

Participation à l'expérience neutrinos de nouvelle génération au Japon Hyper-Kamiokande

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Underground neutrino observatories in Japan

- Kamiokande: SN1987A First Observation of SN neutrinos. Nobel Prize to M. Koshiba
- Super-Kamiokande: 1998 Observation of neutrino oscillations. Nobel Prize to T. Kajita
- Tokai-to-Kamioka: first observation of $\nu_{\mu} \rightarrow \nu_e$. 2 σ indication of CP violation in neutrino oscillations
- Hyper-Kamiokande: 10xSK. Opening new domain in neutrino physics and astrophysics, proton decay searches.

PHYSICS GOALS FOR HYPER-K

Probing/searching for physics beyond the standard model:

Search for CPV in the lepton sector

Determination of the neutrino mass hierarchy

Precision oscillation parameter measurement

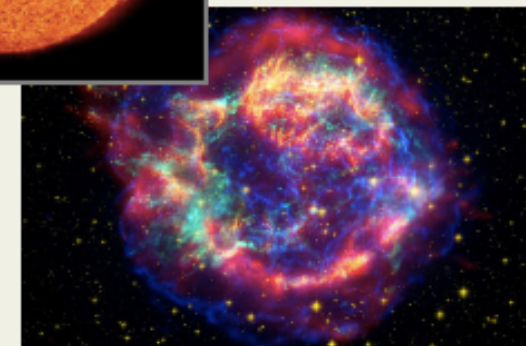
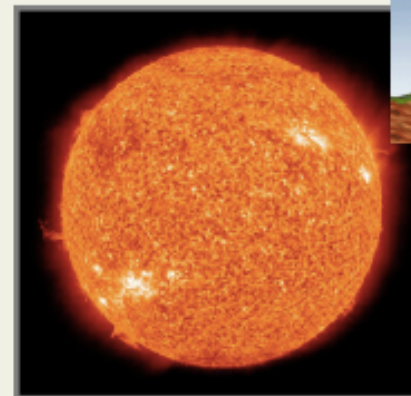
Search for nucleon decay

Astrophysics Observatory:

Precision measurement with solar ν

High statistic supernova burst ν

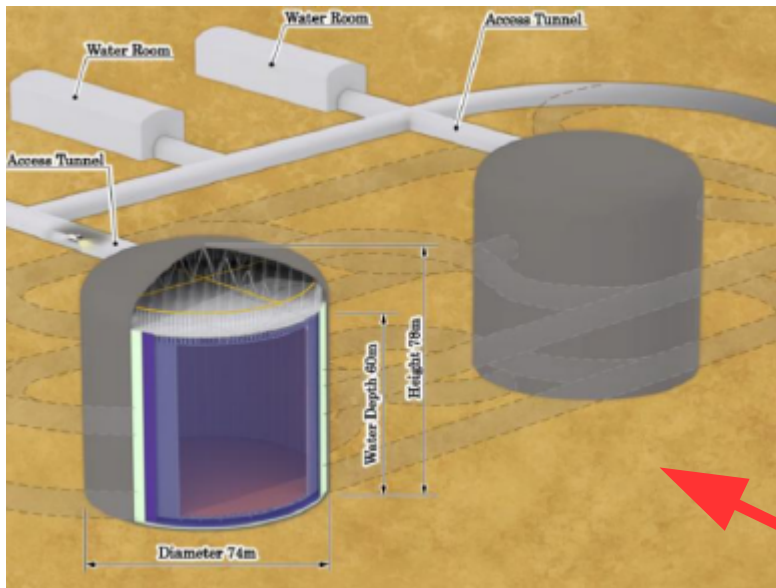
Detection of supernova relic ν



Physics program

		2Tanks (10 yrs)
Beam (1.3 MW)	δ_{CP} precision ($0^\circ, 90^\circ$)	$7^\circ\text{-}21^\circ$
	CPV coverage ($3/5\sigma$)	78%/62%
	$\sin^2\theta_{23}$ error (for 0.5)	± 0.015
Atmospherics+Beam	MH determination ($\sin^2\theta_{23}=0.40$)	$>5.3\sigma$
	Octant ($\sin^2\theta_{23}=0.45$)	5.8σ
Proton Decay	$p \rightarrow e^+ \pi^0$ 90%CL	1.2×10^{35} yrs
	$p \rightarrow \bar{\nu} K^+$ 90%CL	2.8×10^{34} yrs
Solar	Day/Night (from 0/from KamLAND)	$12\sigma/6\sigma$
	Upturn	$\sim 5\sigma$
Supernova	Burst	104k-158k
	Nearby galaxies	2~20 events
	Relic	98evt/ 4.8σ

The Hyper-Kamiokande project



60m x 74 m (diameter)
40 000 50 cm PMT, 40% photo-coverage
260 kton mass, 187 kton fiducial mass is 10x larger than SuperK
2nd tank could be in South Korea

50 cm Box&Line PMT **50 cm**
R12860-HQE (Box&Line dynode) **R1**



Developed
→ Photo-detector
in Hyper-K
baseline design

1.3 MW Beam from JPARC



P2IO Teams Participation to HK

- Development of new precision near detectors: INGRID, Micromegas TPC, WAGASCI, ND280 Upgrade
- Development of HK PMT electronics read-out
- Development of neutrino interaction model and precision measurement of neutrino-nucleus cross-sections