KEK/J-PARC-PAC 2009-18
January 17, 2010

J-PARC Program Advisory Committee

for the

Nuclear and Particle Physics Experiments at the J-PARC 50 GeV Proton Synchrotron

Minutes of the 9th meeting held on
Friday, Saturday and Sunday, 15-17 January 2010

OPEN SESSION (15,16-January-2010):

1. Welcome, Mandate of this meeting: K. Nishikawa (KEK)
2. J-PARC Accelerator Status and Commissioning Plan: M. Yoshioka (KEK)
3. Status of the SKS experiments: T. Takahashi (KEK)
4. E17/E15 status: R.S. Hayano (Tokyo)
5. J-PARC Muon Facility (MUSE): Y. Miyake (KEK)
6. P34 Presentation (A New Measurement of the Muon Anomalous Magnetic Moment g-2 and Electric Dipole Moment at J-PARC): N. Saito (KEK)
7. P33 Presentation (Measurement of Neutron Electric Dipole Moment): H.M. Shimizu (KEK)
8. P26 Presentation (Direct measurements of ω mass modification in $A(\pi^-,n)\ \omega$ reaction and $\omega \to \pi^0\gamma$ decays): K. Ozawa (Tokyo)
9. E06 (TREK) Report: J. Imazato (KEK)
10. Future Perspective of J-PARC: S. Nagamiya (J-PARC)
11. Report from Muon Task Force: S. Mihara (KEK)
12. E21(COMET) Report : M. Yoshida (Osaka)

13. E11(T2K) Report : Beam Line and Neutrino Facility: K. Sakashita (KEK)

14. E11 (T2K) Report : Near Detector Status: D. Wark(ICL/RAL)

15. P32 Presentation (Towards a Long Baseline Neutrino and Nucleon Decay Experiment with a next-generation 100 kton Liquid Argon TPC detector at Okinoshima and an intensity upgraded J-PARC Neutrino beam):

A. Rubbia (ETH Zurich)

16. P35 Presentation (A test experiment to measure sub-GeV flux in the on-axis direction at the J-PARC neutrino beam) : T. Kajita (ICRR, Tokyo)

17. P31 Presentation (Spectroscopic study of hyperon resonances below $\overline{K}N$ threshold via the (K^-, n) reaction on Deuteron) : H. Noumi (Osaka)

18. E14(KOTO) Report : T. Nomura (KEK)

19. Beam time plan: K. Nishikawa (KEK)

CLOSED SESSION(15,16,17-January-2010):

Present: I. Bigi, H. En'yo, A. Gal, M. Gross-Perdekamp, K. Hagiwara, M. Ieiri(Secretary), J. Imazato (Secretary), T. Kishimoto*, K. Kleinknecht, T. Kobayashi (Secretary), T. Komatsubara (Secretary), S. Kumano, T. Mori, T. Nagae, Y. Nagai, S.Nagamiya (J-PARC Center Director)*, S.N.Nakamura, T.Nakano, K.Nishikawa (IPNS Director), J.C.Peng, N.Saito (Secretary), M.Shaevitz, S. Shimoura, R.Tschirhart, K.Tokushuku (Chairperson), H.Yamamoto

*) Part of the time

1. PROCEDURE

The Director of IPNS, Koichiro Nishikawa welcomed the new members of the committee and thanked the outgoing members for their dedication and invaluable help during the initial period for the J-PARC PAC.

The minutes of the eighth J-PARC-PAC meeting (KEK/J-PARC-PAC 2009-9) were discussed and approved.

Specific committee members were assigned as referees for the various experiments. The list is appended as Appendix 1.

2. REPORT FROM THE IPNS DIRECTOR

K. Nishikawa introduced the organization of the lab. KEK is an inter-university research institute cooperative which constructs and operates its facilities to be open to Japanese universities as well as the international communities. The program of the lab is determined in close contact with the research communities. The KEK organization consists of the Institute of Particle and Nuclear Studies (IPNS), the Institute of Materials Structure Science (IMSS), the Accelerator Laboratory, and the Applied Research Laboratory and covers a very diverse program of scientific research including life science. A roadmap for the KEK program has been developed, and was presented to the J-PARC-PAC.

The present highest priorities in the J-PARC project are improvements of the accelerator performance to meet the design intensity, the beam requirements for the initial experiments, and upgrades of the accelerator and experimental facilities. The budget for JFY2010 was proposed by the Cabinet and will be discussed in the Diets. The total KEK budget is 29.5 billion yen, 0.5 billion yen smaller than the JFY2009 budget. The budget for J-PARC from KEK is 6.8 billion yen, a 0.3 billion increase from the previous year.

