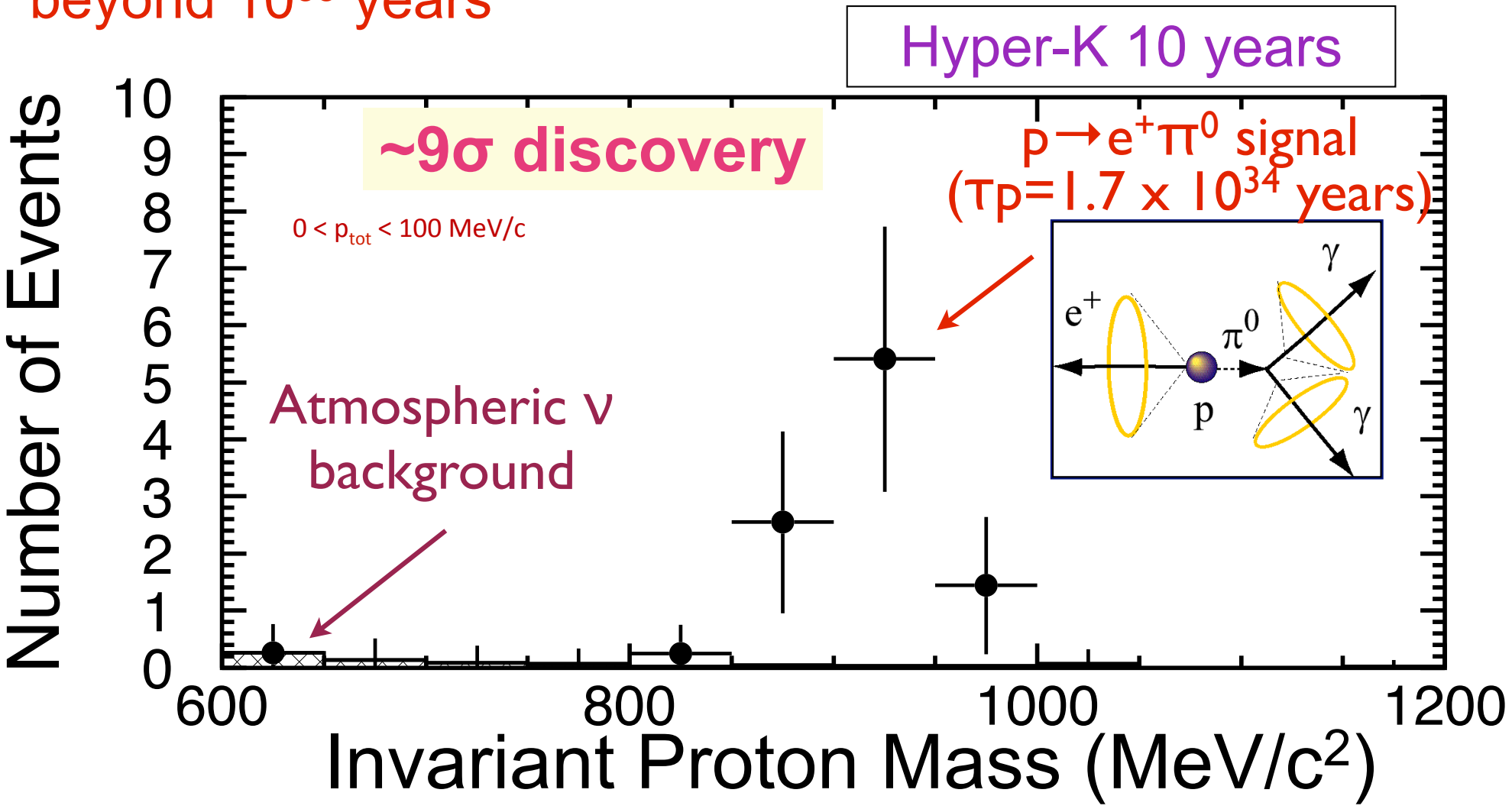
Super-K talk by Y.Suzuki,
K2K/T2K talk T.Nakaya,
T2K talk by A.Izmaylov,
Super-K talk by M.Shiozawa,
Hyper-K talk by G.Catanesi,
Kamland-Zen talk by J.Shirai,
@this workshop




- **Seamless program to get timely results**
- **Rich physics, big chance of discoveries**

# Proton decay ($p \rightarrow e^+\pi^0$) search

- Single event discovery is still possible in Super-K
- Hyper-K is only realistic approach to proton lifetime beyond $10^{35}$ years



