

March 10, 2003

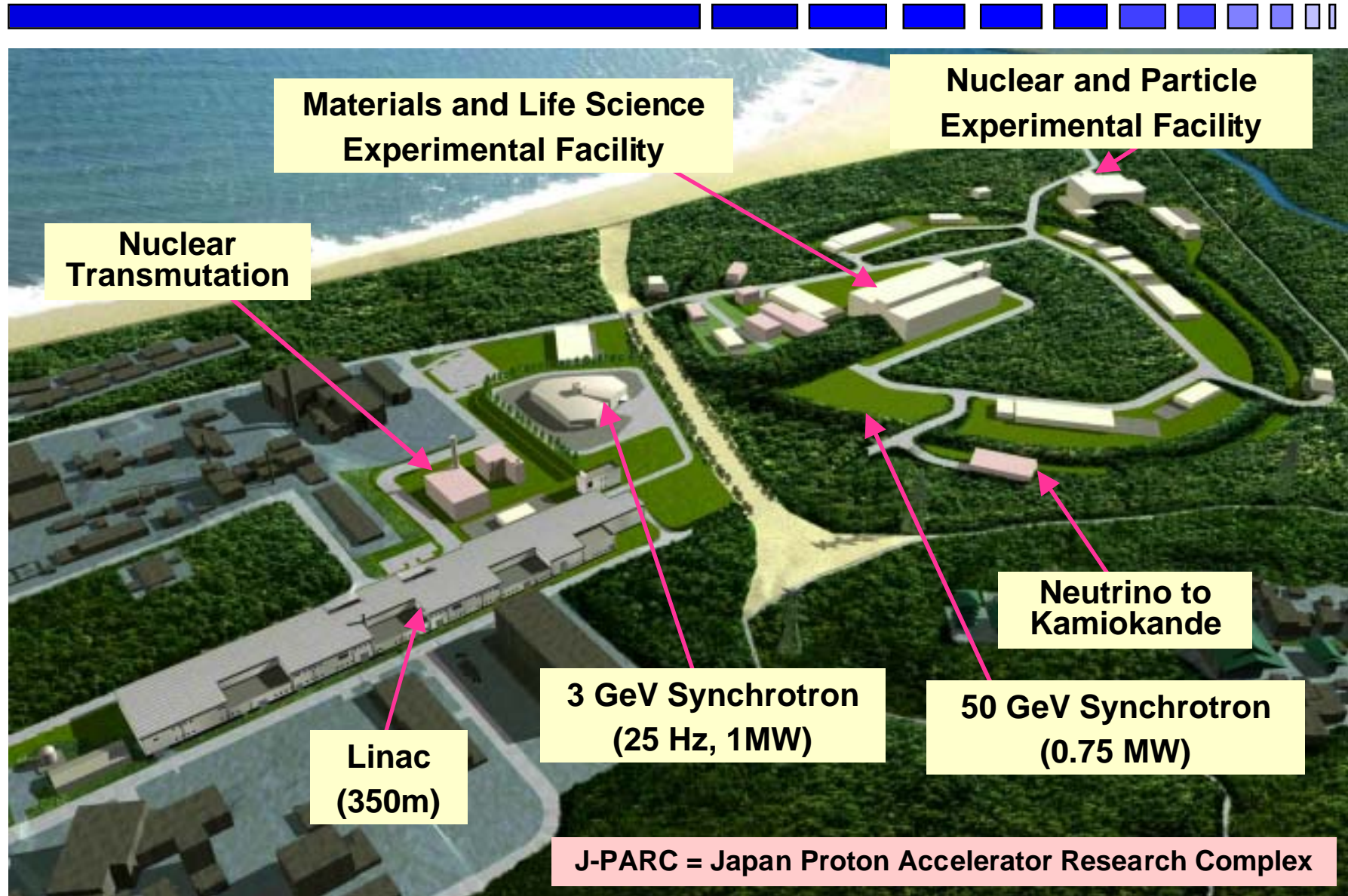
J-PARC One Year Progress

Shoji Nagamiya
KEK/JAERI

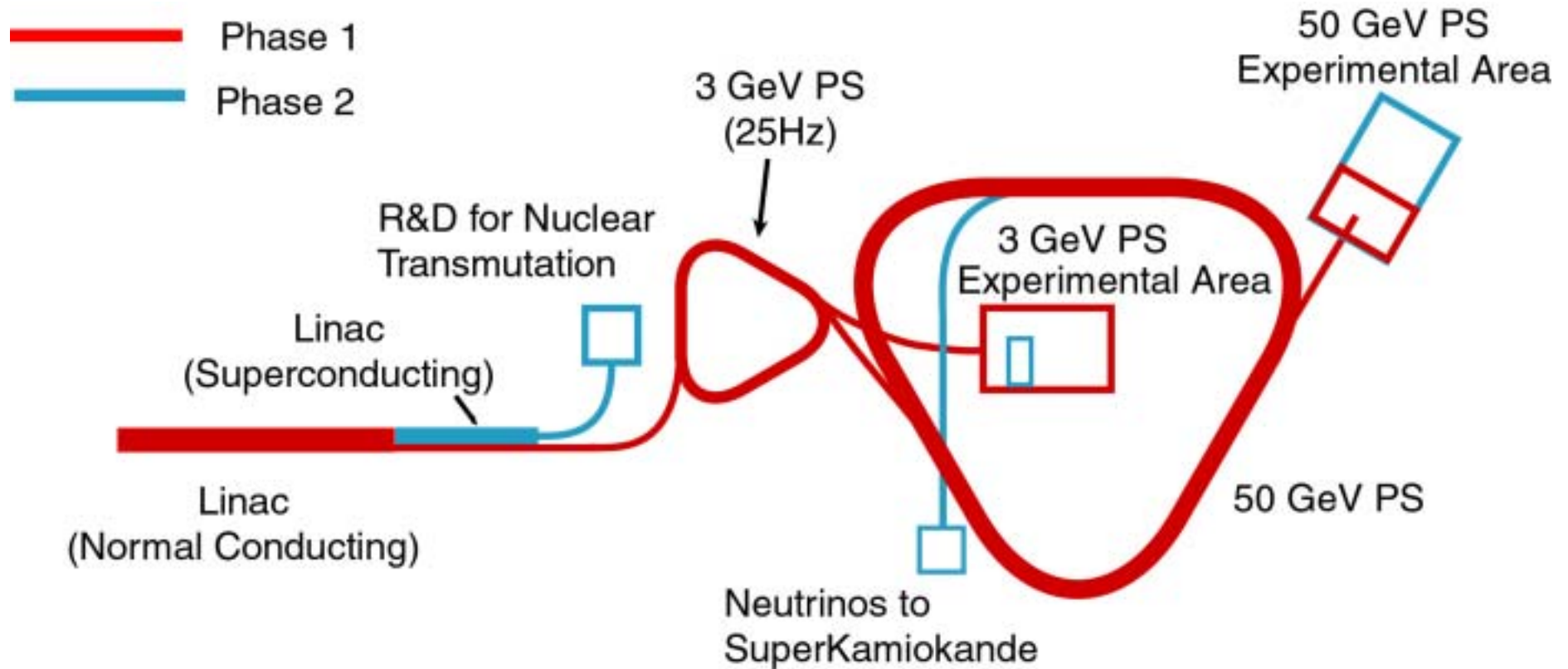
What is J-PARC?

