NP04 at Tokai
August 2, 2004

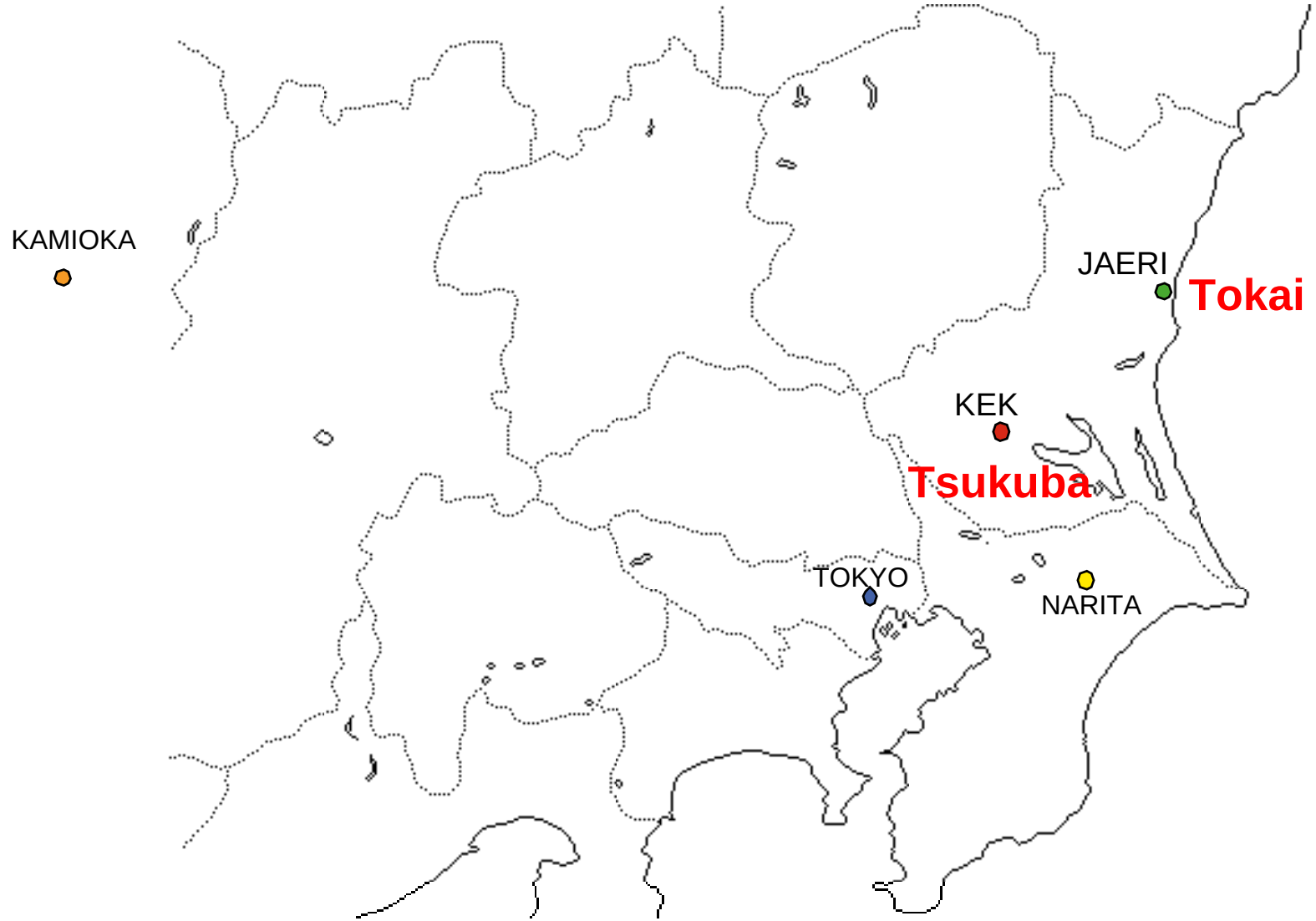
J-PARC Project Status

Shoji Nagamiya

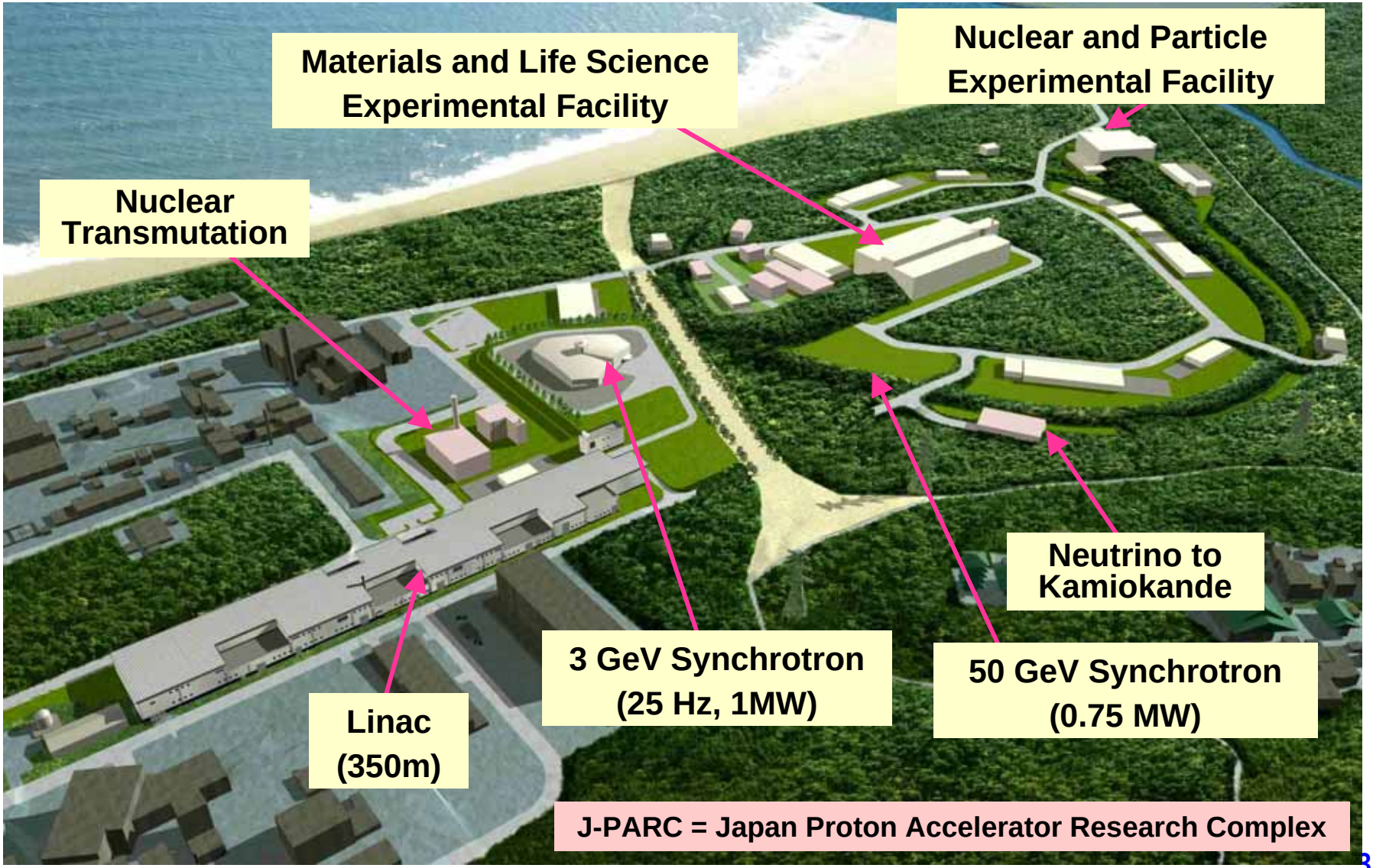
Project Director

1) Budget and schedule
   (recent events in 2003)
2) Construction status
3) Recent news in sciences
4) Letters of intent
5) Other issues