This past year has been a fruitful time for the main ring facilities at J-PARC. The first neutrino beams were produced and events have been detected in both the on-axis and off-axis near detectors of the T2K experiment. The K1.8, K1.8BR and KL beamlines in the hadron experimental facility became operational and the experimental groups have performed various beam surveys.

Following the recommendation of the PAC, the J-PARC Particle and Nuclear physics Coordination committee (JPNC) has been formed. Chaired by Prof. Masakazu Yoshioka (KEK), the JPNC is to coordinate the execution of the physics programs at J-PARC and, for example, will develop the beam time scheduling of the approved experiments, the planning of the facility and experiment layouts and provide coordination with the accelerator division.

The director reiterated the two-staged approval procedure for the PAC deliberations, as described in the minutes of the first PAC meeting. Stage-1 approval will be given by the IPNS director based on the recommendation of the PAC, if the scientific merit of the proposal is high and the experimental methods are sound. This approval will help the proponents negotiate with funding agencies. After stage-1 approval, the PAC will judge the feasibility of the experiment and give a recommendation for a stage-2 approval to the IPNS director. The feasibility judgment will be based on technical achievability, the reliability of the cost estimate and the manpower allocations. If necessary, after stage-1 approval, the IPNS director can ask the Facilities Impact and Finance Committee (FIFC), which is a committee setup under the IPNS director to evaluate the various aspects of the feasibility with respect to the Laboratory's program. A stage-2 approval may be given to the experiment by the IPNS director through the J-PARC Center, based on the recommendations of the PAC and consideration of the financial situation. The second stage approval is a green light for the experiment to proceed.

The Director has clarified that even if the proposed experiment requires further R&D to prove its feasibility, stage-1 approval can be issued when the PAC judges that the scientific merit is high and that it is worth pursuing the scientific ideas of experiment. As a natural consequence, stage-1 approved experiment may be later rejected if the feasibility is not proven. The Director also pointed out that the funds for detector construction of the stage-2 approved experiment should, in principle, come from the proponents.

The E14 (KOTO) experiment was granted stage-2 approval in August, 2009. There were four new proposals (P32, P33, P34, and P35) and two updates (P26, P31) submitted to the meeting. The director asked the PAC to assess these proposals and to review the approved experiments.

3. REPORT ON THE J-PARC ACCELERATORS AND JPNC

M. Yoshioka reported the status of the accelerators. There were big improvements for the two major problems reported in the previous PAC meetings: the electrical discharges in the RFQ and the ripple of the power supplies for the main ring which caused the unstable slow beam extraction.

The vacuum system of the current RFQ has been significantly improved by adding a high-performance differential pumping system in between the ion source and RFQ and by adding more pumps to the vacuum vessel of the RFQ in the summer 2009. After careful conditioning, the RFQ is running stably, which has enabled 120kW user runs at the Materials and Life Science Experimental Facility (MLF) since November. A backup RFQ is being produced but it has been decided to use the current RFQ until the summer shutdown in 2011.

Higher power tests were performed in December. At the Rapid Cycle Synchrotron (RCS), a 1-hour trial of 300kW operation was successfully completed. The MR was also operated with 50kW beams with the fast extraction to the beam dump. The beam loss was localized to the injection and collimation areas and was only 60W. A run of the higher intensity (100kW) was tried and it was found that the kicker for fast extraction occasionally failed to fire. The reason is under investigation. In January through March, the plan is to use 50kW running for the T2K experiment with the fast extraction.

The commissioning of the slow extraction is proceeding. Effects of the ripple originating from the MR magnet power supplies were reduced by the symmetric re-arrangement of the cabling and installation of an improved spill feedback system using an extraction quadruple (EQ) and ripple quadruple (RQ) magnets. Further improvements are scheduled for summer 2011 by enabling a ripple cancellation with an active trim coil. The beam loss during the slow extraction is concentrated in the beam extraction area and the extraction efficiency has increased to 98% at the 350W operation.