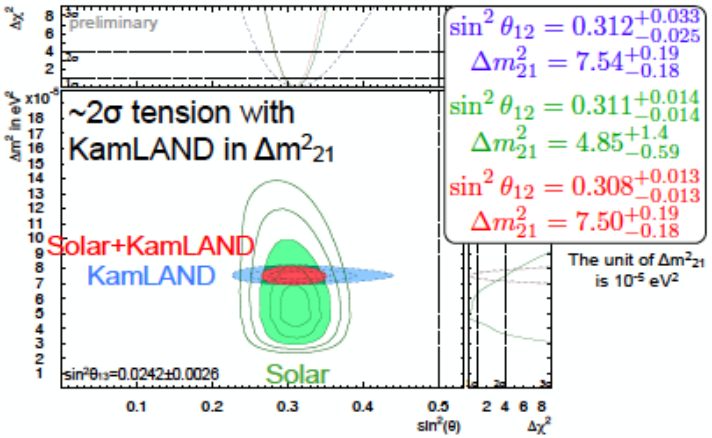
# Neutrino astrophysics/astronomy

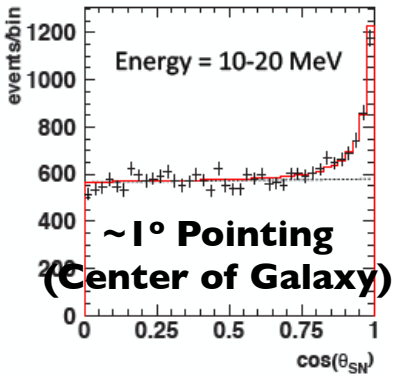
- ~10MeV ν astronomy w/ essential information of **(1)ν's direction, (2)time, and (3)energy**
- w/ **High mass (22kton→190kton)**

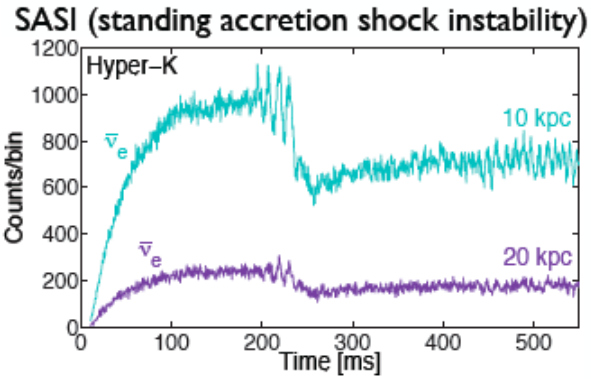
- **Unique solar $\nu_e$** to study **~2σ tension** btw $\nu_e$ and reactor $\bar{\nu}_e$

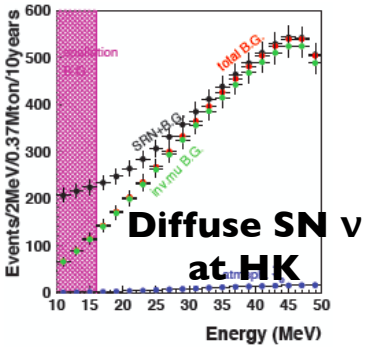
- **Supernova ν burst up to ~Mpc distance** to study **explosion mechanism** and **BH/NS formation**. Capability to provide SN direction **w/ ~1° accuracy** for **alerting** other telescopes including γ/GW observatory.

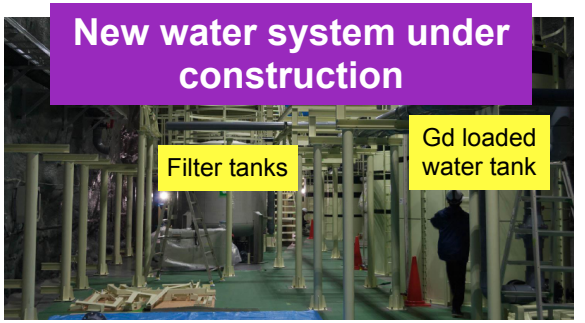
- **SN diffuse ν** to investigate **dim-SN's and BH formation.** Chance of discovery at **SK-Gd** and measurements in **Hyper-K**.