(A brief reminder)

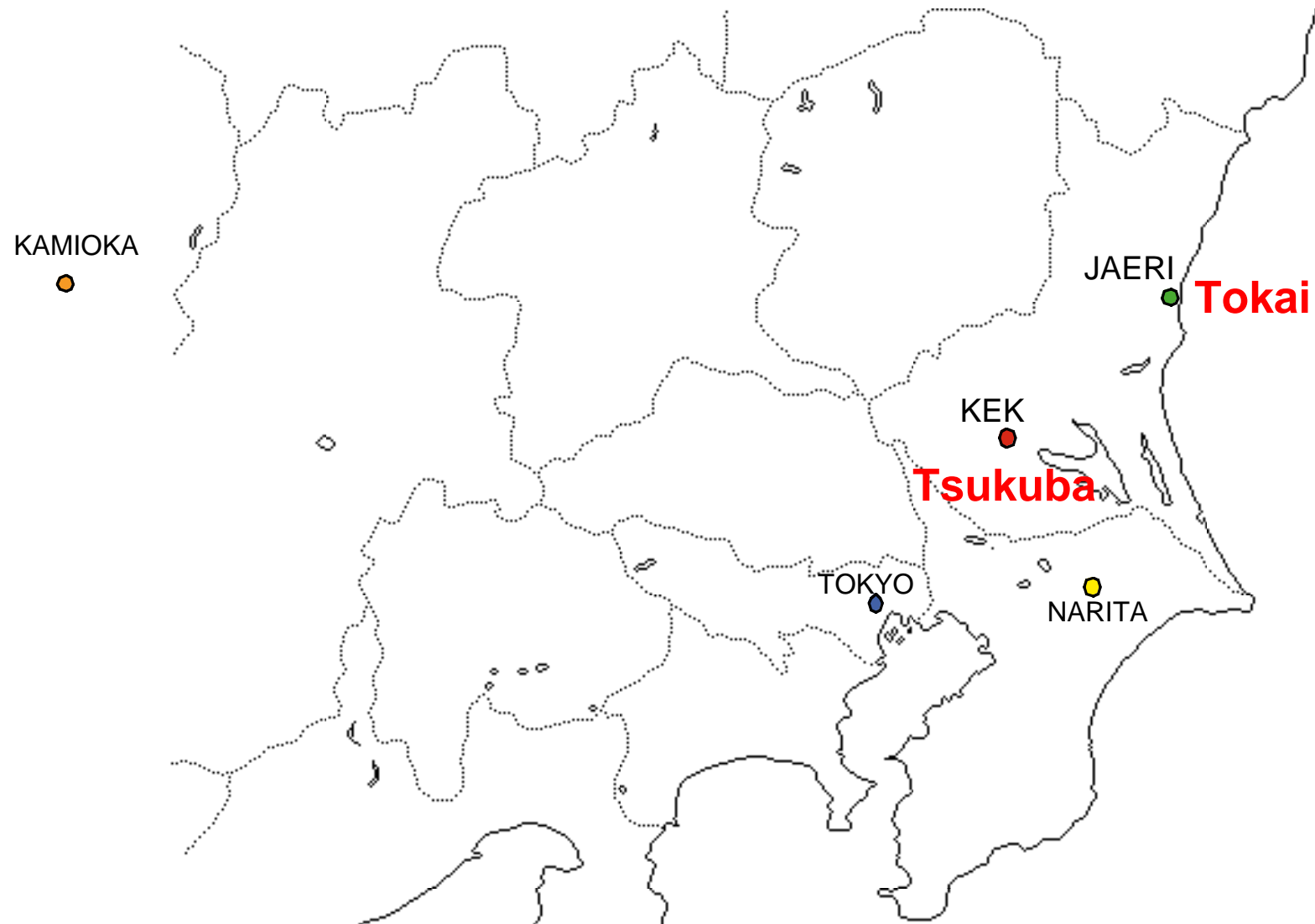
J-PARC Facility



Phase 1 and Phase 2

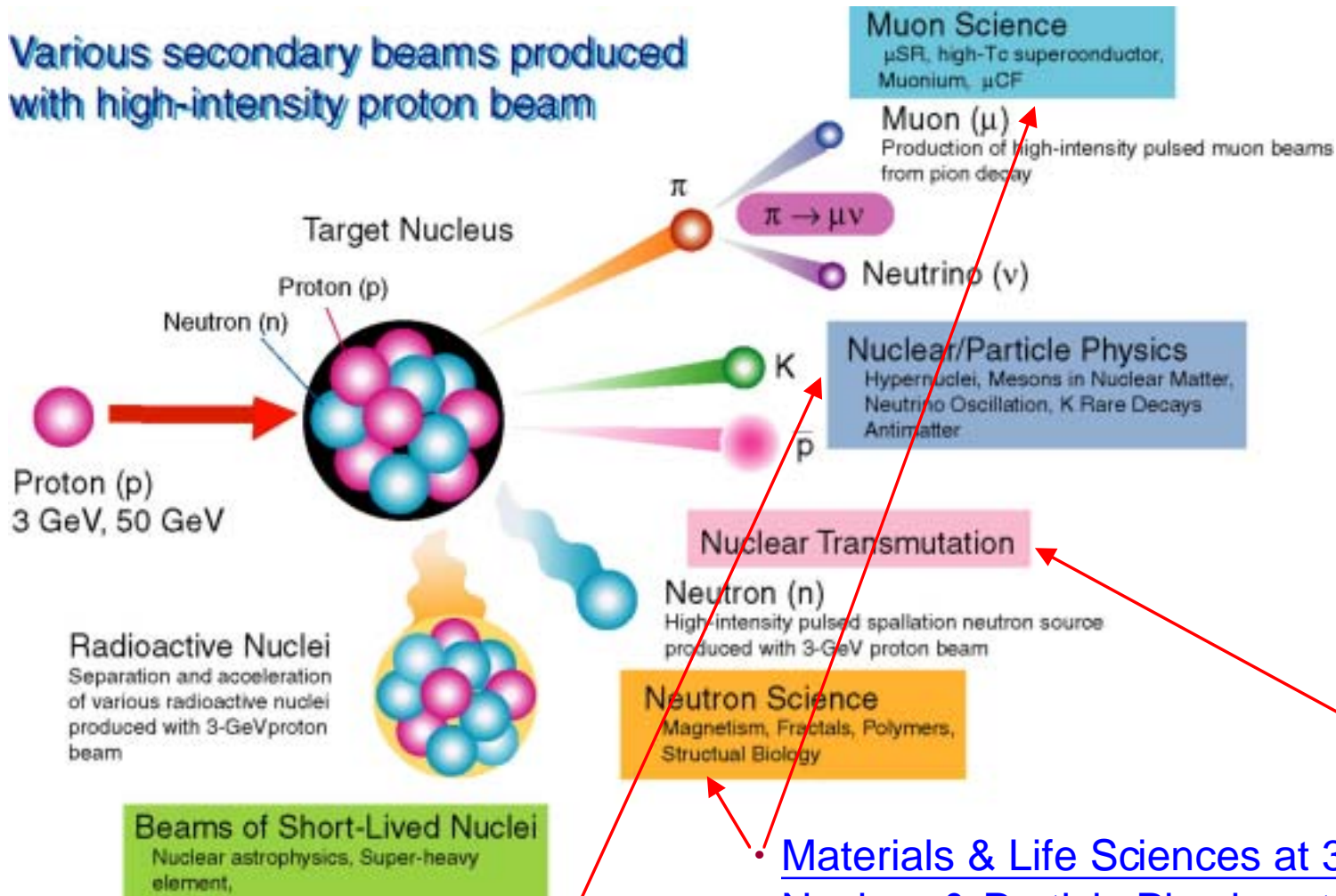


Location of JAERI at Tokai



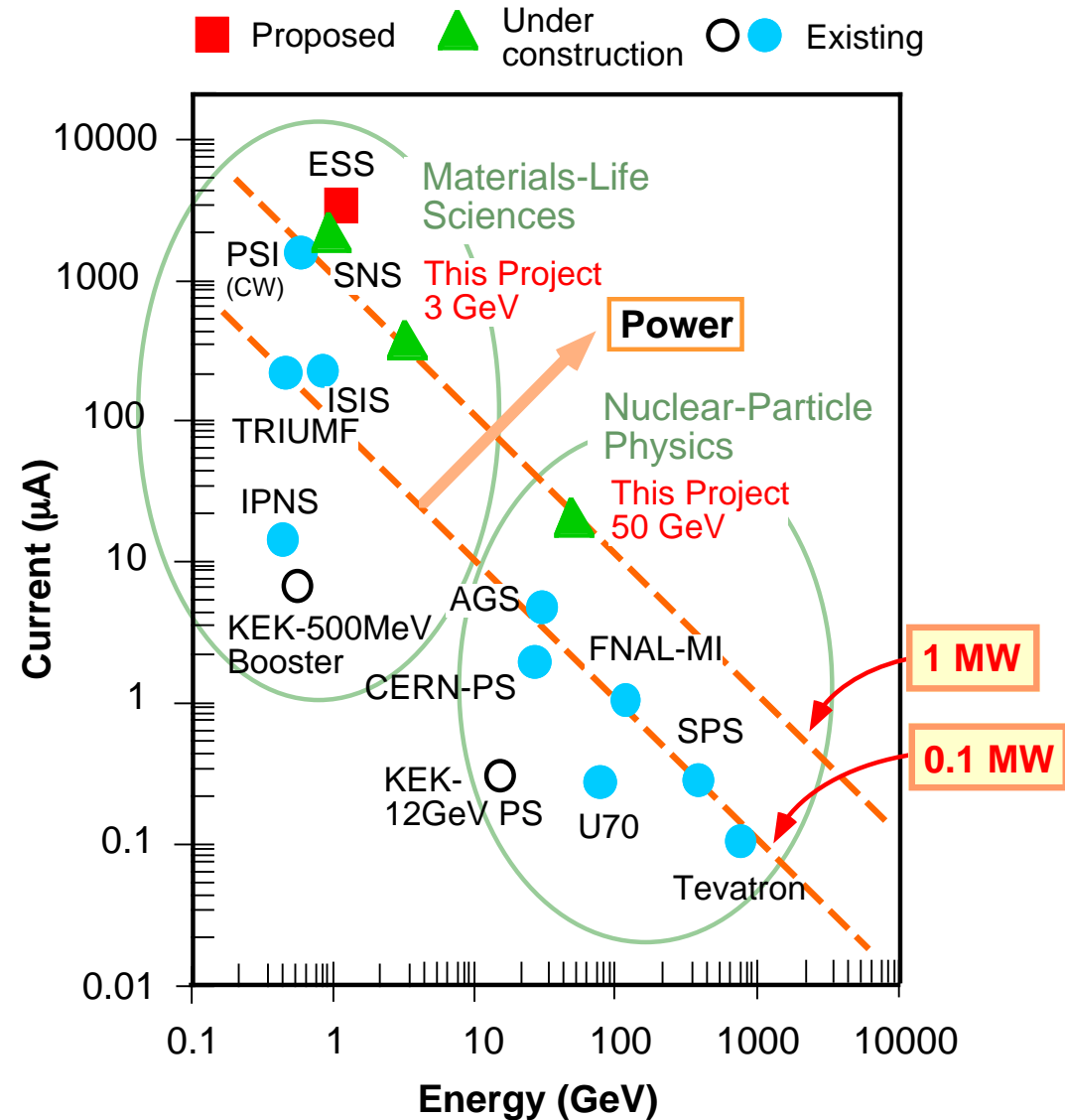
Three Goals at this Facility

Various secondary beams produced with high-intensity proton beam