Towards attaining the required beam design power, the following work is planned. The repetition cycle of the MR was reduced from 6 seconds to 3.5 seconds by improving the energy recovery circuits for the MR and will be ultimately reduced to 2.2 seconds for the fast extraction in 2012. A new extraction kicker with a high-performance pulse forming network and an over-saturated inductor is under construction and will be installed in summer 2010; this will allow 8 bunch injection to the MR. The shielding of the collimators in the beam transport line between the RCS and MR will be increased in summer 2010. The production of the 400MeV linac has started and the installation is planned for the JFY2013 runs. Following these improvements, a time line for the beam power milestones has been made and shows that 720kW running for the fast extraction should be achieved by the end of JFY2014.

A plan for increasing the power beyond these initial design values has also been developed. The MR repetition cycle can be increased to 1 Hz by replacing the magnet power supplies and changing the RF acceleration structures. Also, R&D on new magnet power supplies and a conceptual design of the cavities have started.

As the chairperson of the JPNC committee, M. Yoshioka presented a running plan from January 2010 to June 2011. The commissioning of the fast and slow extraction will continue in January and February. In March, the installation of the K1.1BR beam line will start meaning that only the fast extraction to the neutrino line will be possible. A summer shutdown is planned from July to September. In October, commissioning of the K1.1BR line will start.

A plan of the running schedule in the JFY2010 (April 2010- March 2011) was made by the J-PARC accelerator group. There will be 148 days assigned for the physics running with the MR, 54 days for machine studies and 62 days of the maintenance. On average, 18 days for physics running will be available in each running month. The JPNC is negotiating with the accelerator group to reduce the number of maintenance days by improving the reliability of the equipment and efficiency of the work.

Taking this running schedule together with an estimate of the beam power evolution, M. Yoshioka estimated that the T2K would receive 43kW*10^7seconds by the summer 2010. From October, the monthly proton on target will be about 20kW*10^7seconds, if the beams are 100% used for the neutrino beam.

The estimation of the evolution and maximum power for the slow extraction is not yet clear at this stage. The main issue is the radio-activation caused by beam losses. A quantitative study is on going and better information should be available at the next PAC meeting. The power can be increased once the reason of the beam loss is understood and localized to specific areas. For the JFY2010 period, slow extraction running with a few kW beam might be possible but probably not above 10kW.

Overall, the PAC was very impressed with the accelerator achievements over the last 6 months. J-PARC center and the talented accelerator group should be highly commended for the progress being made towards beginning the exciting J-PARC physics program.

4. REPORT FROM THE J-PARC PROJECT DIRECTOR

The J-PARC Center Director S. Nagamiya presented the status of J-PARC and its future prospect. In addition to the achievements shown by M. Yoshioka, the following highlights were pointed out.

In the MLF which uses the 3 GeV beam from the RCS, there are 17 neutron lines and 1 muon line funded. A magnetism study of $CuGeO_3$ with the Shiki neutron spectrometer was published in J. Phys. Soc. Japan and selected as an editor's choice result. A study of iron related superconductors was done with the muon line and published in PRL. The first neutrino events were observed in the T2K detectors indicating that the experiment is now ready to start a real data run. The commissioning of the kaon beam lines in the hadron hall is now well advanced. By activating the electrostatic separator of the K1.8 line, an improvement of the K/π ratio was clearly observed.

The financial situation of the J-PARC was summarized. Each accelerator component (Linac, RCS and MR) needs roughly 3 billion yen for improvements of the beam power. J-PARC plans to fund these by using a part of the operational funds expected over the next 3-4 years. For equipment funds, a request was sent to the government and the major parts were approved for the linac 400 MeV upgrades and the neutron facility. The operational budget was approved at the 70% level of the full request. For the future, JAEA will adopt a new scheme for funding operations and a part of this will start in 2010. In this scheme, the operations budget is decoupled from the JAEA. As for the KEK side, a slight increase of the operational budget is expected in the JFY2010 but, in the future, there will be a competition with other KEK projects such as the super B-Factory.

As reported in the previous PAC meeting, the J-PARC program over the next 5 to 10 years has been studied and discussed in the J-PARC users committee with the goal to develop a long-term plan.

A Users Office for the J-PARC users has been set up at the Tokai site. The office is located in the Ibaraki Quantum Beam Research Center outside of the J-PARC area. Efforts are also continuing to improve the lodging conditions and availability for users. A new lodging facility should be available by the end of 2010 but the situation still needs to be improved, considering the increase in the number of users, which now is at the level of 100 scientists per day.

J-PARC has been having an annual open house for the public to explain the work and show them the facility. The last one took place on August 1, 2009 with 4600 visitors. It is clear that these functions are important and the PAC encourages the Lab to continue this program.

