Charge to the J-PARC PAC

June 30, 2006 Fumihiko Takasaki

Tokai Campus



Tsukuba Campus

Status of J-PARC Project : → Nagamiya and Kamiya's talks

Five research field of the IPNS

Energy Frontier ATLAS, ILC

 Flavor Frontier
 Technology
 Nuclear Frontier

 Belle, T2K, K, etc
 Frontier
 HN, TRIAC, etc

Theory Frontier String, P. Phen'gy, Lattice, Nucleus KEK's FY 2006 Budget (in oku-Yen = 10⁸ Yen)

> **J-PARC** 140 **KEKB** 80 PF 30 Computing 20 Salary 72 Others **58**

> > Japan-US fund, ATLAS, etc

Researches at J-PARC

Neutrino, Hadrons, "Material/Science"

Their Program is reviewed by this committee.

Beam Line Construction Status

There are two teams which have been working for them with the leaders;

Neutrino line : Prof. Koichiro Nishikawa Hadron lines : Prof. Jun Imazato

The Neutrino line will be ready by the due date of beam commissioning: End of 2009.

At least one of Hadron lines will be ready by the due date of beam commissioning: End of 2008.

Construction of the Neutrino Beam line seems to be very challenging!

There are several issues to be well thought about:

- 1) Design of beam line with minimal beam loss
- 2) Use of the Superconducting magnets

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- 2) Neutrino Production Target which stands against heat and thermal shock due the high intensity beam
- 3) Design of remote maintenance system of the highly radio-active devices
- 4) Design of system to absorb and dissipate heat load

It seems that these issues have seen successfully cleared.



3NBT

ALC: NO.

Decay volume

Civil construction of primary beam line tunnel

50GeVring





Superconducting Combined Function Magnet







Cold mass assembly



Putting magnet in cryostat



Prototyping of the Target: Graphite

Energy deposit 58kJ/spill, Max:186J/g → ∆T ≈ 200K @50GeV







2.6 cm in diameter, 90 cm long



Heat Test with 1/20 model : done \rightarrow Real size prod.



Magnetic Horn (1st Horn)



Successfully operated at 250 KA



Cover Off Axis angle : 2°~3°

 Square box shape made with water cooled iron plates (T<60°C)

Filled by 1atm Helium gas



Cooling channels(Plate coil)

Decay Volume : Side View of



Common decay pipe for SK/HK covering 2~3 deg OA angle





表 3.1: E_{ν} at the oscillation maximum for the baseline length of 295km and corresponding off-axis angle.

Δm^2	2.04	2.18	2.75	3.17	3.28
$[10^{-3} eV^2]$	(90% A.R.)	(80% A.R.)	(best fit)	(80% A.R)	(90 % A.R)
$E_{\nu}[GeV]$	0.487	0.520	0.656	0.756	0.782
OA angle[deg.]	3.1	3.0	2.4	2.1	2.0

Cover this region

Fabrication of components

Components

Proton Beam monitor

Superconducting magnets

Cryogenics

Normal Conducting magnets

Vacuum system

Target

Horn

Target Station

Beam Window

Decay Volume

Beam Dump

Muon monitor

Working design in hand

 Shifting from prototyping to final engineering design and production

All components to be installed and operated by the end of 2008

Hadron Experimental Facility in Phase 1



- Experimental Hall of 58m^w x 56m^L
- One primary beamline A and one target station T1
- Proton beam with 30 GeV and 9µA (270 kW)



J-PARC Hadron-hall under construction (June 23, 2006)

Possible secondary lines in Phase 1



- Shielding is designed so that almost all the phase-1 experiments can be accommodated.
- Options for test beams are also considered.

Construction status of the secondary lines



K1.8 beamline

ES1 is completed in this FY. Q1and D1 are made this year.

<u>SKS spectrometer</u>

Modification of SCM cryogenic system started.





Radiation resistant magnet for the primary beam line (Q440MIC) Fully Inorganic Magnet

QC2MIC Magnet



Electro-Static separator for the K1.8 line

The SKS Spectrometer



∆p/p : 0.1% @1GeV/c

The Kurama Spectrometer





KURAMA magnet

∆p/p : O(1 %) @1GeV/c



A possible Schedule of Beam Delivery

	2007	2008	2009	2010	2011
K1.1					
K1.1BR					
K1.8					
K1.8BR	Primary	Beam			
K0					
High P					

Remarks:

It seems not possible financially to build all six beam lines in the Hadron hall by the due date of beam commissioning in 2008.

The proposed timeline of the beamline construction given in the previous slide is made based on the guideline given by the NPFC in 2003. However, the priority of the installation at the very initial stage of the beam commissioning is subject to the recommendation of this committee.

Organization Chart



Approval procedure

Stage 1 approval

The proposals get it, if their scientific merit is of high value and basic design of the detector is reasonable. This helps them to negotiate with funding agencies.

Stage 2 approval

They get this, if they pass through the review of the technical feasibility and the allocation of financial resources. This gives a green light for the experiment to start. As the Director of IPNS, I would like to ask you to address the following area:

1) Evaluation of the scientific merits, technical feasibility and recommendation about neutrino program at J-PARC,

2) Evaluation of the scientific merits and technical feasibility of proposals at the Hadron hall and prioritization of secondary beam lines (K1.8, K1.1BR, K1.1, K1.8BR, K0, others)

3) Prioritize proposals as day-1 experiments.

We would appreciate it if the committee identifies proposals which are "really competitive scientifically" not in a local Standard but in a global Standard and therefore will provide "good reasons and justification to get support" from the funding agency and the community at large. We need good arguments why.....

Thank you for your attention.

Commissioning & Linac Energy Recovery



Construction needs to start from JFY2008, hopefully for 3 years, as shown in this figure.

Policy on Beamline Layout

- Make all attempts to construct the K1.8 and K1.1 beamlines requested by the two Day-1 experiments. If it proves impossible to build both lines simultaneously, make a plans to install K1.8 with a provision to accommodate K1.1 later.
- Even though there are no budgetary measures at the moment, consider the installation of a test beamline positively.
- Design the experimental hall so as to accommodate the three kaon decay experiments in the future.
- Don't shut the doors to the Lols which received a lower evaluation. They may develop to good experimental proposals in course of time.
- Make a detailed beamline layout for Day 1 and a facility construction plan for Phase 1 taking the above criteria into consideration.

IPNS Research Planning Committee Yamanaka Committee: Nov 2002

Recommendations

- 1. Start the construction of <u>neutrino beam line</u> as soon as possible and push on with the <u>oscillation</u> <u>experiment</u> with top priority.
- 2. Push on with <u>strangeness nuclear physics</u> and <u>kaon</u> <u>rare decay</u> physics from which we can expect certain results.
- 3. <u>Muon experiments</u> should start investigation of technical problems, studies and proofs immediately and aim at physics outputs in Phase 2
- 4. <u>Hadron/nuclear experiments</u> should be carried out from the latter half of Phase 1 to Phase 2.
- 5. <u>Antiproton science</u> should be performed in Phase 2 seeing the development of the field.