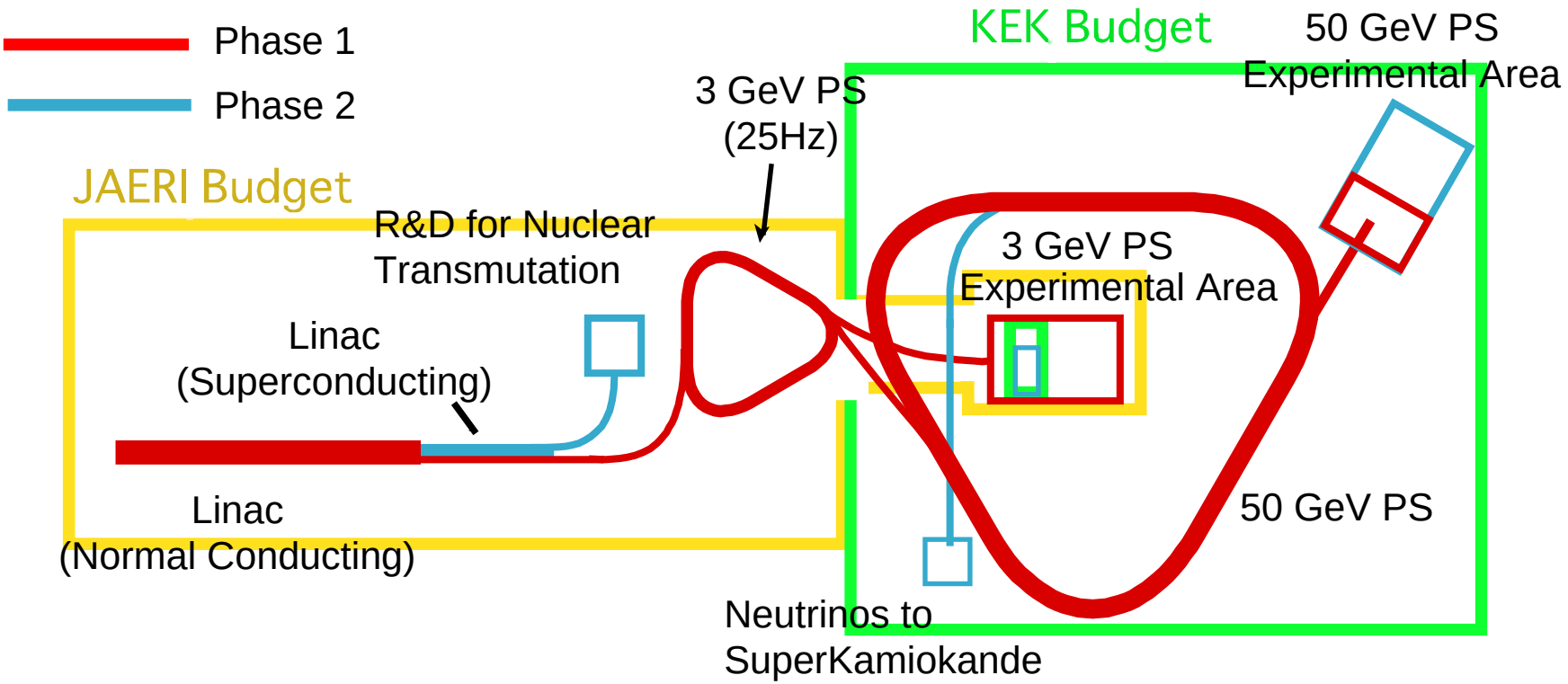
Location of JAERI at Tokai



J-PARC Facility

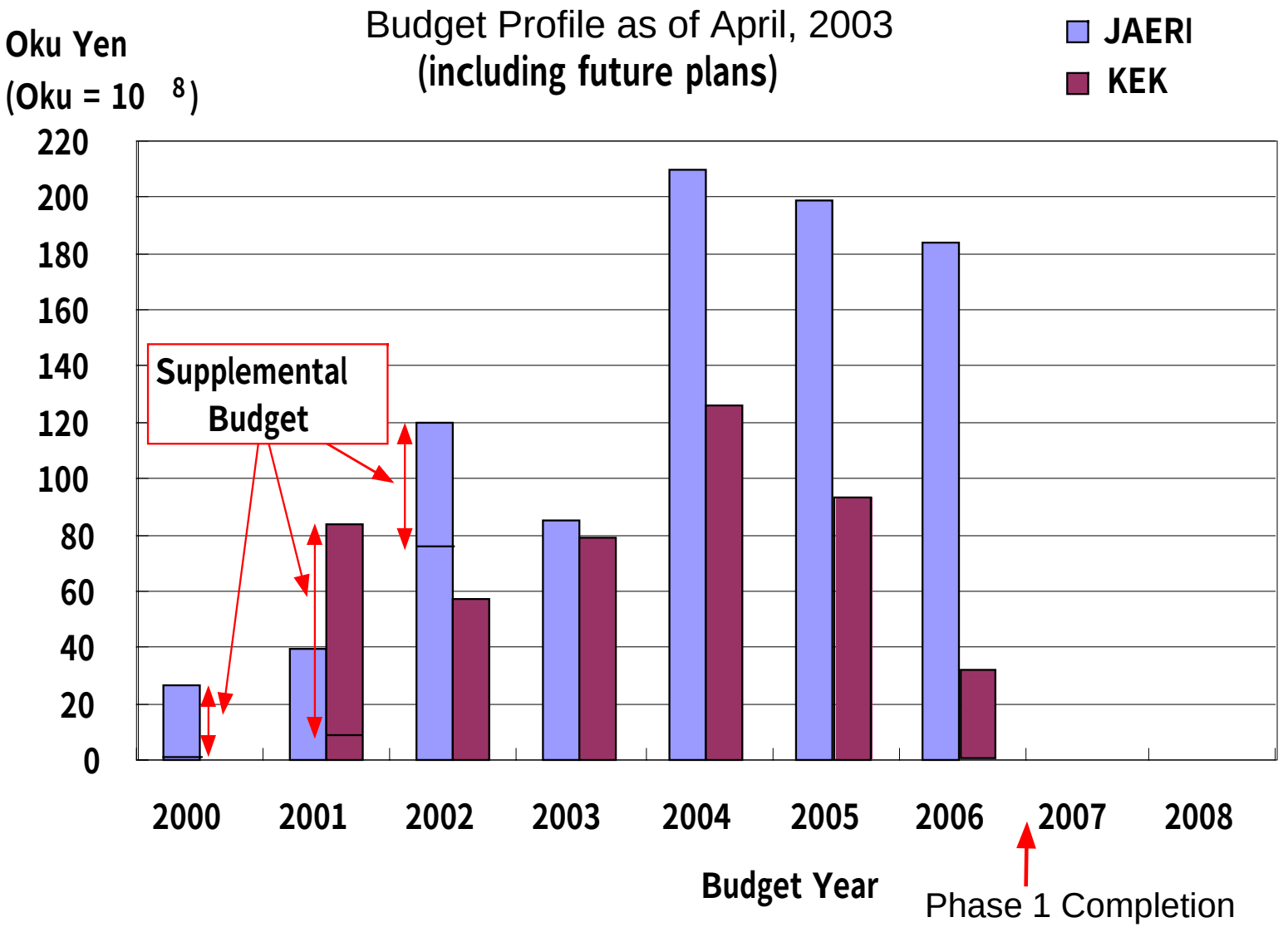


Phase 1 and Phase 2 (as of 2001)



- Phase 1 + Phase 2 = 1,890 Oku Yen (= $1.89 billion if $1 = 100 Yen).
- Phase 1 = 1,335 Oku Yen for 6 years (= 2/3 of 1,890 Oku Yen).
- JAERI = 865 Oku Yen (≅ 2/3), KEK = 470 Oku Yen (≅ 1/3).

Budget Profile (before the Summer, 2003)

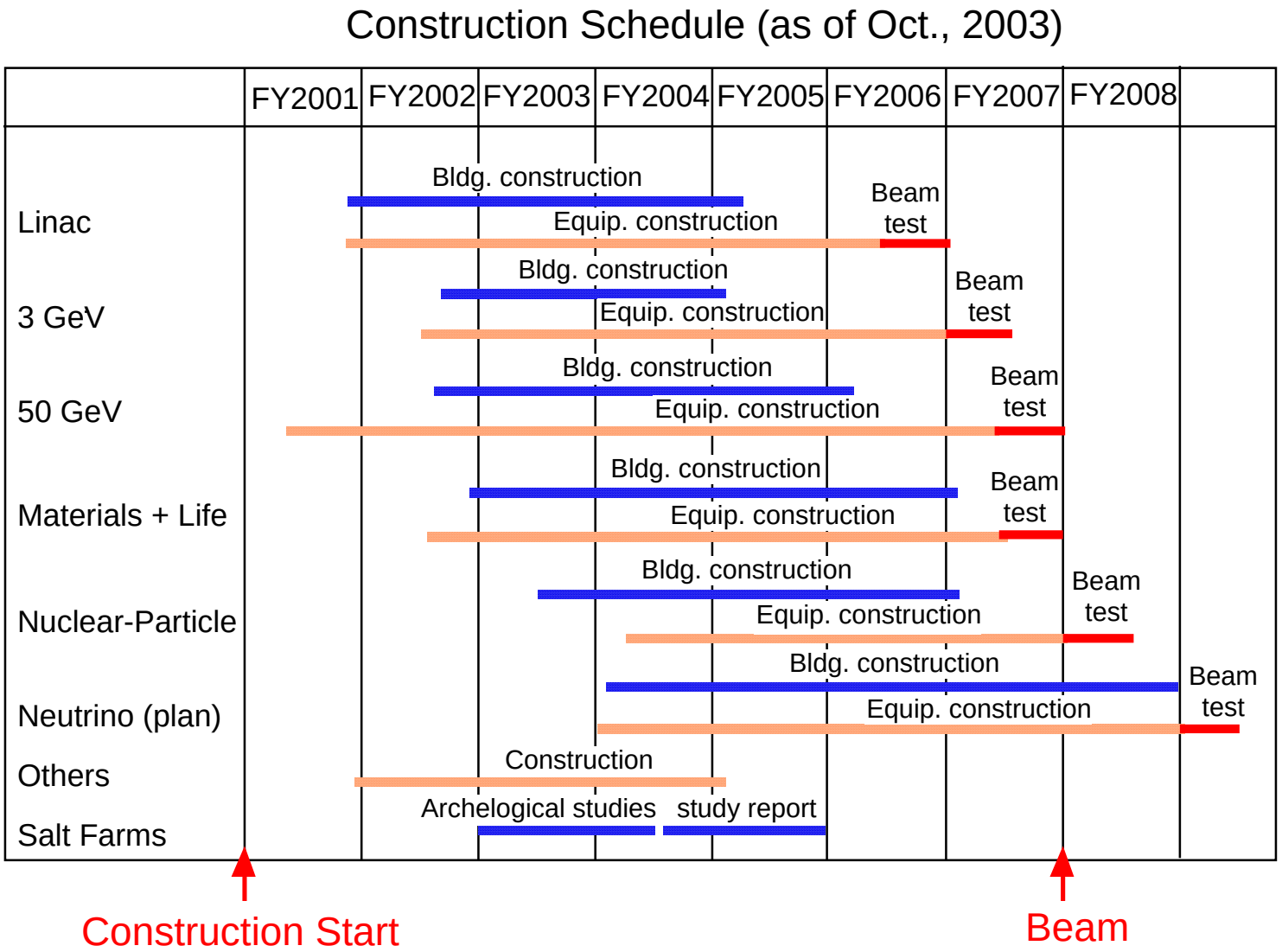


Recent Events (1)