The progress of the J-PARC program is going very well and the PAC congratulates the J-PARC Center for this excellent work.

5. STATUS REPORT ON J-PARC MLF MUON FACILITY

Y. Miyake introduced the MLF muon facility. The production target is located upstream of the neutron target in the MLF area and exposed to the extracted proton beams from the RCS. In the design, four muon beam lines can be constructed. Because of lack of funding, only one beam line has been built so far by using the old beamline components from the KEK Meson Science Laboratory (KEK-MSL).

The first muon beams were successfully delivered in September 2008. Since November 2009 the facility has been providing the world-strongest source of pulsed muons. More than 15 experiments have already been performed.

As an upgrade plan, a surface muon port and an ultra slow muon port (Super-Omega beam line) are proposed and funding requests have been submitted. The remaining line (H-line) could be used for a number of experiments: the g-2 experiment, the mu-e conversion experiment, a pencil beam development, or as a high momentum muon line. A strategy discussion has been started in IMSS on the usage of this H line.

The radiation level of the target area will be very high and all beam line components will need to be remotely installed. For this purpose, precision guide pins have been installed on base plates and shielding walls. However, some pins are being removed in order to place extra shieldings; these pins will need to be re-installed at a later date.

There has been intensive R&D for the production of ultra slow muons, starting in 1985 with the generation of thermal muonium from a heated tungsten target. An international collaboration has been formed with KEK, RIKEN-RAL(UK) and other institutes to pursue this option. The Omega beam line is planned to provide unprecedentedly intense slow muons (1.3×10^6 muons/second) by implementing several improvements such as a laser for muonium ionization with 100 times the power. The work on the ultra slow muon beam has many R&D projects in common with the muon line for the g-2 experiment and, thus, these efforts are important for expanding the physics potential at J-PARC.

6. PROPOSAL EVALUATIONS

1. **P32:** (Towards a Long Baseline Neutrino and Nucleon Decay Experiment with a next-generation 100 kton Liquid Argon TPC detector at Okinoshima and an intensity upgraded J-PARC Neutrino beam)

   The proponents propose to develop a suitable scalable Liquid Argon TPC detector with gas amplification in Argon vapor as an R&D for a next-generation long baseline neutrino experiment.

   The PAC acknowledges the high scientific merit of a neutrino oscillation experiment with a baseline longer than T2K. The measurements of the mixing angle θ_{13} and a possible CP violation in the lepton sector are of highest significance.

   Before large detectors can be considered, it has to be shown that such a technique is adequate for the purpose and superior to alternative schemes. In particular, the readout scheme and the scalability are open questions. Based on a small-scale R&D, a roadmap has to be put forward.

   The specific P32 proposal is to set up and test a 250 Liter LAr prototype TPC in a low-energy charged particle beam at J-PARC, preferentially with kaons from the K1.1BR beamline. **The PAC encourages the team to proceed with this development work and recommends the allocation of beam time of a low intensity charged particle beam at J-PARC for this test.**

2. **P33:** (Measurement of Neutron Electric Dipole Moment)

   A vibrant worldwide experimental program exists to search for electric dipole moments and related T-violating observables for neutrons, protons, deuterons, atoms, and molecules. It is driven by the dual realization that

   (i) such efforts represent (almost) zero background searches for New Physics due to the Standard Model's inability to produce anything but minute EDM effects, and

(ii) one might detect the New Physics that has generated the Universe's matter-antimatter asymmetry.

The experiment proposed under P33 would develop a very interesting route for this search. It promises to improve the experimental sensitivity for the neutron's EDM by more than an order of magnitude, to a level where an effect could quite conceivably surface. It would be a valuable part of the world-wide effort even if it were not the first to succeed. It should also be noted that it would nicely complement searches for other EDMs taking place in Japan.

An innovative new approach is proposed to measure the neutron EDM to a sensitivity of 5 x 10^{-28} e-cm by constructing an ultra-cold neutron (UCN) source with the 400 MeV pulsed proton beam soon to be available at J-PARC. A cylindrical solid deuterium converter is proposed as the converter for the UCN production via the super-thermal process. A novel idea of this proposal is to use a rebuncher and a "UCN juggler" to achieve an unprecedentedly high UCN density of ~ 10^5 UCN/cm^3 eventually. This would then allow the use of a relatively small UCN storage/measurement cell, which could significantly reduce the systematic uncertainties of the measurement.

