J-PARC

Japan Proton Accelerator Research Complex

J-PARC Status after March 11

J-PARC at Tokai-mura, Ibaraki-ken

J-PARC

TIT

Japan Proton Accelerator Research Complex

Bird's eye photo in July 2009

J-PARC

(RCS

3GeV333µA

Japan Proton Accelerator Research Complex

~500m

PPP C

100Me

50GeV-PS 15µA, 750kW

Bird's eye photo in July 2009

1 to

.....

MLSF

<u>Hadron</u> a Counter experiments

Goals at J-PARC





Competition with Diya Bay, FNAL, etc.

Nuclear & Particle Physics Program at J-PARC Hadron Experimental Hall



Power Capability of J-PARC



Damages for Accelerators and Facilities

2011.3.17.

Around the Linac



Electric wires and water pipes were all damaged.

About 1.5 m drop as seen above, over a wide area.

Inside Linac Tunnel

No serious damages were seen for the Linac itself from the ourside...





March 24th, water level increased, 10 cm deep! We decided to introduce motor-driven generator to pump water....

As of March 17, 1 cm deep water was on the floor.....

2011.3.29.

3 GeV RCS Ring





Condenser bank was waved. Cables were distorted with heavy weight on them.

No obvious damages were observed in tunnel. (Photos were taken on March 29). 2011.3.17.

50 GeV Main Ring

Stopping water leakage

We found serious water leaks from tunnel wall!

However no damages are observed on magnets etc.

Circumference Measurement



We found a large misalignment in both horizontal and vertical directions. Realigned will be done between August and October.

Superconducting primary Proton beam line looks healthy

On Site Detector; About 1 cm deep water at the bottom, immediately pumped out!

Neutrino Beam Dump



Area around the beam dump was 1~2m subsided, and repaired!



This East Wall is for future expansion of the facility, and its two main beams were most seriously damaged in the Hadron Hall. It will take 2 months for recovery!

Subsided surface of surrounding area.

Around the Hall; Cooling Water Piping



At present, cooling water can be supplied through the bent piping! All the bent parts should be replaced ASAP!

In Hadron Hall

SKS seems healthy

Slight displacement of shield blocks

K1.8BR seems healthy, too

However, all the magnets, monitors, detectors, etc. slipped off in the range of mm to cm.

Summary of Damages

- No Tsunami Effect
 - We prepared for up to 8 m Tsunami against 6.2m at present
- Main Buildings/Accelerators were almost OK
 Many underpins for major buildings.
- However, many utility buildings, roads, and added buildings had significant damages.
- When to recover ?
 - Aiming at recovering by the end of this year, 2011.
 - Expect to have 2 cycle (about 2 month) running this fiscal year (by March 2012).
- Operation of Next Fiscal Year
 - Full 9 cycle (200 day) operations for users

J-PARC Recovery Schedule (@2011.5.20)



Even in the "Recovery days", our scientific activity is still continuing!

E11; First result of v_e appearance search

Super-Kamiokande IV

T2K Beam Run 0 Spill 822275 Run 66778 Sub 585 Event 134229437 10-05-12:21:03:22 T2K beam dt = 1902.2 ns Inner: 1600 hits, 3681 pe Outer: 2 hits, 2 pe Trigger: 0x80000007 D_mall: 614.4 cm e-like, p = 377.6 MeV/c

Charge (pe)

Section (1997) Section (1997)





ve Candidate event





E19; Search for Θ + in p(π –,K–)



- NO significant structure has been observed.
- Upper limit with current statistics : 0.3 ~ 0.4μb (90%C.L.)
 (very preliminary) cf. 3.9μb (KEK-PS E522)

continue the experiment to goal sensitivity = 75nb/sr (lab)

E14; Rare Kaon Decay $K_L^0 \to \pi^0 \nu \bar{\nu}$

Fermilab KTeV Csl calorimeter

dismantled by Dec. 2008 July 2010







Stacking

October 2010: Engineering run with 1800 crystals



KOTO Csl

Completed with 2700 crystals Feb.08 16:30 2011

After earthquake





calorimeter

Thank you very much for your attention 8 Thank you very much for your warn-hearted support during our most serious days!

Appendices

Marks of Tsunami near Hadron Facility





ence

2011April07





Knocked down pine The wrack left to the fence

Big vortex appeared near Oh-arai Port (15km south from J-PARC)



地震の後、渦を巻く大洗港付近の海

Delivered proton



- Started physics data taking Jan, 2010
- Stable beam operation at 145kW achieved
- ◆ By Mar.11, 2011, 1.43x10²⁰ (~70 [kW 1e7s]) delivered
- All data taken was analyzed

E11; Result of v_e Appearance Search

- We observed 6 events in the far detector.
- The predicted number of events, assuming $\sin^2 2\theta_{13} = 0$, is only **1.5±0.3**.
- For the θ₁₃ = 0 hypothesis, the probability of observing
 ≥ 6 events is 0.007.
 - \Rightarrow Equivalent to **2.5** σ

significance.

Presented by Dr. Okumura at 1E-1 Parallel session (Monday) at this PANIC2011!

Reconstructed Energy (E_{rec}) < 1250 MeV

(MC w/ $\sin^2 2\theta_{13} = 0.1$)



Summary

- T2K reports new results on $\nu_{\mu} \rightarrow \nu_{e}$ oscillations based on 1.43 x 10²⁰ p.o.t. (2% exposure of T2K's goal)
 - * Expected number of events is 1.5 \pm 0.3 (sin²2 $\theta_{13} = 0$)
 - ✤ 6 candidate events are observed
 - * Under $\theta_{13}=0$ hypothesis, the probability to observe 6 or more candidate events is 0.007 (equivalent to 2.5 σ significance)
 - * 0.03 (0.04) < $\sin^2 2\theta_{13}$ < 0.28 (0.34) at 90% C.L. for normal (inverted) hierarchy (assuming $\Delta m_{23}^2 = 2.4 \times 10^{-3}$ eV², $\sin^2 2\theta_{23} = 1$, δ CP=0)
 - To appear in PRL (arXiv:1106.2822v1)
- We will resume J-PARC operation in Dec,2011 and restart T2K data taking as soon as possible
- ν_{μ} disappearance result with full data set will be reported at EPS conf. next week

Bombe station is floating!

Asphalt surface is cracking!

3 Cave-in of the neighboring soil of the Hall

Hadron Beam Group + α May 2011