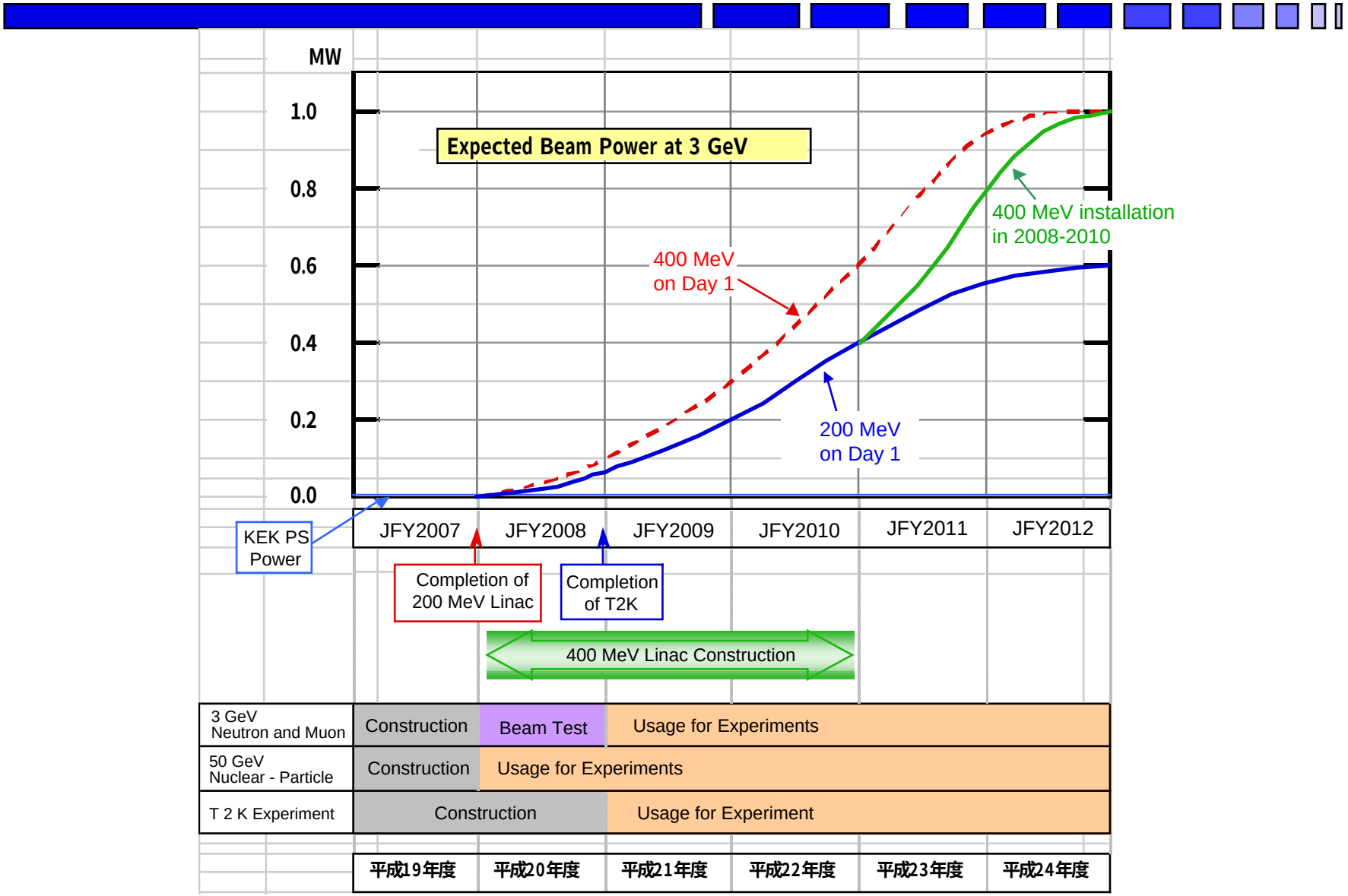
- Negotiation for the JYF2004 Budget with the MEXT (our funding agency) in August, 2003 (about one year ago)
  - One-year stretch of the project was proposed by the MEXT due to the shortage of the JAERI budget. ①
  - With the present budget, 400 MeV Linac cannot be constructed. A proposal to start with 200 MeV on Day-1 while the need of an additional budget for the 200 MeV to 400 MeV Linac was proposed. ②
  - Start of the neutrino project from JFY2004 was also proposed. ③

Conclusion at the negotiation: Items ① and ③ were taken by the MEXT, while the item ② were deferred to a later stage.

Construction Schedule



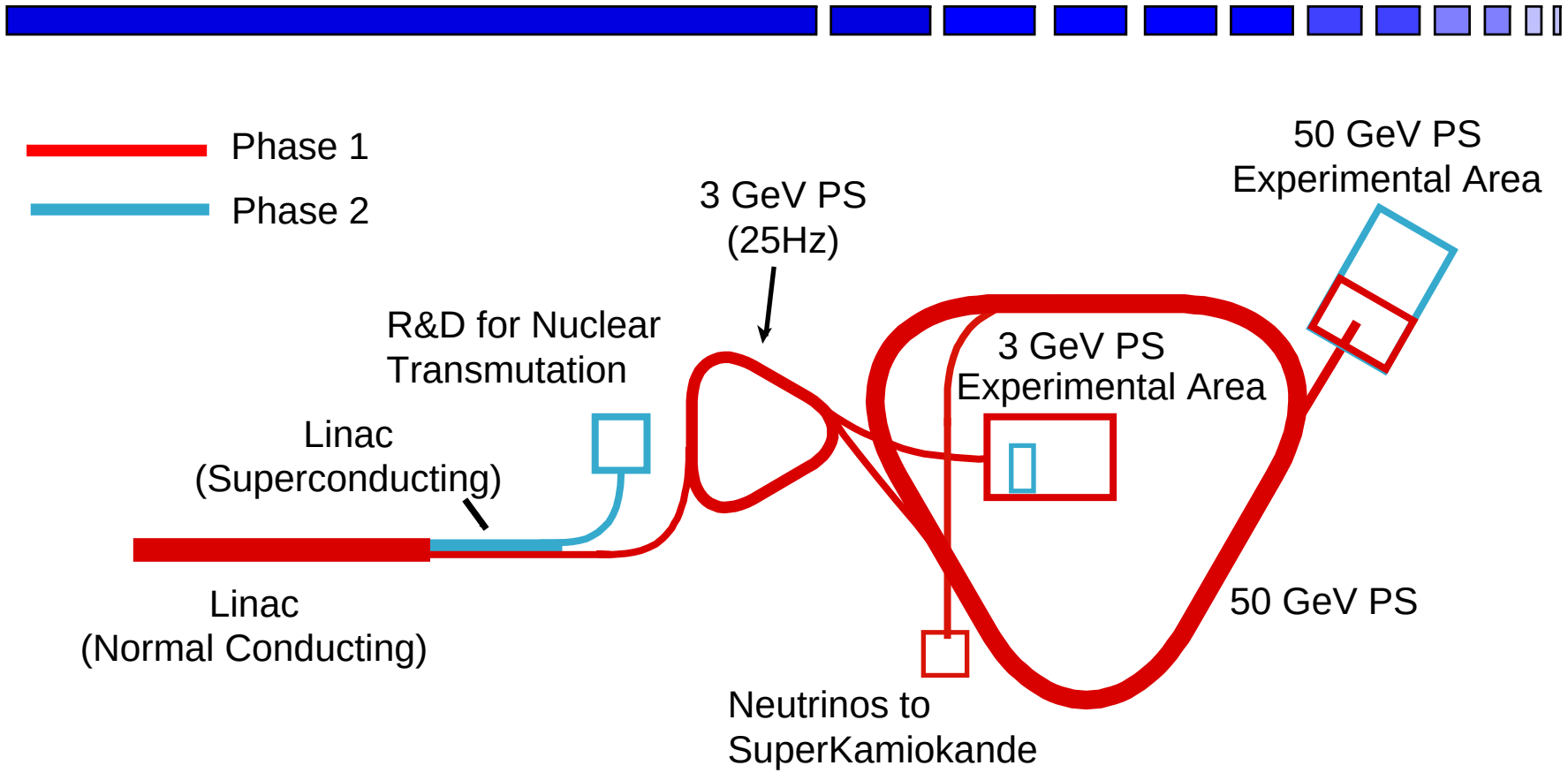
Expected Beam Power



Recent Events (2)