The PAC acknowledges a number of new ideas in the proposed approach. These ideas require extensive R&D to demonstrate their feasibility. Some of the critical R&D items for the proposed experiment include:

1) Demonstration of the maximal UCN density produced in the solid deuterium converter. The UCN source at PSI also utilizes solid deuterium converter, and the comparison of the actual performance of this source with the simulation can provide very useful guidance.

2) The idea of using a rebuncher for preserving the initial UCN density in the transport needs to be demonstrated. Other potential losses for the UCN transport should also be examined.

3) There is very little discussion about the design of the measurement cell, as well as the measurement technique. What is the expected coherence time for the small storage cell? Many known systematic errors should also be specifically evaluated.

The PAC recognizes the outstanding physics potential of the proposed experiment and is impressed by the creative new approach for the measurement. Even though the PAC does not recognize any clear showstoppers in the proposal at this early stage, concrete R&D plans and a realistic schedule still need to be developed. Thus, the PAC recommends that the proponents submit a more detailed proposal with a clearer R&D plan in the future. In view of overall J-PARC programs and the physics potential, the PAC regards the establishment of the UCN source as a high priority.

3. **P34:** (A New Measurement of the Muon Anomalous Magnetic Moment g-2 and Electric Dipole Moment at J-PARC)

   The proponents presented a proposal to measure the anomalous magnetic moment, a_μ, of the muon with a precision of 0.1 ppm and the electric dipole moment of the muon possibly reaching $d_\mu=1.0\times10^{-22}$ e·cm. The proposed measurement will improve the precision of the previous experiment at Brookhaven National Laboratory, E821, by a factor 5 for a_μ from 0.54 ppm to 0.1 ppm and by more than a factor 100 for d_μ from the E821 limit of $d_\mu<1.9\times10^{-19}$ e·cm.

   The J-PARC g-2 collaboration will use a novel experimental method. Muons from a high intensity ultra-cold muon source will be re-accelerated to a momentum of p_μ=300 MeV/c and subsequently injected and stored in a high precision magnetic field. The anomalous magnetic moment is obtained from the difference between the spin precession and the cyclotron frequencies for the stored muons. The muon spin precession is experimentally accessible through the parity violating asymmetry in the weak decay of the muon. Decay positrons are emitted preferentially in the muon spin directions and will be detected with a silicon tracking device placed inside the stored muon orbit. For a given location along the muon orbit, g-2 can be directly observed as the modulation frequency in the decay positron rate observed in the silicon tracker.

   The high intensity ultra-cold muon source will use the surface muon beam line H-2 off the MLF muon production target. The surface muon beam will be stopped in a thin muonium formation target. The muonium atoms will leave the target at thermal energies and will be ionized with a high power laser immediately downstream of the target. This technique has been pioneered at the RIKEN-RAL muon facility where an ultra-cold muon source is used for μSR at low rates of about 20 μ^+/s and an overall conversion efficiency of 3×10^{-5}. At J-PARC it is believed that the intensity of an ultra-cold muon source could be increased to 1.3×10^6 μ^+/s. (A factor of 2x333 is obtained from the higher repetition and surface muon rates and an additional factor of 100 will result from an increase in laser power.) The natural polarization of muons obtained from ionizing muonium formed from a 100% polarized surface muon beam is 50%. The experiment is considering increasing this polarization by applying a 0.3T holding field in the volume of muonium formation.

Re-acceleration of the thermal muons will use a sequence of low-β section accelerating to 43 MeV/c in 180ns and a high-β section accelerating to 300 MeV/c. This will result in a muon beam with a longitudinal momentum spread of Δp_z~300 keV and a transverse momentum spread of Δp_t~3 keV. The transverse momentum spread is small enough to store the muon beam in the high precision magnetic field for the positron decay observation time period of 33 μs (5 decay times) without magnetic or electric focusing fields.

The re-accelerated muon beam is injected with an angle to the magnet axis at one end of the muon storage magnet. The injection scheme utilizes a radial fringe field component at the end of the magnet. The radial field component is tuned to shift the muon orbit so that it will be centered with respect to the axis of the magnet. A kicker magnet stops the motion of the muons in the direction of the magnet axis and stores the muons in the center of the magnet in the region of highly uniform field.

In the storage region, the muons orbit a system of silicon detectors that are capable of tracking the decay positrons and of determining the decay time and the energy of the decay positron.