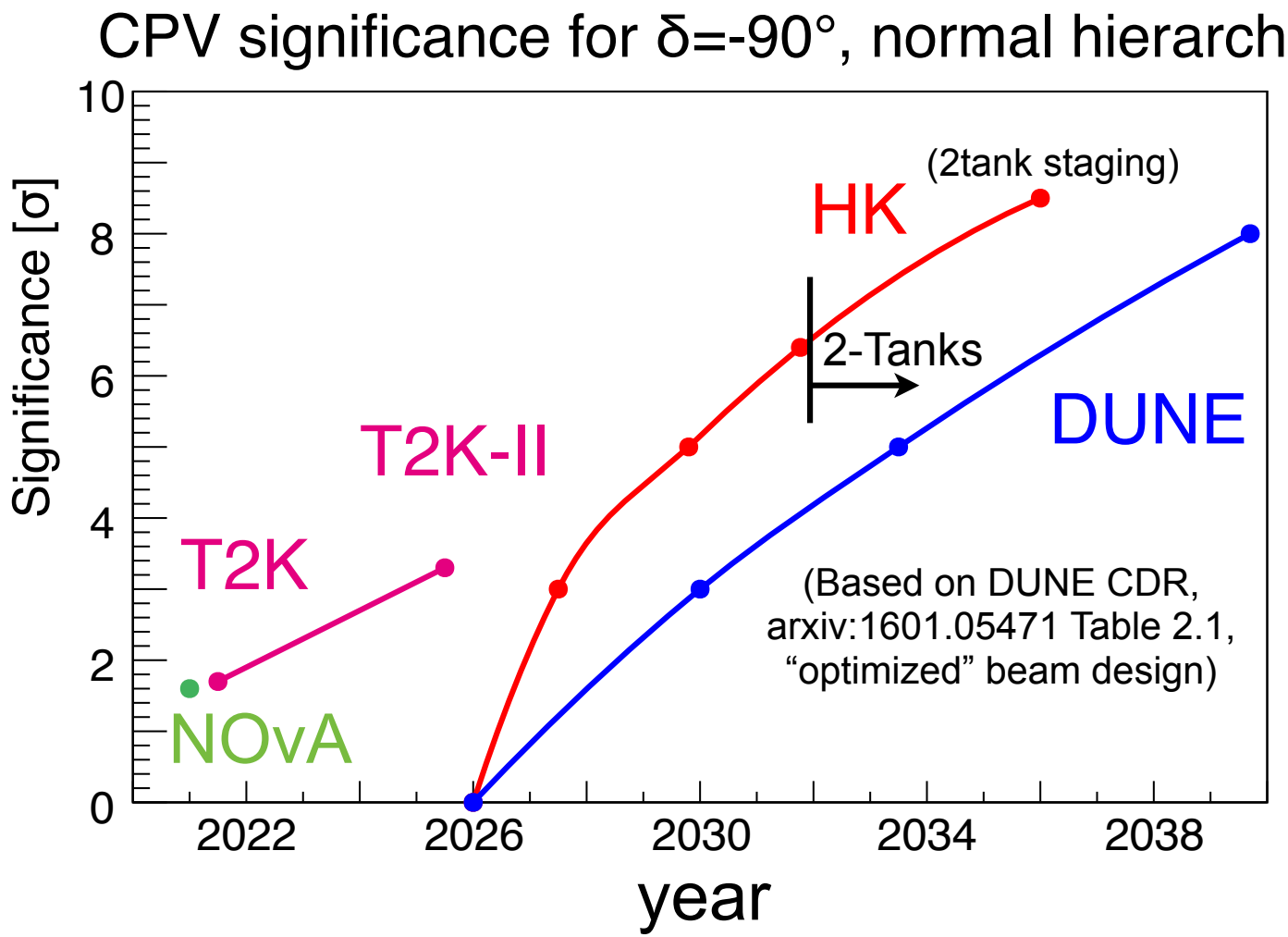



# Expected CPV significance

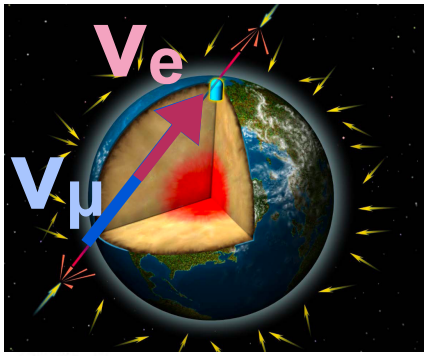


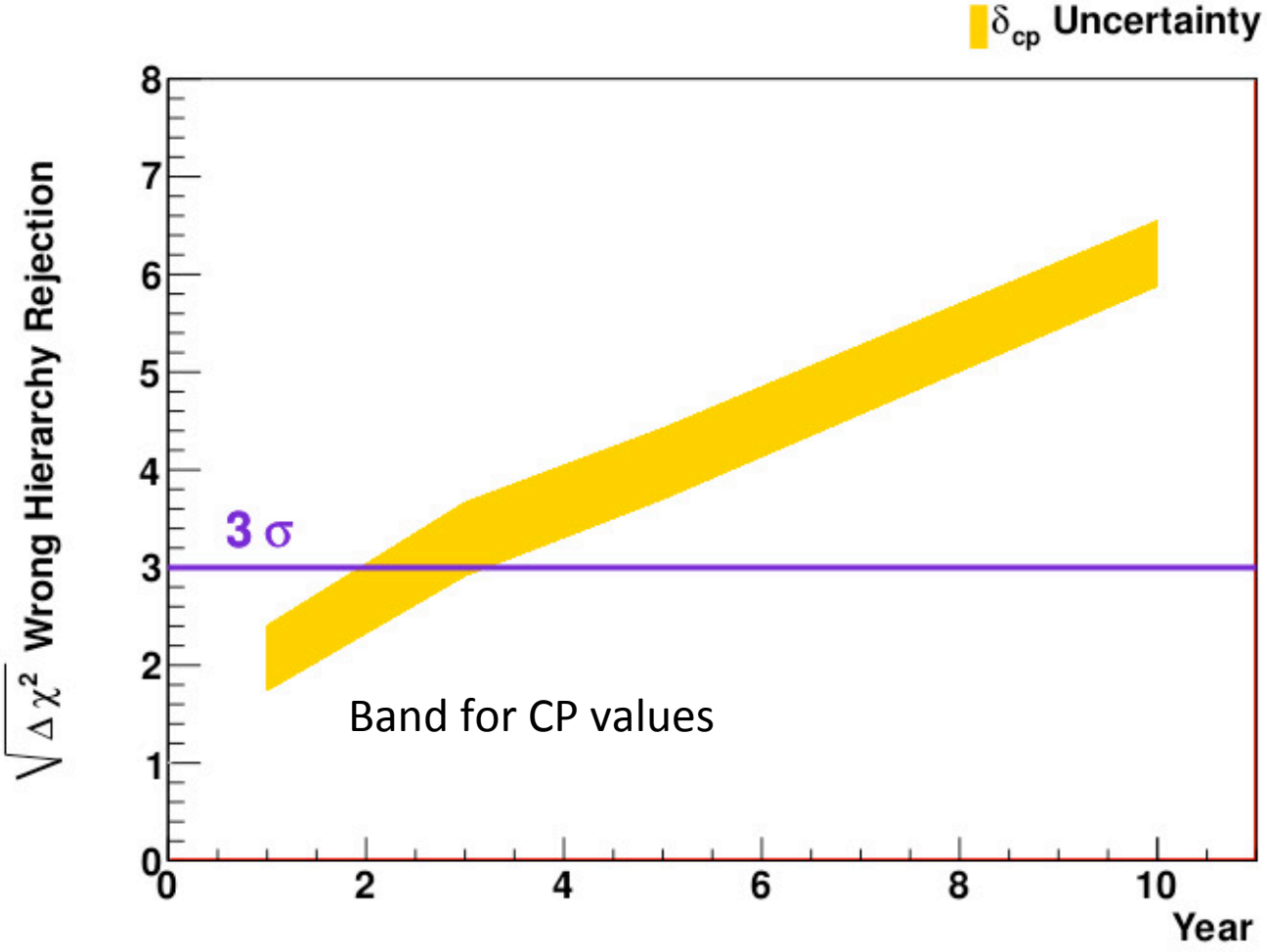

- T2K suggests $|\sin\delta_{CP}|=1$ and aims to discover w/ 3σ.
- Big chance of CP violation discovery, and then measurement w/ precision of < 20 degree in HK.

# Mass hierarchy determination

SK suggests normal hierarchy w/ ~2σ, further improvements are foreseen.

Determination possible by 2~3 years ($\sin^2\theta_{23}$=0.5) at HK.



# Final remark

- Japan-based neutrino program will have rich physics with world-leading science outputs
- Hyper-Kamiokande is the flagship experiment in the program
  - Ready-to-go design
  - Budget request is being issued in Japan
- Open for international participants
  - Many places where international contributions (intellectual/in-kind) are necessary