- Materials & Life Sciences at 3 GeV
- Nuclear & Particle Physics at 50 GeV
- R&D toward Transmutation at 0.6 GeV

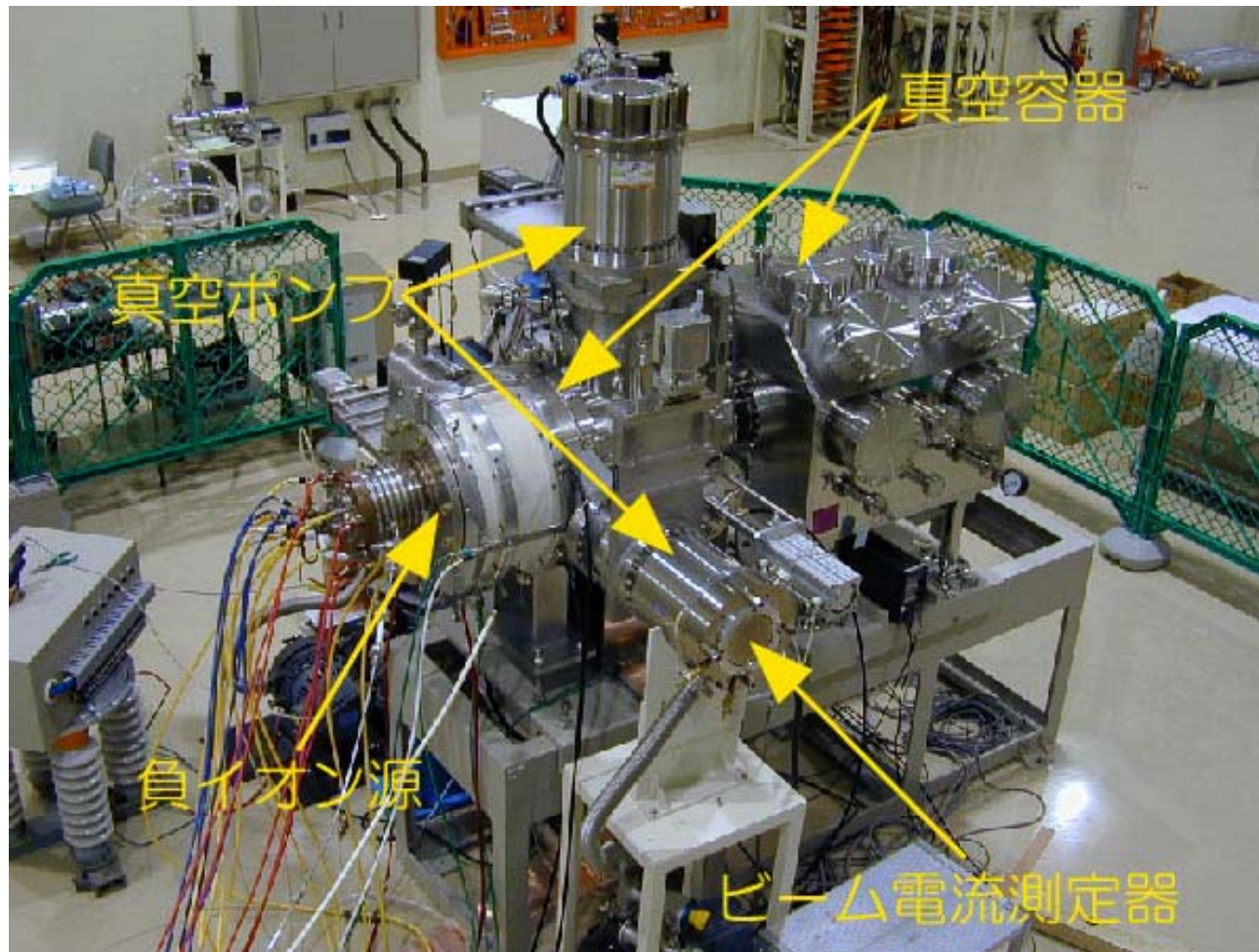
World's Proton Accelerators



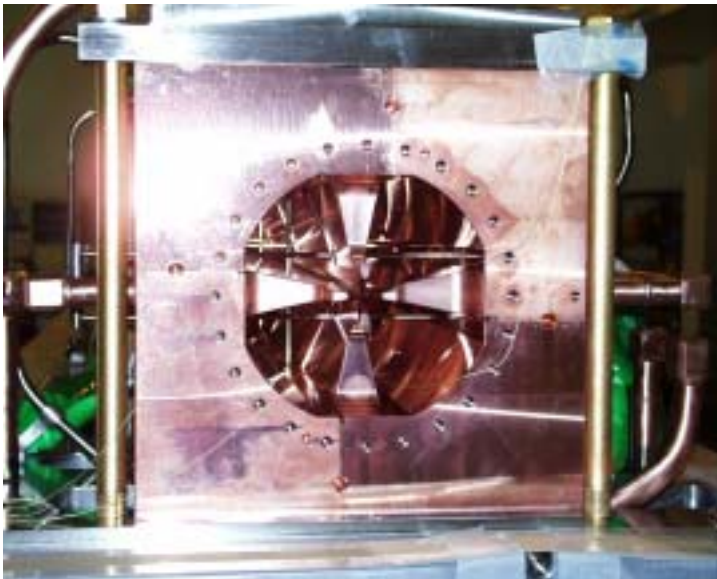
Overall Progress

H⁻ Ion Source

70 mA の電流値を達成 (spec=60mA)