Findings:

(1) The PAC welcomes this very innovative proposal and recognizes the strong scientific merit of the proposed measurement. a_μ and d_μ are fundamental properties of the muon. a_μ is sensitive to electromagnetic, strong and weak processes and has been calculated in the framework of the Standard Model with a precision of 0.41 ppm. For the near future it is expected that the theoretical uncertainty will be improved to 0.3ppm. The Standard Model value differs from the E821 experimental result by 3 to 4 standard deviations indicating contributions from physics outside the standard model. In particular in a situation where LHC experiments might directly identify the physics responsible for the difference between the measured anomalous magnetic moment and its Standard Model expectation, a g-2 measurement of the highest precision will be important in guiding and testing the theoretical interpretation

of LHC data. It is quite conceivable and actually likely that a precise measurement of g-2 could provide important insights into the nature of the dynamics beyond the Standard Model that hopefully will emerge in high p_T collisions at the LHC.

A new run using the equipment of the BNL experiment has been proposed at FNAL. The proposed precision for g-2 of the new FNAL experiment is nearly identical to the precision proposed for the J-PARC experiment. Given the importance of the measurement the PAC recognizes the value of measuring g-2 with independent experimental approaches and independent groups.

(2) The proposed experimental method relies on several innovative but untested experimental ideas and technologies. Careful R&D will be required to demonstrate the feasibility of the overall approach in reaching the desired precision. The proponents have suggested a R&D program for several of the components and the PAC recommends strong support for this R&D effort.

(3) The theoretical uncertainty is dominated by the uncertainty in the determination of the hadronic contribution to a_μ. For the near future a reduction of the theoretical error by 25% to 0.3ppm appears possible. However, it is unclear if it will be possible to further reduce the theoretical uncertainties below the level of 0.3 ppm. The PAC agrees that the goal of an experimental uncertainty of 0.1 ppm aims adequately high. In fact a new experimental result should help to stimulate the theoretical work necessary to further reduce the uncertainty on the hadronic contribution to a_μ in the future.

(4) The PAC appreciates the importance of the proposed high intensity cold muon source also for material science and possible future muonium experiments. A low intensity cold muon source already exists at the RIKEN-RAL muon facility and a well defined R&D program is underway to develop the high-power laser system needed for the proposed intensity increase. In the interest of upgrading the H-2 beamline before activation levels become high, it may be prudent to consider splitting the current proposal into two: a separate proposal for the cold muon source and one for the g-2 experimental apparatus.

(5) The PAC considers the presented schedule to be unrealistically ambitious. A careful study of the schedule should be carried out and a set of milestones should be developed based on the R&D needed to establish

feasibility. These milestones should include and address the following R&D questions:

(a) Demonstration of the feasibility of the high power laser and the linearity between muon yield and laser power up to the muon currents required.

(b) Quantify beam phase space after re-acceleration by using a full beam tracking simulation of the proposed LINAC and the initial acceleration stage.

(c) Feasibility of the injection scheme:

- Quantify the impact of radial fields on the field in the muon storage region.
- Quantify the impact of a full current quench on the injection field (yoke hysteresis).
- Evaluate the need for injection steering beam instrumentation and provide a conceptual design for the instrumentation to be used for the injection beam steering and injection time measurements.
- Quantify the fields from eddy currents induced by the injection kicker.
- Quantify the positron background in the injected muon beam and evaluate the impact that the positron background has on the beam steering and decay-positron detection instrumentation.

(d) Feasibility of the high precision magnetic field:

- Use a concrete magnet design to demonstrate that a field uniformity of 10^{-6} can be reached in the presence of the iron yoke. In particular, quantify the impact of non-uniformities in the permeability of the yoke steel on the uniformity of the magnetic field.
- Provide a conceptual design for the shimming scheme and the controls systems for active current shims.
- Quantify the impact of a quench on the magnetic field uniformity (yoke hysteresis).

- Quantify the impact of the maximum expected seismic activity on the field uniformity.
- Quantify the impact of the instrumentation systems installed inside the field including the effects of materials and electrical currents.
- Evaluate the cost for the thermal stabilization of the magnet to 0.1K.
- Evaluate the need of a small-size prototype magnet to demonstrate that the required field uniformity can be reached.

(e) Characterize the magnet quench behavior and specify the design for quench protection systems:

- Carry out an analysis of the quench behavior of the magnet including all eddy currents and possible forces on the detector instrumentation and kicker systems.
- Provide the design of the quench protection systems.