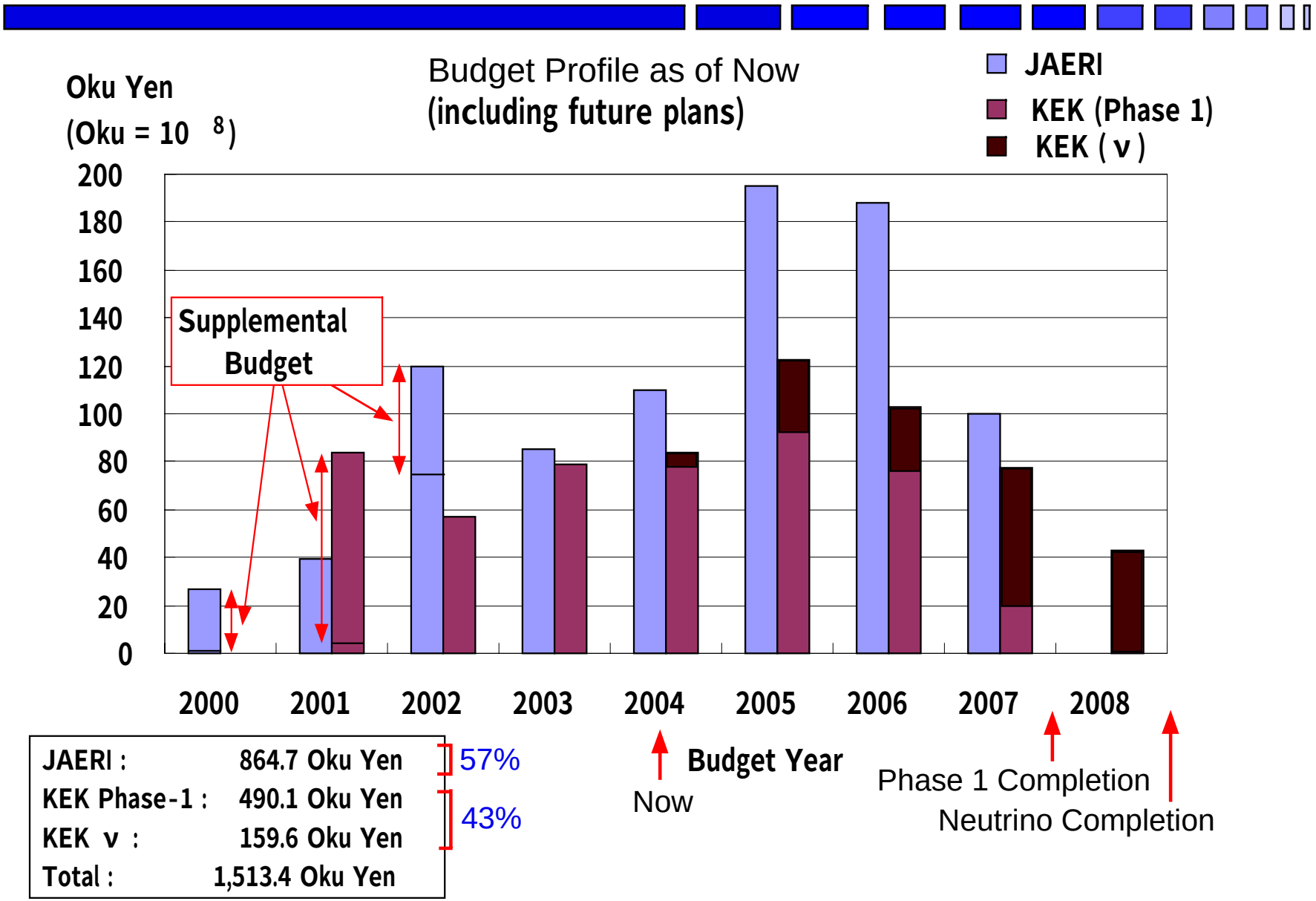
- Review by the Council of Science and Technology Policy (CSTP)
  - All budget requests from MEXT to Ministry of Finance are subject to the review of CSTP.
  - CSTP ranked Phase 1 project to “A” (and the building construction to “S”) whereas the neutrino project to “C”. (S=Superior, A=Very Good, B=OK, C=Poor).
- Interim Review of the Project was held in November, 2003
  - Four meetings on Nov. 7, 14, 21 and 27.
  - Major recommendations: Neutrino program must start immediately. The energy recovery of Linac to 400 MeV must be done immediately after the installation of 200 MeV Linac.
  - Finally, both CSTP and the Ministry of Finance agreed to these recommendations.
- Announcement in Late December, 2003
  - Neutrino project approved for construction (total = 160 Oku Yen, 5 years).
  - Approval of the neutron beam line design outside the J-PARC budget.

Phase 1 and Phase 2 (as of today)



- Phase 1 + Phase 2 = 1,890 Oku Yen (= $1.89 billion if $1 = 100 Yen).
- Phase 1 = 1,513 Oku Yen for 7 years.