RFQ and DTL

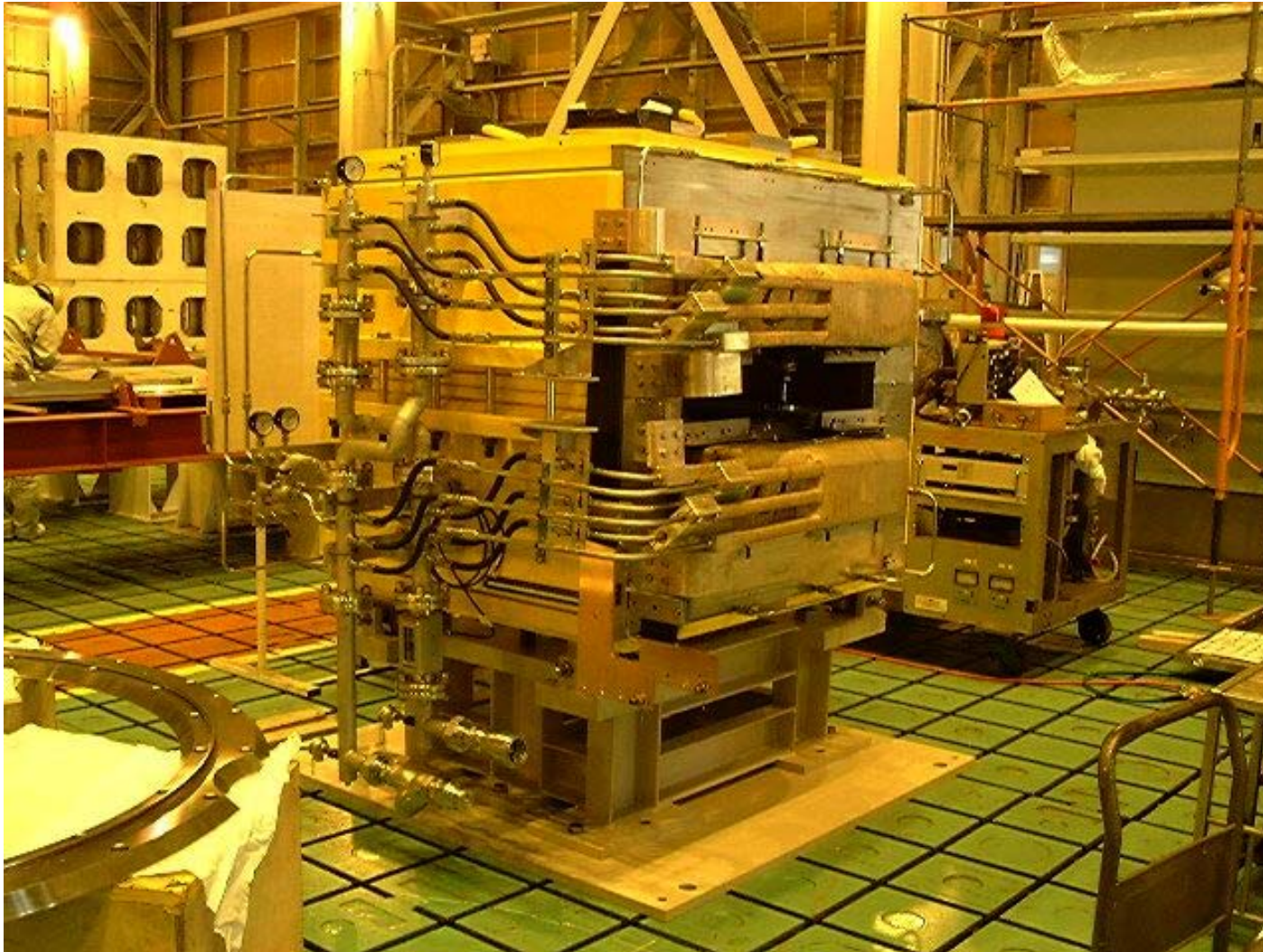


RFQ with π -mode stabilizing loop



DTL with quadrupole magnet imbedded

Magnet for 3 GeV



Vacuum Chambers



(直径200,長さ650 x 3mm)

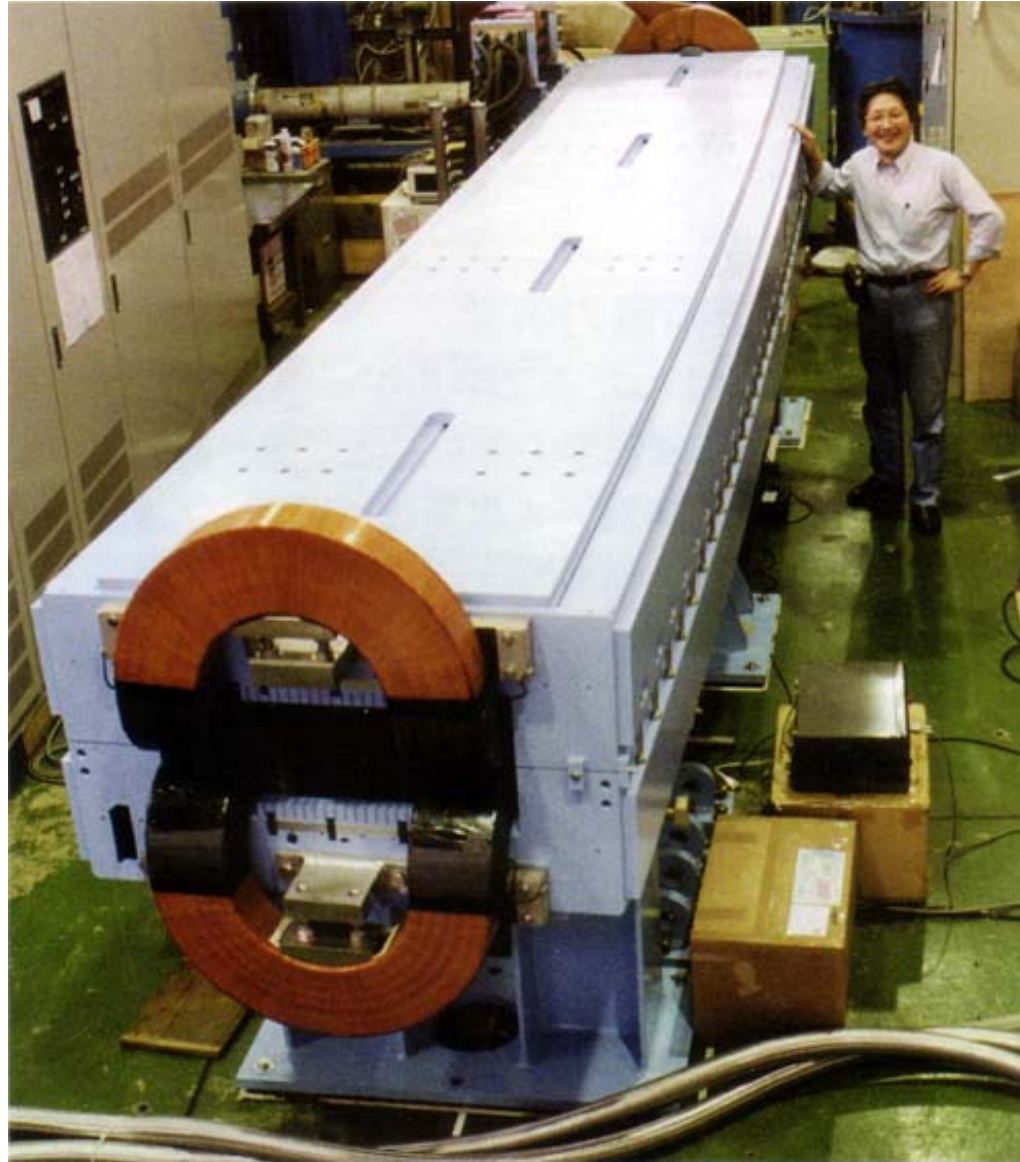
Ceramic Tube

- ・メタライズとロウ付けで接合
強度270MPaを達成
- ・セラミックダクトにTiフランジ
接合に成功

Ti ベロー



50 GeV Magnet



Ground Breaking Ceremony



June, 2002



Expected View at the Completion



Linac Area (Left) and 3 GeV Area (Right)



50 GeV Area



Expected View at the Completion



Bridge and Road for Construction Work



Walking Road and Park for Local Village



2 4 5 号から晴嵐の碑への道路



晴嵐の碑周辺の広場

Opening Ceremony



Visit by Minister Toyama



December 2002



遠山文部科学大臣ご視察

Other Progress

Other One Year Progress (1)



- Science Frontier 21 (created by Ibaraki Prefecture):
 - The first general report was published at the end of March, 2002. In order to develop science cities in the North Ibaraki area, three points were emphasized: 1) promotion of industrial usage of neutrons, 2) internationalization of the Tokai village, and 3) the need of education for young generations.
 - The follow-up committee was created. This committee's final recommendation will be discussed at the end of March, 2003.
 - The Ibaraki Prefecture is preparing a significant fund to support J-PARC.
- Safety Issues:
 - A high-level committee for Safety was created under KEK and JAERI. Two meetings were held, primarily to discuss radiation safety first.
 - Rules in case of emergency were agreed between KEK and JAERI.
 - Agreement between KEK and JAERI on the maintenance and supplies on electricity was signed.

Other One Year Progress (2)



■ Communities:

- Physical Society of Japan: Several special sessions in annual and divisional meetings.
- Special sessions at communities of neutrons, muons, nuclear physics, and particle physics. Discussions at the Atomic Energy Society became active these days.

■ Organization at the Operational Stage:

- Discussion Points:
 - Needed budget and needed manpower for the operation of J-PARC
 - Basic structure of the organization
 - Relations to a) international communities, b) academic organizations including both universities and institutions, and c) industries
 - Relation of the J-PARC organization to KEK and JAERI
 - How to establish Tokai branch at KEK?
- Two Task Forces were created at the Project Team and at the KEK. Over ten meetings each were held from the summer 2002 to now.
- Also, the discussions at KEK's council meetings were held several times since the fall 2002.
- No final conclusions. Discussions will continue.

Manpower & Budget for Operations



Very Preliminary!

			Manpower Survey				
		KEK			JAERI		Total
	Researcher	Technicians	KEK Total	Researcher	Technicians	JAERI Total	
Needed	133	72	205	165	75	240	445
Available Now	87	43	130	65	75	140	270
Administration + Building Maintenance + Manpower from Companies are excluded.							
			Budget Survey				Unit = Oku Yen
	Electricity	Maintenance	Exp't Fund	Travel	Outside Manpower	Others	Total
Minimum Need	97.4	57.1	16.3	4.9	15.7	11.6	203

Other One Year Progress (3)



■ Other Notable Events of the Project:

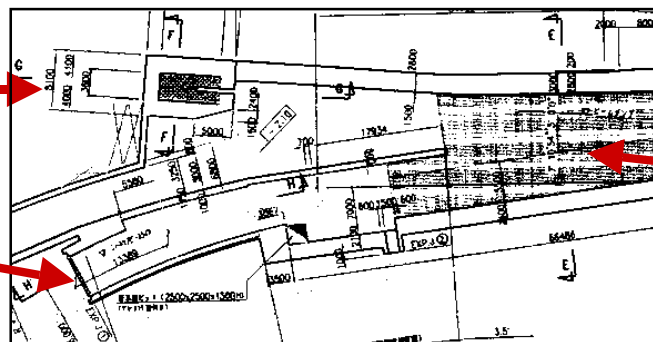
- Geographical studies, in particular, on the change of underground water due to a large construction job have been started by an initiative of the National Institute of Advanced Industrial Science and Technology (AIST).
- Regular meetings are held between the project team and the local inhabitants.
- Designing of planting trees at the construction site was started under the guidance of an expert on forest.
- A new computer network was installed between KEK and JAERI. This VLAN forms one domain specific to the project.
- The Opening Ceremony was held on October 28, 2002. The acronym was announced in public on that date.
- Web page: <http://j-parc.jp/>
- Many CDR's are being created (accelerator, materials and life, nuclear and particle, control, etc.)
- Lol's were called for in a) neutron instruments and b) nuclear and particle physics experiments.

Necessary Arrangements to be Made Now



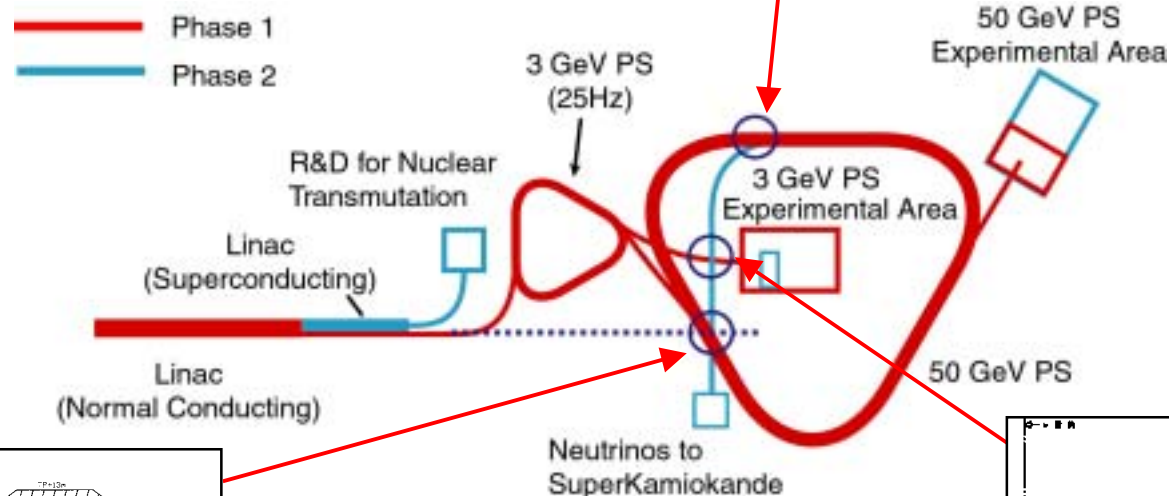
Reserved area for an additional fast extraction

Fast extraction for neutrinos

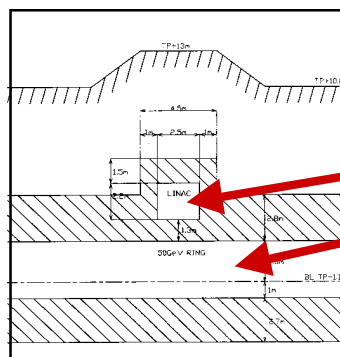


50 GeV
main ring

Plan view



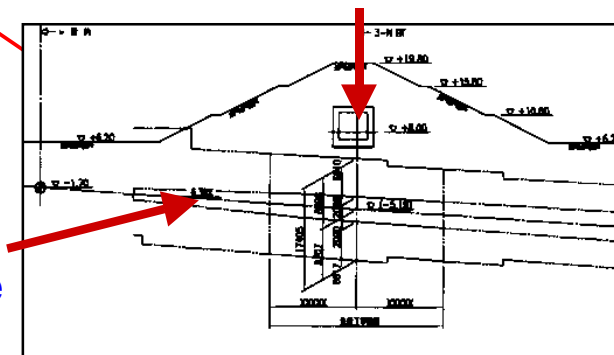
Beam transport
from 3 GeV to
exp'tal area



Tunnel for a future linac

50 GeV tunnel

Vertical View from the left



Neutrino
beam line

Vertical View from the left

Other One Year Progress (4)



■ KEK and JAERI:

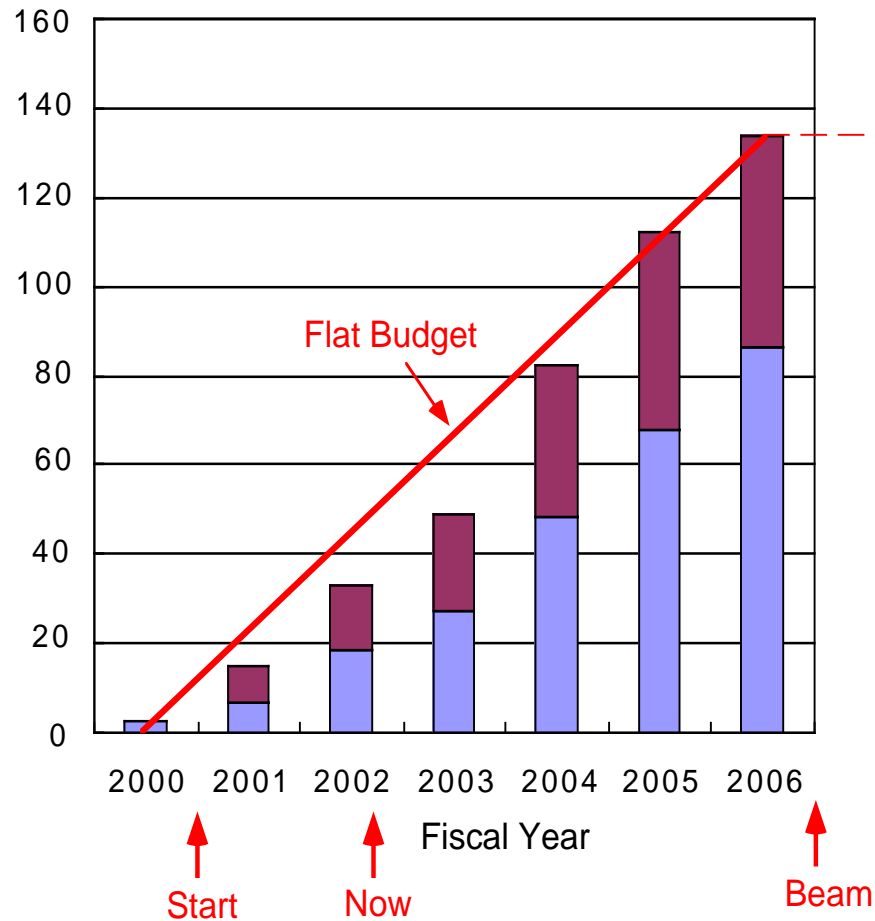
- KEK will be changed to an Agency in JFY2004.
- KEK Management will be changed from JFY2003 (Director General is Yoji Totsuka, Director of IPNS is M. Kobayashi and Director of IMS is A. Koma.).
- JAERI and JNC (Japan Nuclear Cycle Development Institute) will merge together to form one agency in JFY2005, forming a huge organization.
- JAERI Management has also been changed in the middle of JFY2002 (President is Shinzo Saito, Vice Presidents are T. Okazaki and S. Aoe).