Budget Profile



2) Construction Status

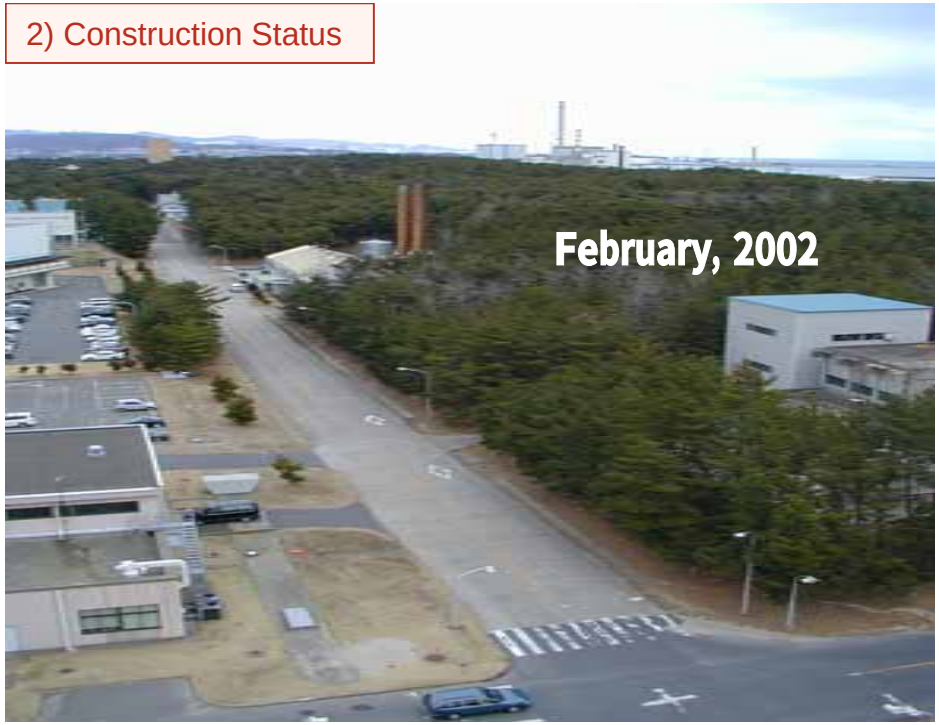

3 GeV Area
UMITOMO


IAC, March 2004


50 GeV Area

2) Construction Status

2) Construction Status



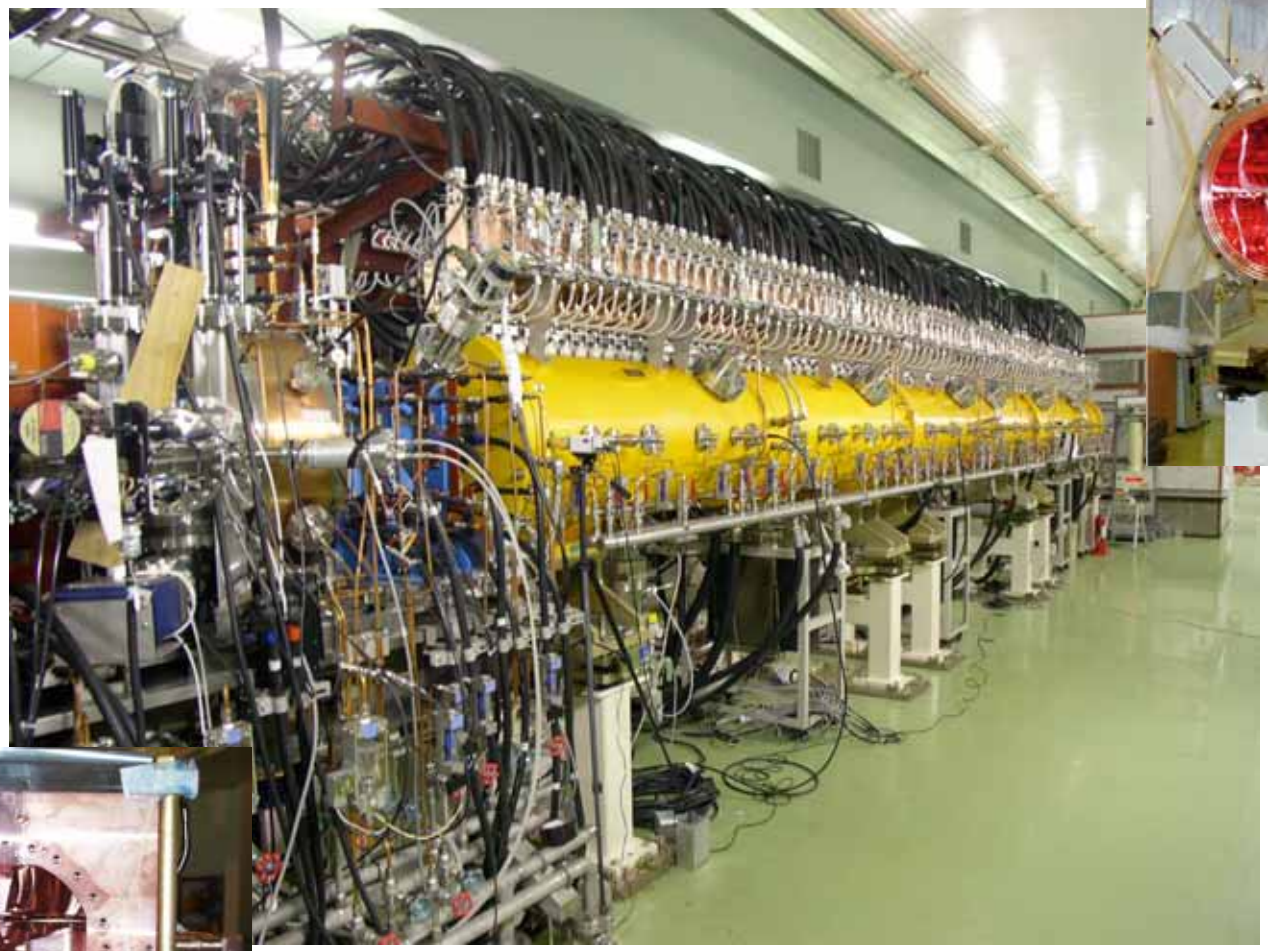
2) Construction Status

大形かん水槽、釜屋跡など（遺構に見える溝は、断面観察のためにつけたもの）

Ancient Salt Farm

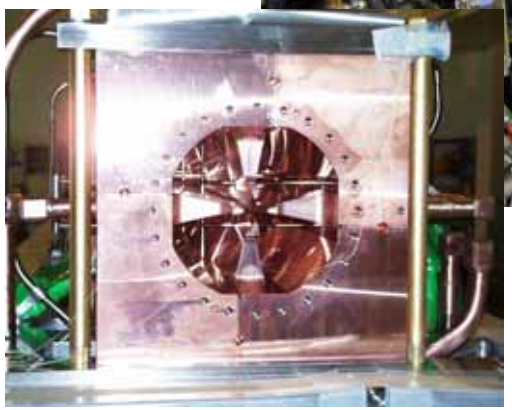
February, 2004

Linac



Inside of Drift Tube Linac

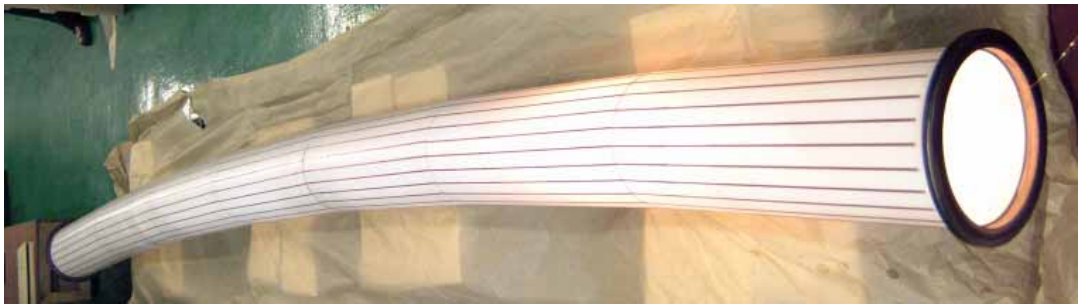
RFQ



Beam test for chopper was also done.

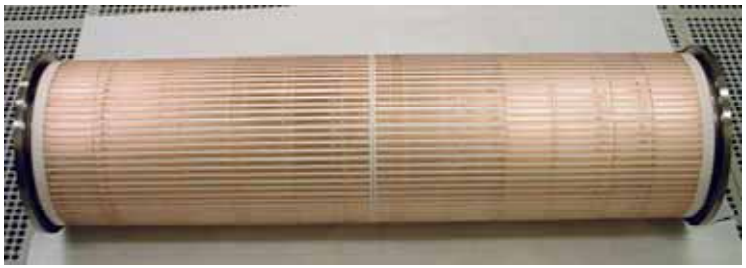
On October 30, 2003, a successful acceleration of 6 mA at 20 MeV. On November 7, 30 mA was achieved.

3 GeV Vacuum Pipe and 50 GeV RF Cavity

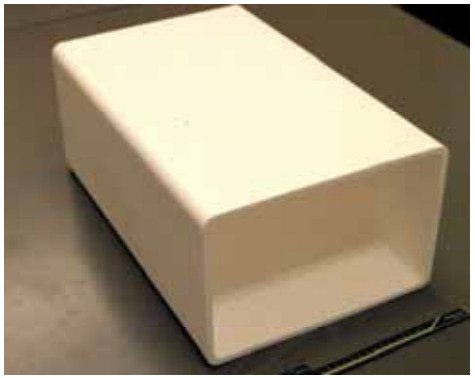


Vacuum Beam Pipe for 3 GeV

For dipole



For quadrupole



New material (Finemet)

50 kV/m Attained.

RF Cavity for 50 GeV

50 GeV Magnets

Dipole Magnet

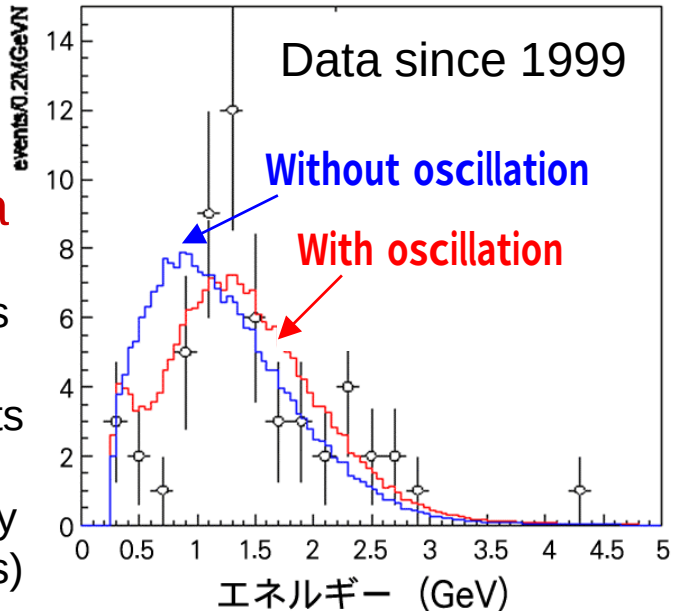
Quadrupole Magnet

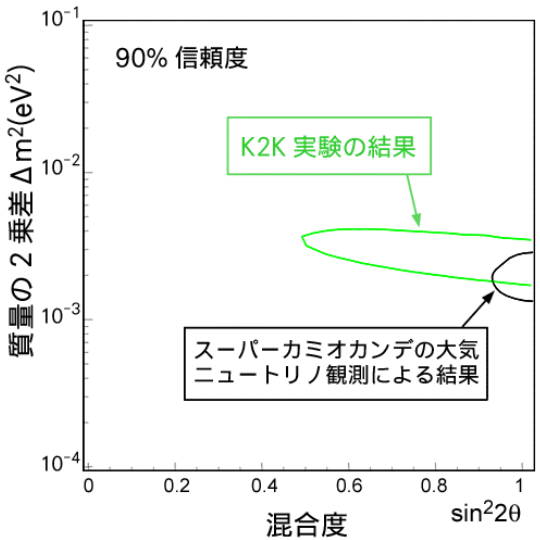
From K2K to T2K

K2K = KEK to Kamioka

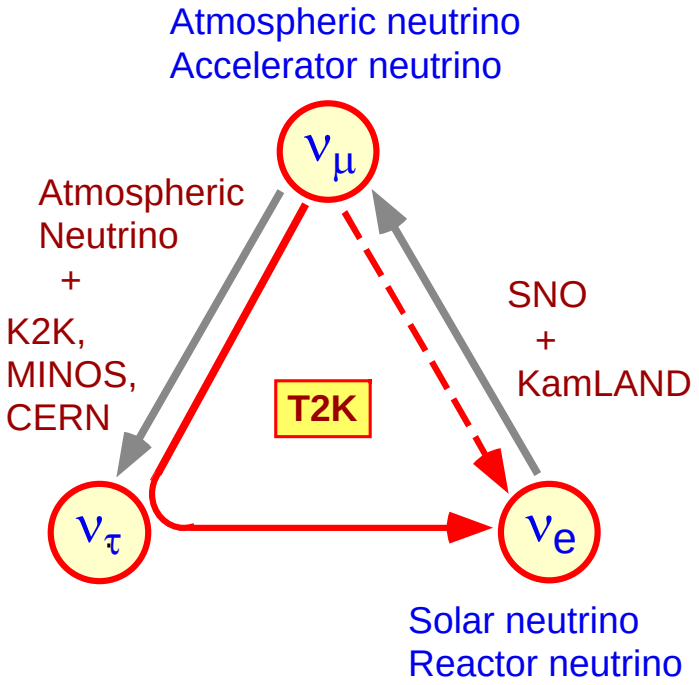
108 events observed (151 events expected without any oscillations)

→ 99.99% confident that ν carries a finite mass.





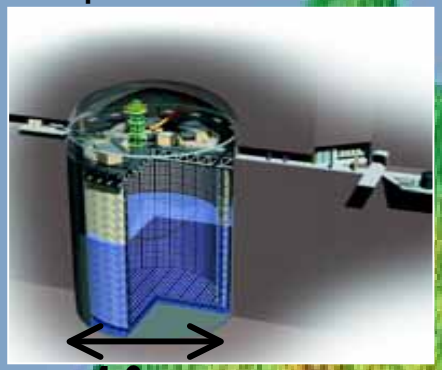
T2K = Tokai to Kamioka
(not yet an official name)



Flux (ν_μ) at J-PARC 50 GeV PS
> 100 **x** Flux (ν_μ) at KEK 12 GeV PS

Neutrino physics at J-PARC
Tokai-to-Kamioka (T2K) LBL ν experiment

Super-Kamiokande



T2K (2009~)

295 km

東海村

J-PARC
@JAERI

神岡

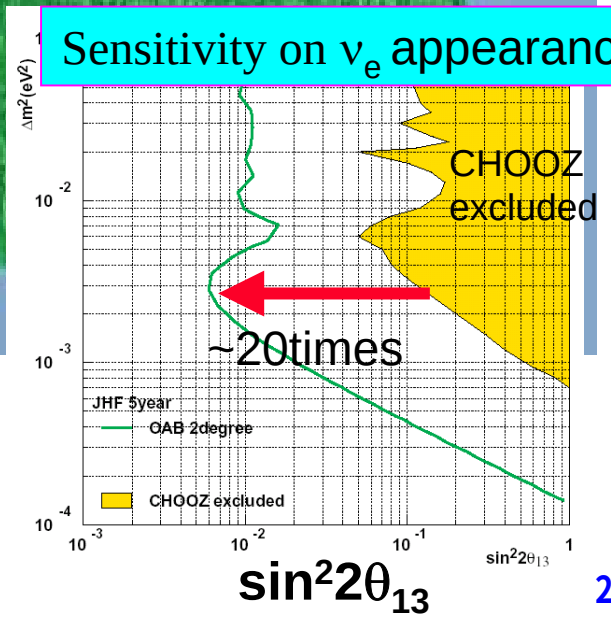
250km

K2K (1999~2005?)