Budget, Schedule, Organization

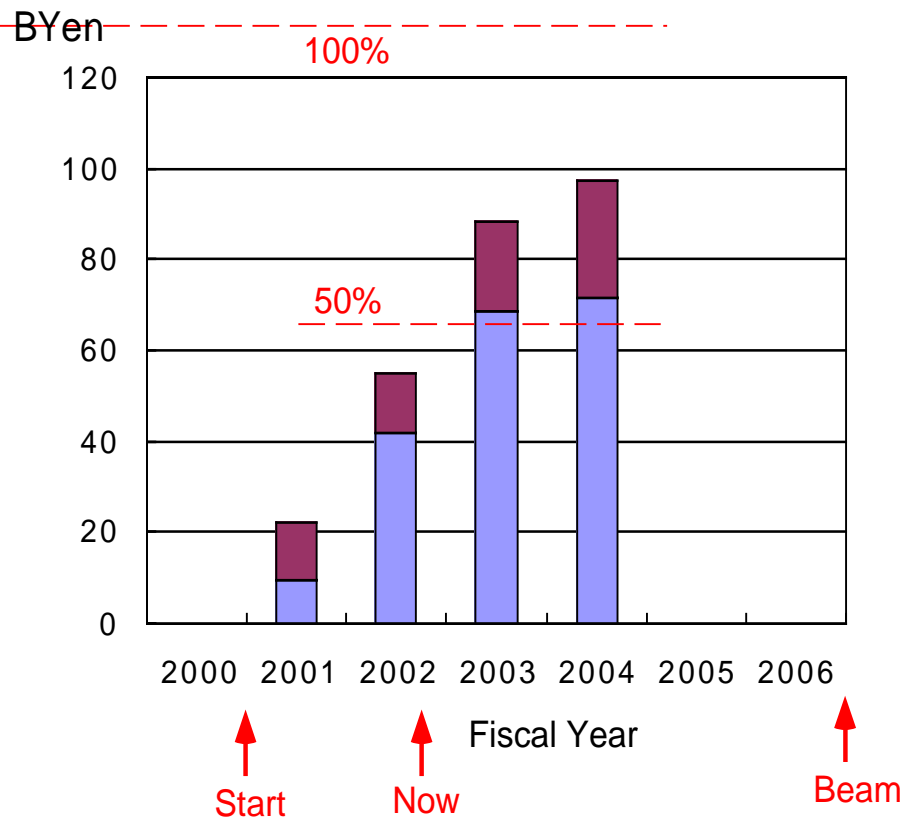
Construction Budget for Phase 1



BYen Integrated Expenses (incl. future plans)



Amount of Purchase Commitment (incl. future plans)



Progress and Issues



■ Good news:

- At the end of the third year (JFY2003), about 70% contracts will be completed.
- At JAERI the creation of the “Neutron Science Research Center” was approved, starting in JFY2003.

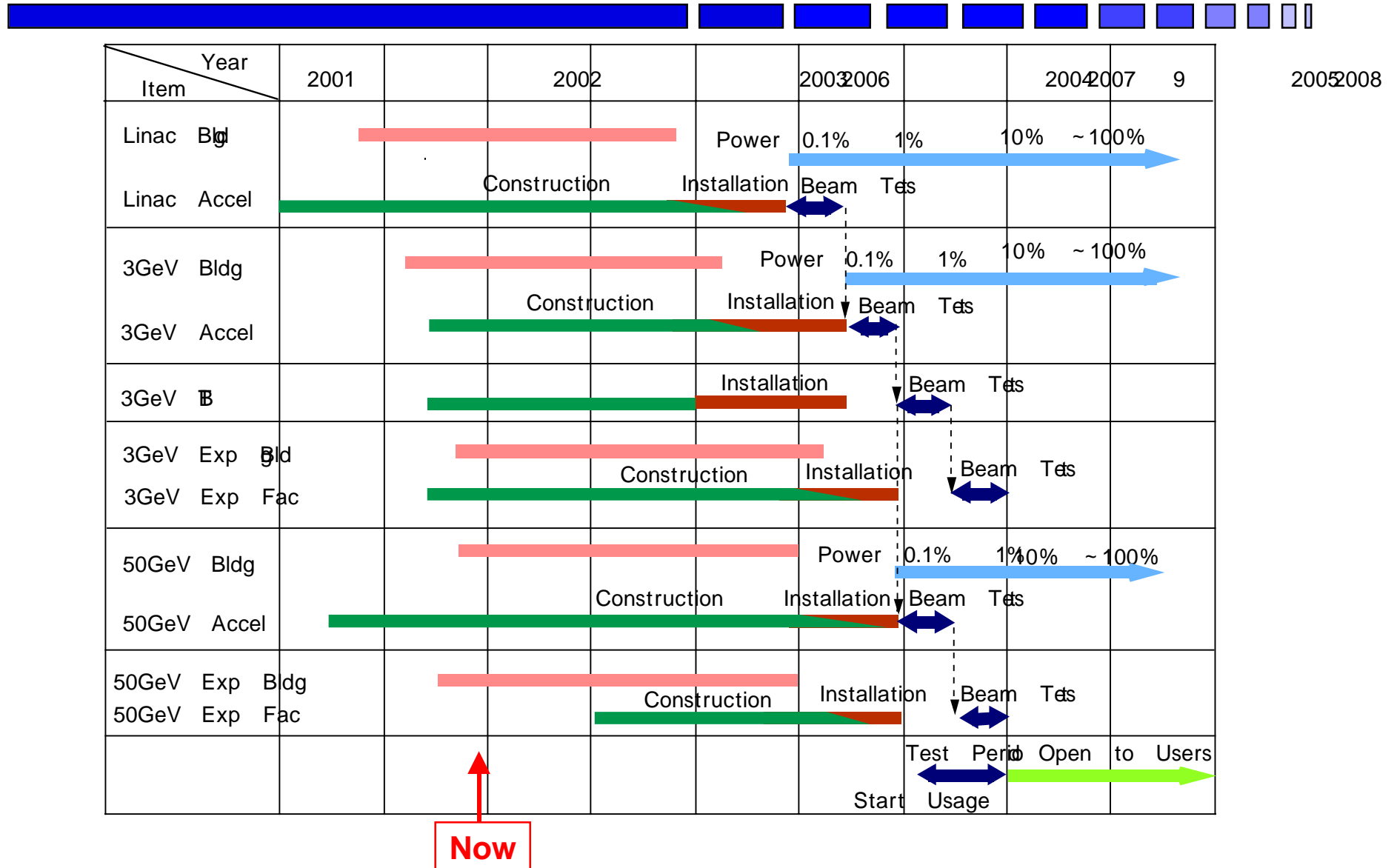
■ Issues:

- JAERI’s responsibility = 865 BYen (First 3 yr fund = 30%)
[Note that KEK’s responsibility = 471 Byen (First 3 yr fund = 46%)]
- Cost for Linac and 3 GeV (see the talk of Y. Yamazaki)

■ JFY2003 Request:

- Funding for “neutrino” was not approved for JFY2003.
 - We will submit the proposal again for JFY2004.

Construction Schedule & Commissioning



Progress and Issues



■ Good news:

- Linac: 80% contracts completed.
- 50 GeV: 60% contracts completed.
- 3 GeV: 50% contracts completed.
- Materials & Life Experimental Facility: 40% contracts completed.
- Construction for 3 GeV and Linac areas are in progress (see pictures presented before).

■ Issues:

- Remains of ancient salt farms were discovered in the area of 50-GeV construction site.
- Extensive archeological studies of these remains will be performed during JFY2003 and perhaps in JFY2004 as well.
 - introduces a delay of construction work by **at least half a year.**

Coins



仮設燃料輸送道路（試掘№12-1）



この付近よりお金が一枚出土（人骨が出土した付近）



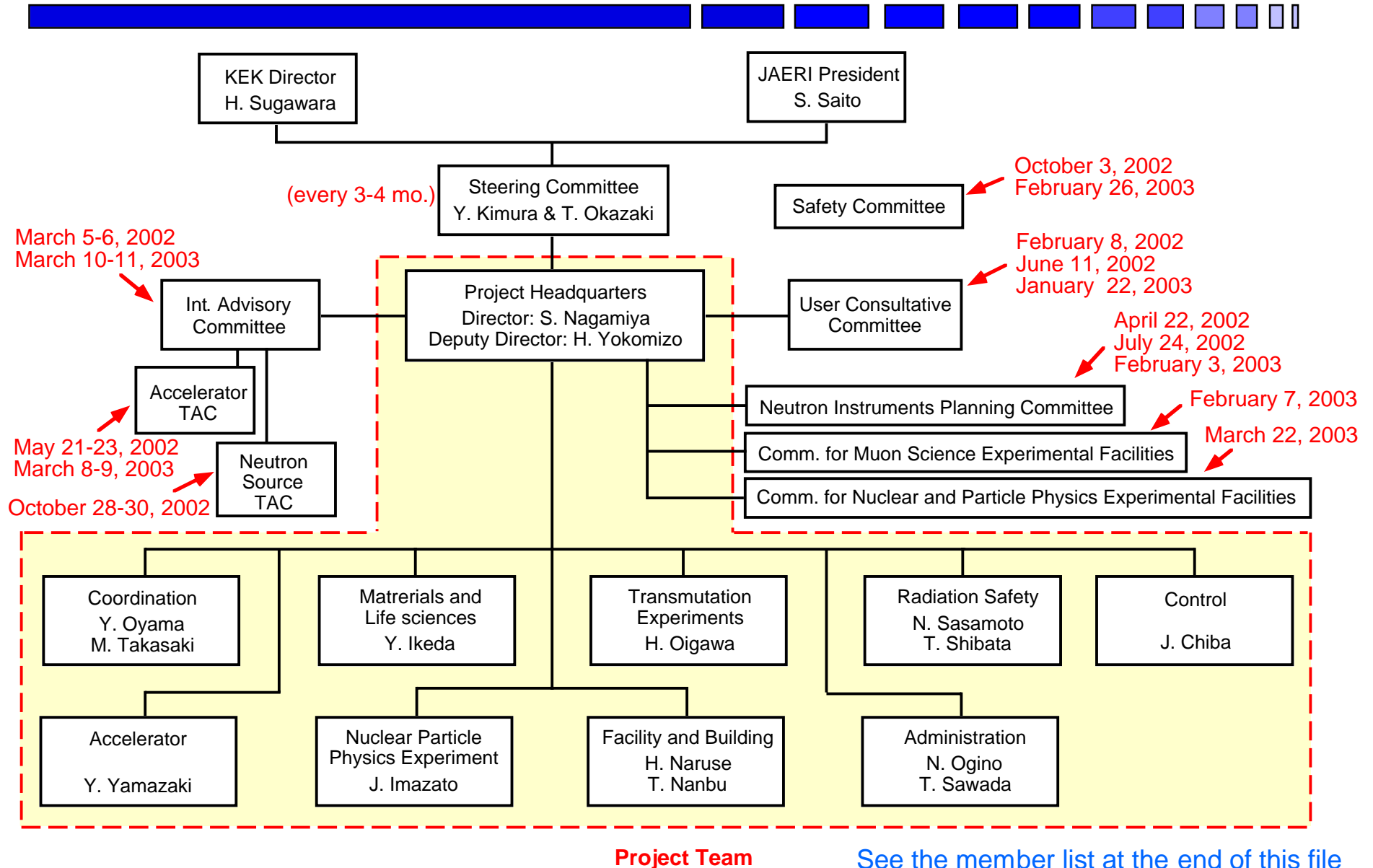
永楽通寶（表）



永楽通寶（裏）

Discovered
On March 6, 2003

Organization for Construction



Progress and Issues



■ Good news:

- Many needed committees have been created during the past one year.
- Out of 8 standing committees for the project, 6 committees include members outside Japan.
- Neutron instrumentation: Call for Lol's will be made every year. 18 Lol's were submitted this year.
- Nuclear and Particle Physics: Call for Lol's was made. 30 Lol's were submitted.

■ Issues:

- Although many committees for sciences were created, no equipment budgets have been approved for any experiments.
- Travel budget is very limited to invite committee members, to afford communications between two institutions, etc.

Replies to Recommendations

Replies to Recommendations (1)



Accelerator

- **Recommendation #1:** We **recommend** that Project Management should develop a strategy for assuring that sufficient manpower is assigned to the accelerator project to assure successful completion.
 - Efforts made to create new positions (about 10 positions) for accelerators.
 - A few people were converted from B-Factory to J-PARC.
- **Recommendation #2:** We **recommend** that availability/reliability criteria be developed and formally communicated to the accelerator design/construction team.
 - The beam commissioning schedule is being created (see early figure for the first-order scenario).
 - Regular meetings with users are held to communicate between accelerator physicists and the users.
 - An issue discussed during the past one year was on the linac energy and its influence on the beam power for experiments. Meetings have been held with the neutron community and nuclear/particle community.

Replies to Recommendations (2)



Nuclear and Particle Physics

- **Recommendation #3:** We **recommend** that the Super Kamiokande detector be rebuilt as a matter of urgency to start this program as soon as beam is available from the 50 GeV accelerator.
- **Recommendation #4:** We **recommend** that ways be studied to bring forward the high power operation of this accelerator and the development of the associated neutrino beamline.
 - The four year budget proposal (JFY2003-2006) for neutrinos was submitted from KEK as the first priority item of the project team. The total budget is 16 BYen.
 - Unfortunately, the request was not approved for JFY2003. We will try for JFY2004 again.
 - A strong endorsement from this IAC will help.
 - Studies are in progress to attain a higher beam power (after the completion of Phase 1, though).

Replies to Recommendations (3)



Nuclear and Particle Physics (continued)

- **Recommendation #5:** Because of strong effort in current rare K-decay searches, the Japanese scientific community can develop a world leading program in this field. The committee endorsed the science objectives as world class with the **recommendation** that priorities be set and international collaboration be encouraged to maximize the cost-benefit ratio of the rather expensive investments which are required for such searches.
- **Recommendation #6:** The hypernuclear program would most benefit from the very high intensity available at the Joint Project with the existing suite of instruments already developed or possibly obtained from other laboratories. It is **recommended** that a careful prioritizing of the initial physics objectives be undertaken.
 - Lol's were called. Currently many Lol's for slow-extracted beams were submitted. A committee was formed to evaluate these Lol's.
 - Based on the committee's recommendations, the design of the beam line for Phase 1 will be decided. The committee report will also be reported to IAC.

Replies to Recommendations (4)



Materials and Life Sciences

- **Recommendation #7:** The centerpiece of the material and life science facility is the neutron spallation source associated with neutron scattering facilities. **We recommend** that very high priority be attached to the world class' construction of these facilities. The associated muon facilities will give a great improvement in intensity over the current KEK facility and will be outstanding after realisation of Phase II.
 - Neutron science has a very high priority.
 - Calls for Lol's have been made during the past one year. The call will be made every year.
 - Construction budget for beamlines and equipments has not been taken care of.
- **Recommendation #8:** We believe that it is most important to stimulate participation in this life science facility by active institutions in this area such as RIKEN to define a strong life science research program.
 - Effort still needed for this recommendation.
 - An effort to create a new graduate course at Ibaraki U. was initiated.

Replies to Recommendations (5)



Materials and Life Sciences (continued)

- **Recommendation #9:** We understand that funds will have to be found and priorities set to allow a critical suite of new instruments to be available on day one. We **recommend** that the Director develop ways of doing this, in the budgetary context, during the coming year.
 - A budget proposal of 2BYen was sent to the Government, but it was not approved. A continuous effort will be made.
 - Ibaraki Prefecture is considering the support for instrumentation.
- **Recommendation #10:** We **recommend** that proposals, selection and design of dedicated muon facilities and/or experiments should now be started by the Japanese and international experimental community. The design of the proton target station should not preclude the optimization of muon facilities.
 - Committee for Muon Science Experimental Facilities was created. Representatives from the world user communities attended at this committee meeting.
 - Additional efforts toward the muon facility are being discussed.