KEK

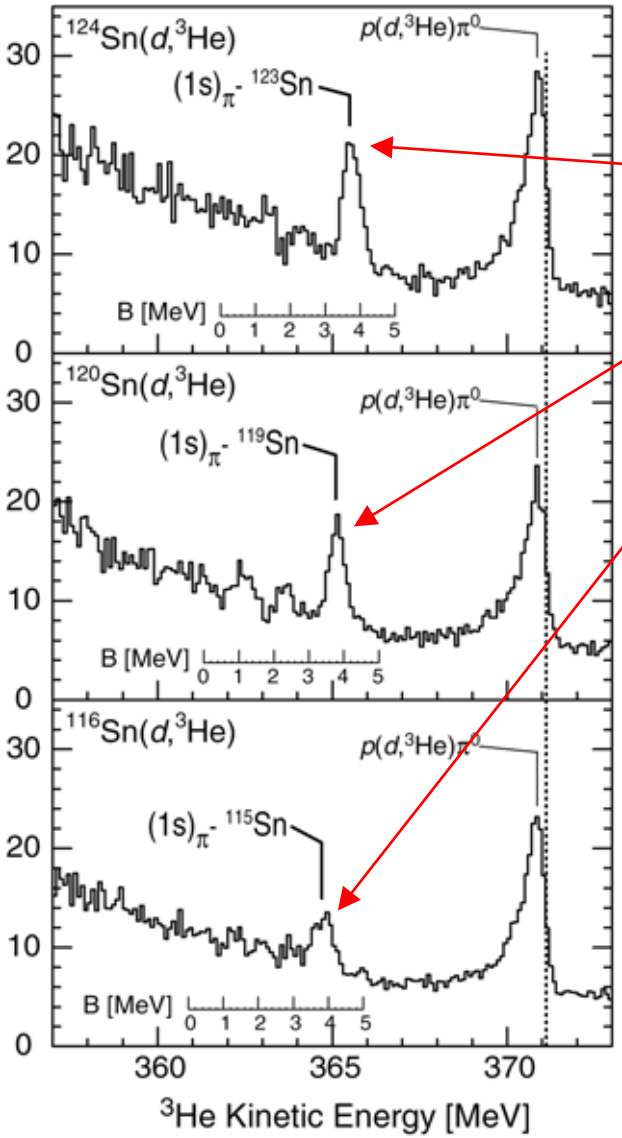
- Off-axis sub-GeV ν_μ beam from J-PARC 50GeV-PS
- ~3000 ν_μ CC int./yr (w/o osc.)
- ν_e appearance discovery
- ν_μ disapp. presice meas.
- 5 year const. Start exp. in 2009.

Sensitivity on ν_e appearance

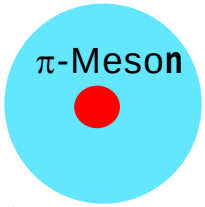


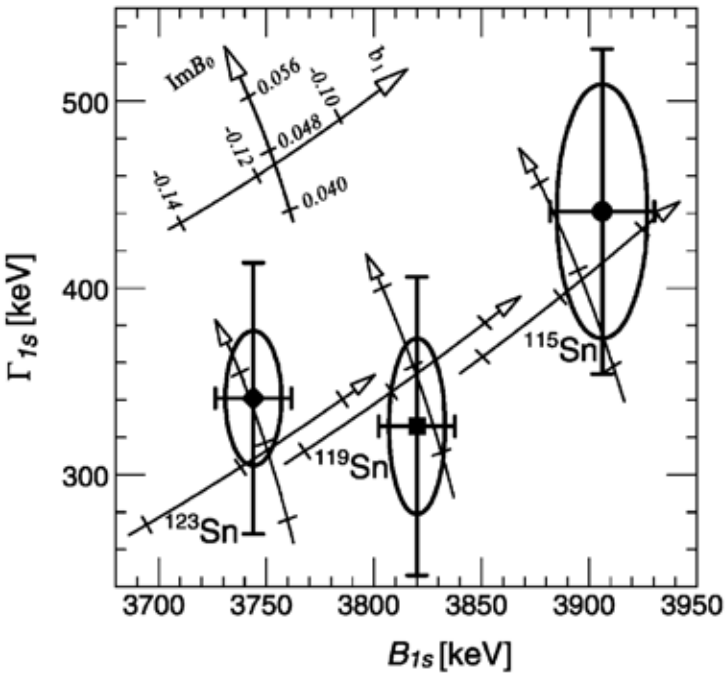
$\sin^2 2\theta_{13}$

Pion Implantation



Meson Implantation





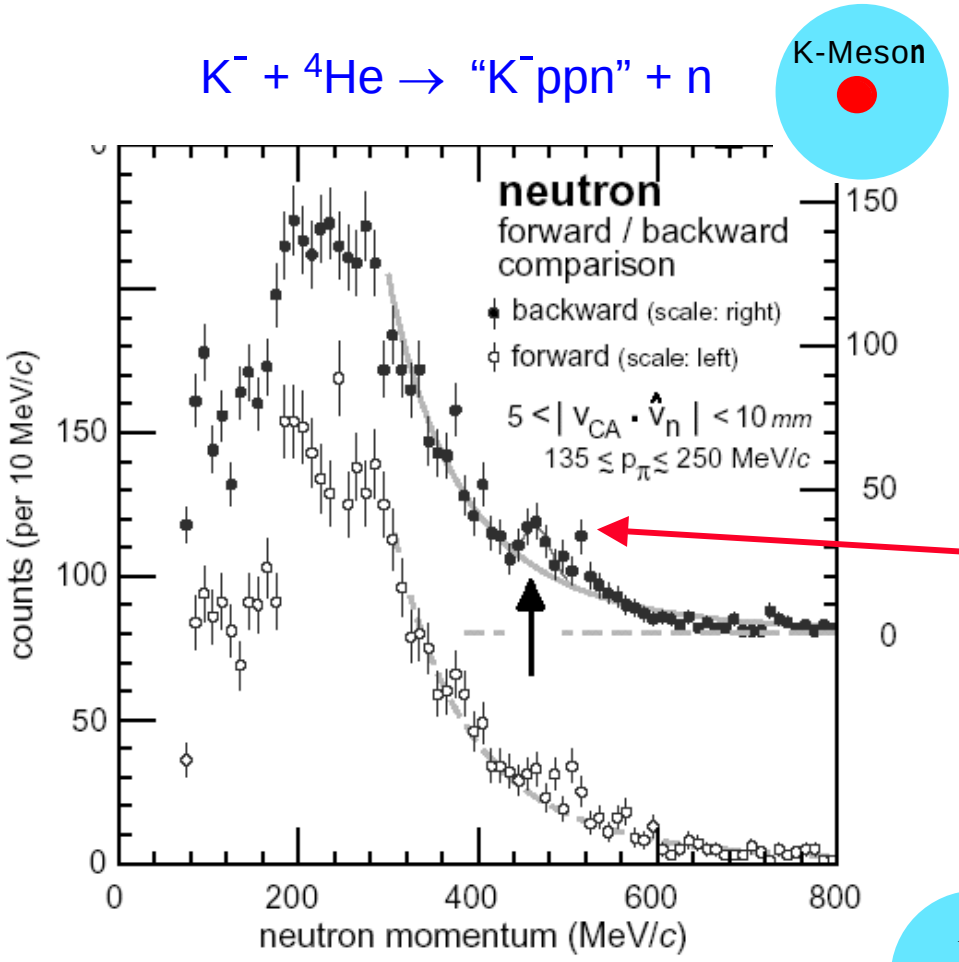
Inside nuclear matter the pion mass is reduced by 20%.

$$f_\pi^*(\rho)^2 / f_\pi^2 \approx 0.64$$

K. Suzuki, et al., Phys. Rev. Lett. 92, 072302 (2004)

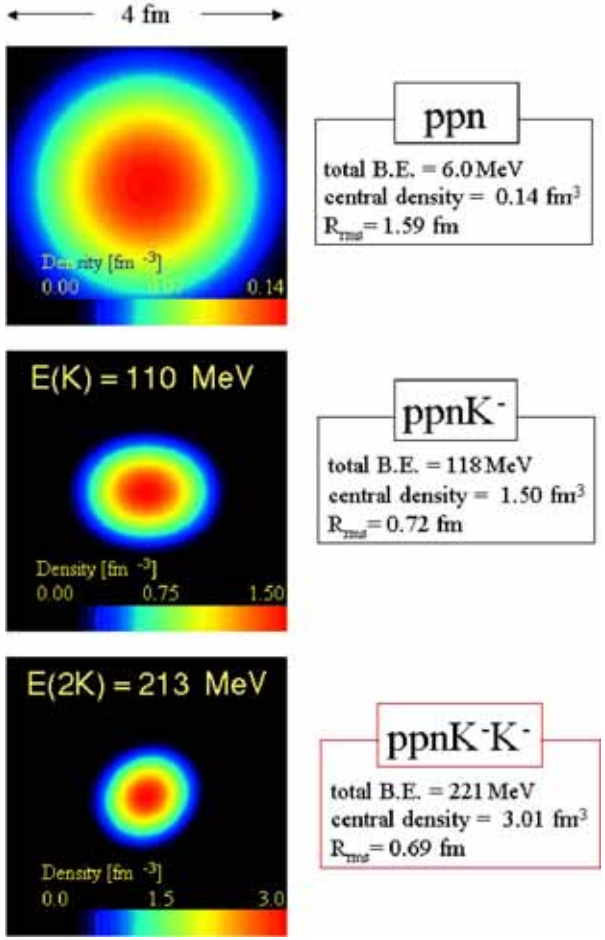
Strange Meson Implantation

$K^- + {}^4He \rightarrow$ "K^-ppn" + n

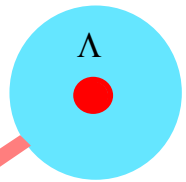


^3He

K^- in ^3He



Experiment by M. Iwasaki, et al.



Theory by Y. Akaishi, et al.

Nuclear shrinkage is also observed for Λ implantaion inside the nucleus ← K. Tanida, et al.