Replies to Recommendations (6)



Nuclear Transmutation

- **Recommendation #1 1:** We believe that Japan has a unique opportunity to play a major role in the demonstration of nuclear waste transmutation with accelerator driven systems. We encourage JAERI and KEK to further develop their contacts with foreign research organizations and obtain their participation and support for the TEF, particularly the TEF-P. We believe that given the concern of Japanese citizens it is of strategical importance that an initial design and safety analysis activity for the TEF-P be funded in Phase I of the project.
 - ADS is one of three major goals of J-PARC.
 - On March 24-25 a workshop is held in Tokyo by inviting many eminent scientists from the US, Europe, China and Korea. International collaborations will be discussed there.
 - R&D activities are in progress (see the presentation by H. Oigawa).

Replies to Recommendations (7)



Budget and Organization

- **Recommendation #12:** We believe that given the budgetary, manpower and schedule constraints posed by the splitting of Phase I and Phase II a clear prioritization of projects is necessary in the coming year.
 - Phase 1: Selected experiments both for a) neutron science and b) slow-extracted beams in nuclear/particle physics have the highest priorities.
 - Issues, however, are that both experiments have not yet been funded. In the worst case, the KEK's equipments will be shipped to JAERI. Need efforts to obtain funding.
 - Would like to explore possibilities to ship equipments from outside Japan.
 - Neutrino proposal will be sent this year for JFY2004 (KEK).
 - Another urgent item is the recovery of the Linac energy to the original design goal (JAERI).
 - Phase 2:
 - KEK: Neutron equipments, muon beamlines and equipments, extension of the K-Hall, 50 GeV upgrade.
 - JAERI: ADS + Superconducting Linac

Replies to Recommendations (8)



Budget and Organization (continued)

- **Recommendation #13:** We **recommend** a policy of "world class standard" in the quality of the construction of the accelerators and the initial suite of supporting instruments even if the number of instruments or experiments has to be limited..
 - Selecting the the best experiments is the first important task. The relevant committees will select Lol's.
 - Finding the money is another important task. The Government suggests to find other resources such as "Grant-in-Aid in Science" money, etc.
 - Traditionally, the experiments were supported in Japan (or at KEK) by the operational budget.
 - Creation of a budget framework to support experiments at accelerator facilities is, however, the national issue.
 - The Ibaraki Prefecture is preparing a significant money to support a few beam lines and equipments for neutrons.

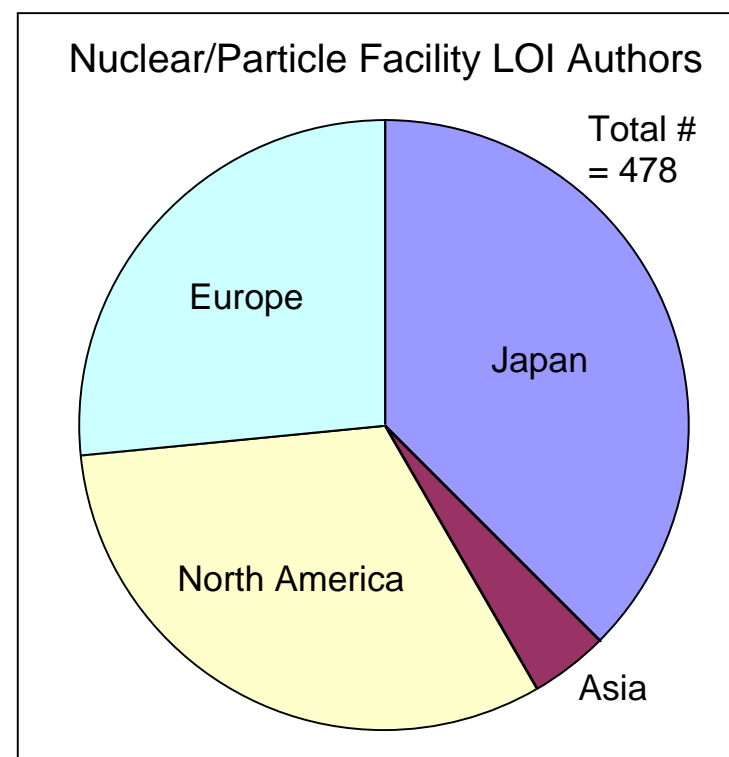
Replies to Recommendations (9)

Budget and Organization (continued)

- **Recommendation #14:** We believe that the different workshops organized to discuss international collaboration around this project have already attracted the world attention. It is at the scientific and technical level that Japan has the best chances of success in attracting international support. We

recommend that attraction of international collaboration be one of the priorities of the director.

- For neutrons: Much more efforts are needed from now on.
- For nuclear and particle physics: A workshop was organized in the fall of 2002. LoI' were submitted later by 478 physicists, with 2/3 from outside Japan.
- Asian participation is still an issue for the future.



Replies to Recommendations (10)



Budget and Organization (continued)

- **Recommendation #15:** We **recommend** that the director of the facility establish several PACs, one for each machine's scientific program, and solicit program and beam priority advice separately from each of these committees. For issues and conflicts among the programs of the individual machines, the director should rely on advice from a high-level, facility-wide policy committee such as the IAC.
 - Three committees are now working. Each committee will select scientific programs and initial construction items. Priority of the beam will also be discussed.
 - Since each committee has not reached any conclusions at this moment, the conflict will be discussed at the next IAC.

Replies to Recommendations (11)



Budget and Organization (continued)

- **Recommendation #16:** The Committee commends the Director for the structure of project committees set up in the last year. These have started to work effectively. Their integration into the management of the science program after start up deserves some thought. We **recommend** that this matter be discussed at the next meeting of the International Advisory Committee along with the development of the scientific user community. Input from the User Consultative Committee would be desirable on this point.
 - The User Consultative Committee had two meetings during the past one year. The main effort there was to create the best organization to allow the maximum and convenient usage of the facility after its completion. Task Force was created under this guideline.
 - Useful comments on science priorities have also been obtained from this committee.

Replies to Recommendations (12)



Budget and Organization (continued)

- **Recommendation #17:** We **recommend** that budgetary delegation be given to the Director subject to half yearly review by the Steering committee.
 - Nice advice.
- **Recommendation #18:** Because of the importance of international collaboration we **recommend** that international collaborative delegation be given to the Director subject to half yearly review by the Steering committee.
 - Again, nice advice.

Memo on Issues

Issues (1)



■ Schedule, Budget and Manpower:

- Construction of 50 GeV facilities will be delayed at least by half a year due to discovery of ancient salt farms.
- Budget has a shortage for linac and 3 GeV.
- Per-year budget need a sharp increase in JFY2004 in particular at JAERI (80 Oku to 200 Oku).
- Need detailed discussion with the funding agency, including the funding scenario, schedule, etc.
- Shortage of the manpower for construction (this is always an issue).

■ Accelerator:

- The change in the linac beam energy is the major concern. A decent recovery scenario must be established.
 - Director's Ad Hoc Committee was created to review this point. Two tasks were charged: 1) to decide what must be done now in order to avoid a long shutdown in later years, and 2) to solicit the next major mile stone(s) for recovery.

Issues (2)



■ Nuclear-Particle:

- We would like to start “neutrino” in JFY2004.
- The present 12 GeV PS will be closed soon. The continuation of the activities from the 12 GeV PS to the J-PARC 50 GeV is a concern.
 - Experimental programs, movement of equipments from KEK to J-PARC.

■ Neutrons:

- Shortage of the beamline and equipment funds.
- Need to explore new mechanisms in obtaining fund, in addition to the present budget route from the Government.
- Needs work to make it international.

■ Muons:

- What to do about muon beamlines and equipments?

■ ADS:

- Funding scenario must be worked out.

Issues (3)



■ Organization at the Present Stage:

- It takes time to reach an agreement between KEK and JAERI on many issues. For example, it took half a year to complete the KEK-JAERI agreement to form a committee for the project. Endless time is needed to establish safety regulations. etc., etc.
- Much more frequent interactions between KEK and JAERI headquarters are needed.
- Effects of changing into agency for both KEK and JAERI+JNC ???

■ Organization at the Operational Stage:

- The central argument on the organizational scheme at the operational stage is if a strong leader for the J-PARC Center is required (or, if the J-PARC Center must be established). In addition, even if the J-PARC Center is established, what is the function of this Center? Does it cover research programs? Or, is the function limited to the machine operation and safety alone?
- Opinions are currently split. Need continuous discussions.