Two Types of Letters of Intent (LoI's)

Neutron Scatterings

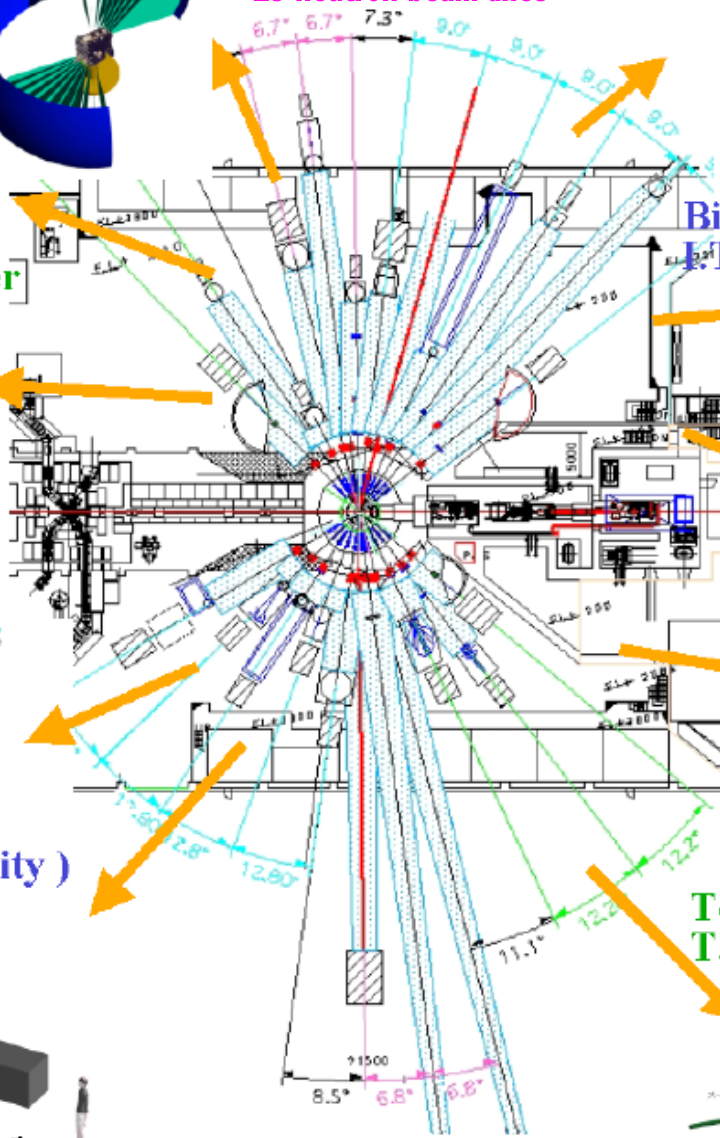
- Call for LoI's: Once a year.
- Fall of 2002: Accepted 18 LoI's.
- Recommended 9 LoI's into the next detailed proposals.
- Additional LoI's came in.
- Approved LoI's need to proceed into the funding request.

Nuclear Particle Experiments

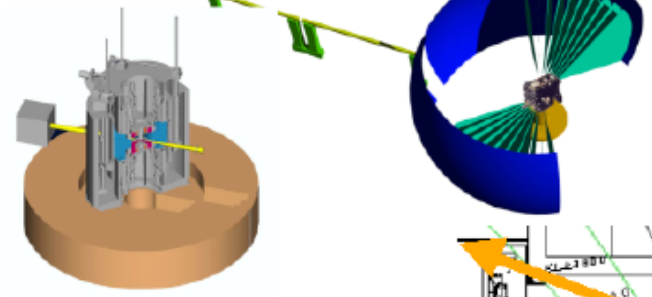
- Call for LoI's: June, 2002.
- Early 2003: Accepted 30 LoI's.
- Committee for Nuclear and Particle Experimental Facilities
  - Three meetings: March & June, 2003 + February, 2004.
- Discussions on ν experiment, Day-1 experiments with K-beams, Phase-1 experiments, and Phase 2+ experiments.
- Need on redesign of experimental area, etc. to allow high priority experiments.

JSNS

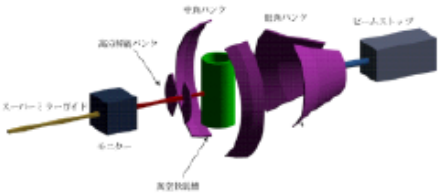
23 neutron beam lines



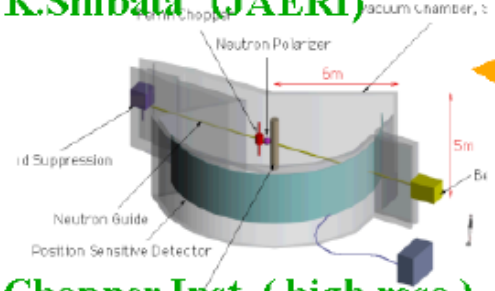
Stress Analysis diffractometer
A.Moriai(JAERI)



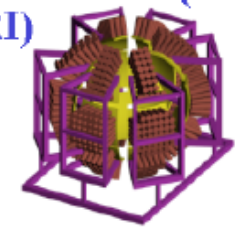
Powder diffractometer (versatile)
T.Ishigaki (Muroran Inst Tech)



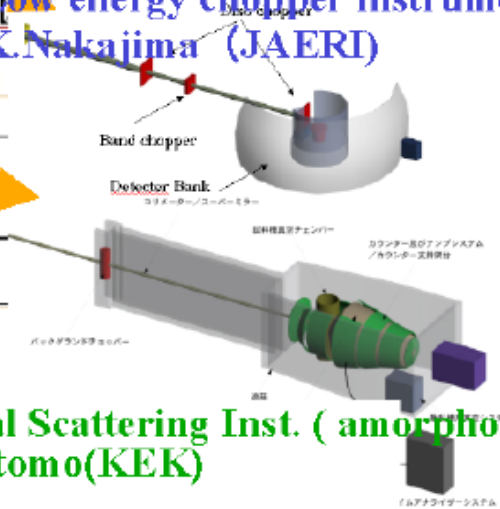
Bio- molecular spectrometer
K.Shibata (JAERI)



Bio- molecular X- tal diff.(versatile)
I.Tanaka(JAERI)

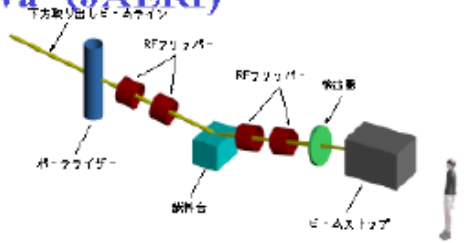


Low energy chopper instrument
K.Nakajima (JAERI)

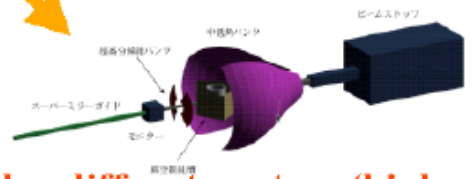


Chopper Inst. (high reso.)
S.Itoh(KEK)

Small angle diff.(high intensity)
K.Aizawa (JAERI)



Total Scattering Inst. (amorphous)
T.Otomo(KEK)

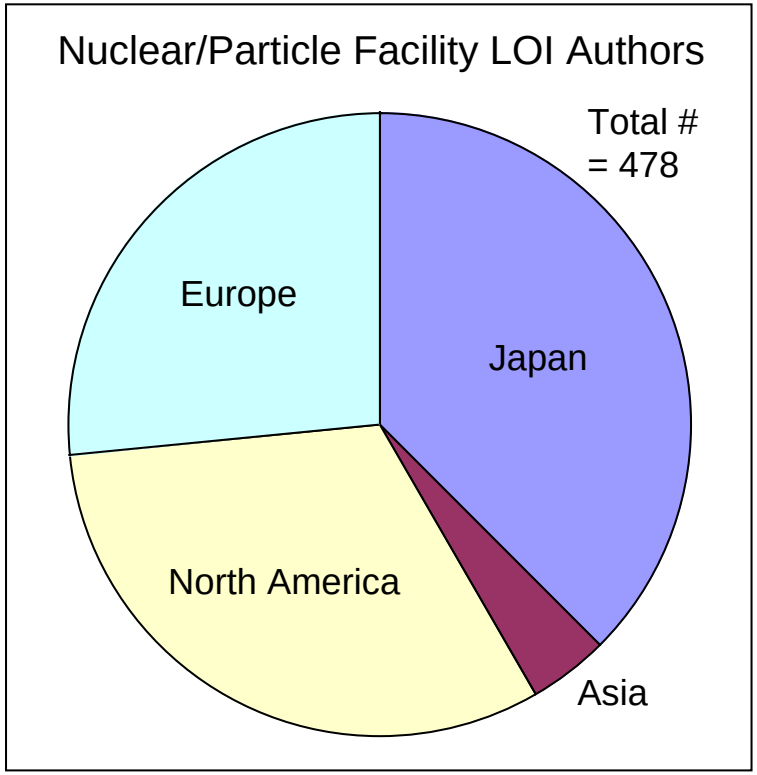


Reflectometer (horizontal)
N.Torikai(KEK)

Powder diffractometers (high resolution)
T.Kamiyama(KEK)

Letters of Intent for 50 GeV

- Announce of LoI call : July 2002
- Thirty LoI's were submitted by early 2003
  - Strangeness nuclear physics 7
  - Nuclear/hadron physics 7
  - Kaon decay physics 4
  - Muon physics 3
  - Neutrino physics 1
  - Future facilities 8
- 478 physicists with 2/3 from outside Japan. Asian participation is still few.
- Call for proposals: Most likely, within a year, if no further delay is observed for the 50 GeV construction.



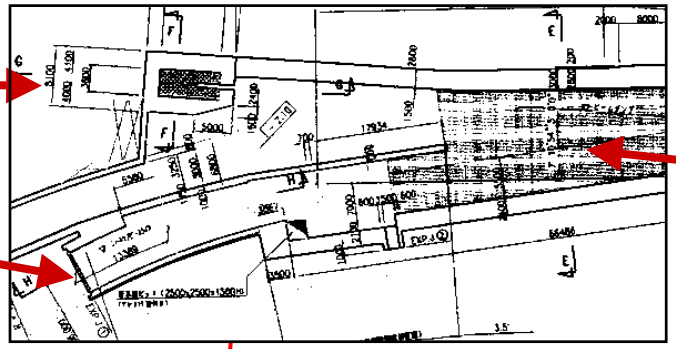
Major Recommendations

- Neutrino Experiment
  - High priority experiment. Need to start from JFY2004.
  - Technical Advisory Committee for neutrino must be established.
    → First meeting was held in November, 2003. Chair: E. Blackmore
- Day-1 Experiments
  - Selected two LoI's: L06 (S=-1,-2 Spectroscopy) & L10 (Dense K-bar).
  - Need to have K=1.8 & K=1.1 beamlines.
  - Recommended for us to make effort to construct test beam lines.
- Phase 1 Experiments
  - 16 experiments are being planned.
  - Need to prepare, in addition to the K=1.8 & K=1.1 beamlines, a neutral kaon beam line, high-momentum beam line including primary proton beam. A possibility of having three rare decay experiments (K^0 and K^+ rare decays + K^+ T-violaion) still exists.
  - Prepare rooms for other new expeirments that have not been proposed.
- Phase 2+ Experiments
  - Many excellent proposals including experiments using PRISM, an experiment on the muon, etc.
  - Prepare the second fast extractraction beam line.

Arrangements to be Made for the Future

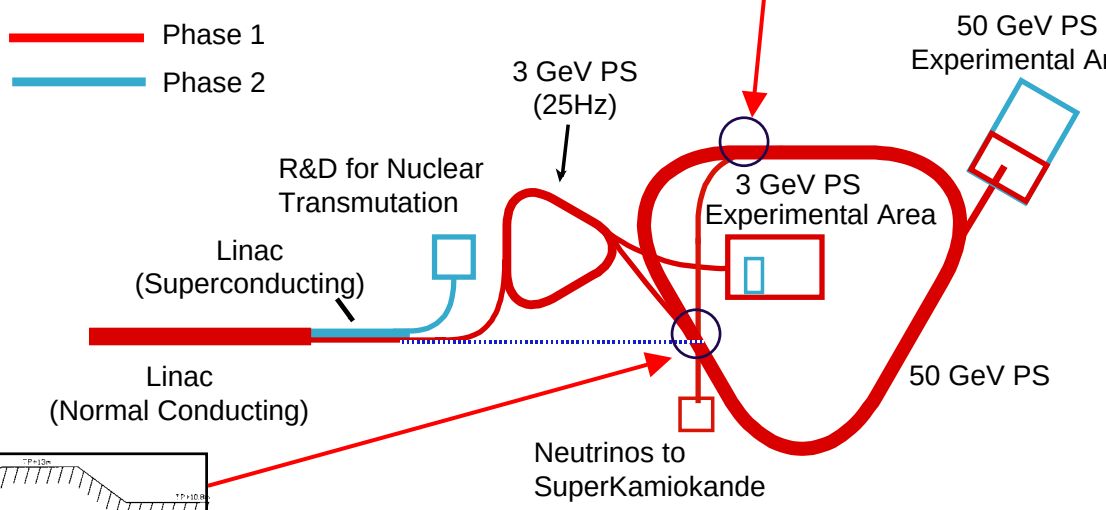
Reserved area for an additional fast extraction

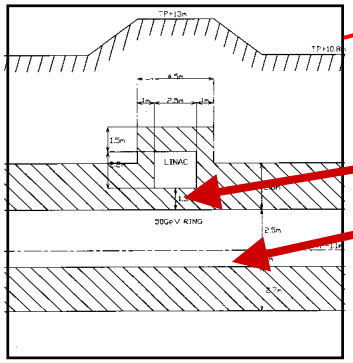
Fast extraction for neutrinos



50 GeV main ring

Plan view





Tunnel for a future linac

50 GeV tunnel

Vertical View from the left

Organization at the Operational Stage

- At both KEK and JAERI, Working Groups were Created to Discuss this Issue.
- Also, a Task Force was Created under the Steering Committee

- Major Issues:
  - J-PARC Center should be located under both KEK and JAERI.
  - What type of respnsibilities and rights can J-PARC Center have?
  - What is the function of the J-PARC Center? Does it cover research programs? Or, is the function limited to the machine operation and safety alone?
  - Where is PAC?

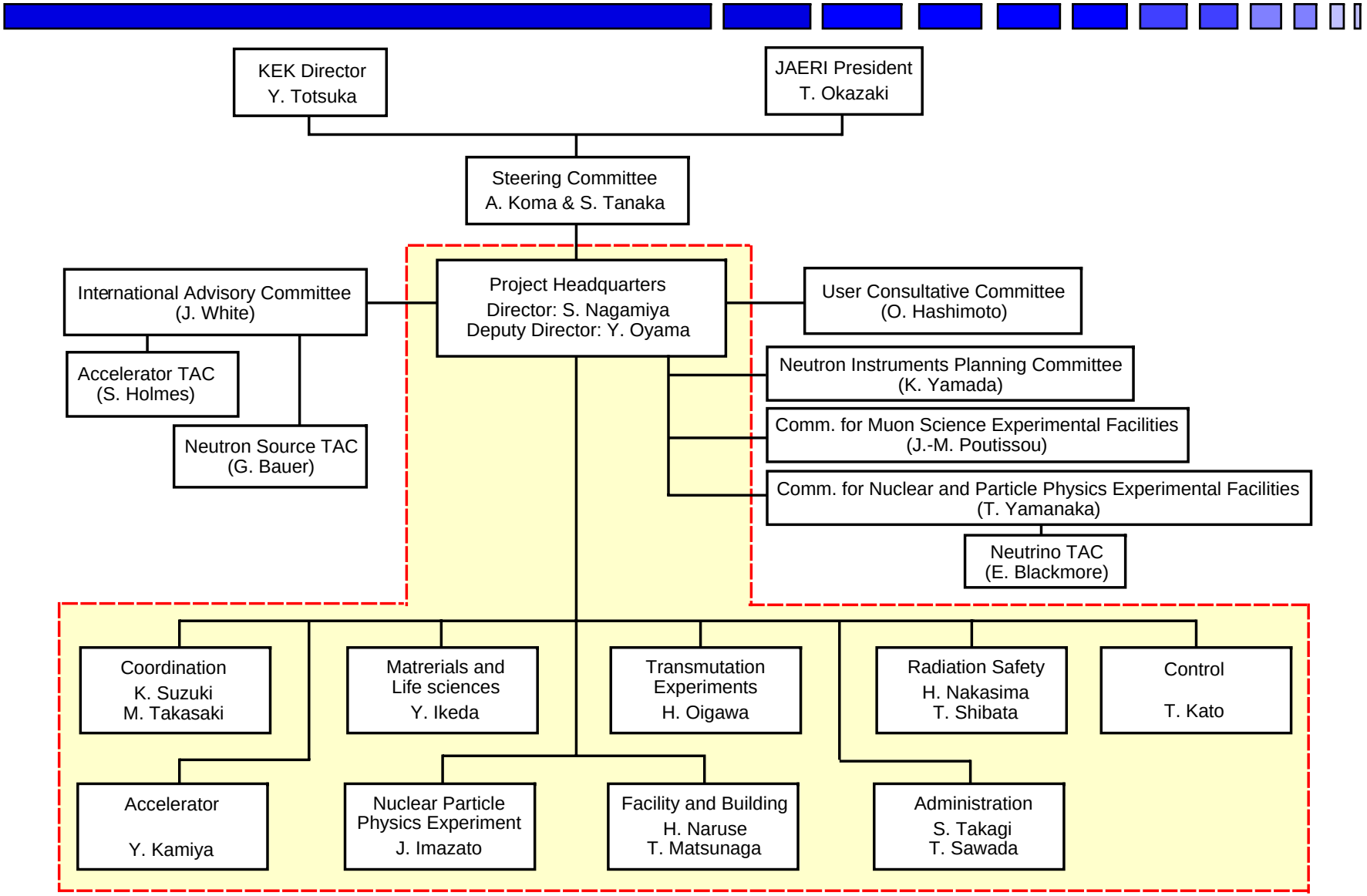
Will create a reasonable scheme soon !

Mechanism to Interact with User Communities

- Intense Discussions at the Recent User Consultative Committee + Discussions with Community Leaders
  - Conclusion is to change the structure of the User Consultative Committee.
  - New Committee: 12 members from four communities (neutron, muon, nuclear physics, and high-energy physics), 2 from Science Council of Japan, 2 from ADS, and 2 from industry.
  - Workshops similar to NP04 in other fields, workshops at regular PSJ meetings, mini-workshops, etc.

We created a new User Consultative Committee in July, 2004.

Organization for Construction



Summary

- Status
  - Construction for both equipments and facilities: Almost on schedule.
  - Budget: Slower budget than we anticipated. One year delay of the completion is expected at this moment (= 7 year project instead of 6).
  - Ancient salt farms: Archeological studies will be completed in August. Half a year delay due to these studies, but no major impact on the schedule as compared to the delay induced by the budget.
- Interim Review in November, 2003
  - Neutrino and the energy recovery of linac to 400 MeV were the main issue. Immediate start of the neutrino and a timely recovery of the linac energy were recommended. → Neutrino from JFY2004 was approved.
  - Initiation fund for the neutron beam lines was added in 2004 at JAERI.
- Other Issues
  - Sharp rise of the construction budget is needed still for JFY2005 to keep the 7 year project.
  - Organizational structure at the operational stage? PAC (time and place)?
  - How to reflect opinions from communities into the construction priorities.
  - Need to start to estimate the operational budget.
  - Mechanism of creating neutron beamlines, beamtime fee, power users, etc.