(f) Design of a field measurement scheme:

- Provide a conceptual design for the field measurement systems including stationary probes, trolley probes, calibration probes, their readout and possible feedback to active current shims.
- Provide a conceptual design for the NMR probes operating in the muon storage vacuum.
- Specify the scheme for the absolute probe calibration.
- Specify the scheme for tracking the field map versus time.

(g) Feasibility of the proposed detector systems:

- Provide a conceptual design of silicon vanes with mechanical supports, readout electronics, and DAQ electronics.
- Based on the conceptual design, carry out GEANT4 simulations including backgrounds from annihilation-photon backgrounds from decay positrons and positrons delivered at injection time. From this simulations determine: the energy resolution for decay positrons and possible early-to-late effects from the pileup resulting from positrons delivered at injection time and the high initial instantaneous rates.

- Quantify the power needs and the resulting currents and stray fields. Determine the possible early-to-late effects from changes in the current load during a single storage period.
- Provide the scheme for the timing systems for the readout and quantify their stability in establishing limits on possible early-to-late effects.
- Carry out R&D to determine the possible early-to-late effects based on rate or time dependencies of the detector efficiencies.
- Evaluate the impact of eddy currents from a full current quench with respect to the integrity and the alignment of the detector systems.

The PAC strongly encourages the g-2 collaboration to advance the proposed R&D and develop a detailed plan and schedule. The PAC is looking forward to hearing a first progress report from the g-2 collaboration at the next PAC meeting in July. In addition to a progress report on the proposed R&D for the high intensity cold muon source the PAC recommends that the proponents prepare a revised detailed schedule including a set of milestones for review at the next PAC meeting. Finally, the PAC suggests that a conceptual design of the silicon detectors be prepared for review and that a realistic GEANT simulation of the silicon response during a muon store at full intensity be presented. The simulation should include effects from all backgrounds.

4. **P35:** (A test experiment to measure sub-GeV flux in the on-axis direction at the J-PARC neutrino beam)

This proposal describes a plan to place a tracking detector composed of interleaved layers of iron and scintillator bars in the ND280 hall in order to gather information on the on-axis neutrino flux and energy distribution. These on-axis measurements could possibly provide information to be used to put additional constraints on the flux from lower energy pions that are not sampled by the existing off-axis near detector. It should be noted that the production of these low energy pions are measured by the NA-61 experiment and, therefore, P35 would have to provide information that is at the level of the NA-61 measurements to be useful.

For the technique and plan described in this proposal, there are worries that this measurement can be accomplished. The data from the device will have difficulty in separating out the QE events where the neutrino energy can be determined from the outgoing muon energy and angle. A well-measured, fairly pure sample of QE events would be necessary to determine the flux and energy distribution. During the presentation, a strategy to address these background problems was mentioned but this has not been investigated or substantiated. Therefore, there are many questions as to whether this device and technique can be used to accurately measure the low energy neutrino flux and spectrum.

On the other hand, almost all of the components for the detector are available and the construction and testing will be completed by the end of the summer. So, there should be modest impact to the T2K program by installing the device to run parasitically during the 2010-2011 neutrino run. The opinion of the PAC is that the data could have some merit but not at a very high level. The decision for going ahead with this test experiment should be determined by the T2K experiment and Laboratory management.

5. **P26:** (Direct measurements of ω mass modification in A (π^-,n) ω reaction and $\omega \rightarrow \pi^0\gamma$ decays)

The PAC heard the presentation of the revised P26 proposal which attempts to address several questions/issues raised at the 7th PAC meeting. The revised proposal contains the following new information:

1) The updated result from the TAPS photo-ω production experiment, presented in a recent conference, now shows no evidence of mass shift. However, a new calculation suggests that the TAPS experiment does not have the sensitivity to observe the mass-shift signals, in agreement with the updated TAPS result.

2) A recent paper which describes ω bound states in nuclei with a mean-field potential is now used to calculate various observables in the proposed $^{12}C(\pi^-,n)\omega$ reaction, including the neutron energy spectrum, the missing mass distribution, as well as the ω invariant mass distribution. The calculation assumes a strongly attractive potential with a depth of 156 MeV, leading to a p-shell ω nuclear state with ~50 MeV binding energy and a width of ~60 MeV.

3) As a result of the 60 MeV in-medium width of ω meson, the branching ratio for $\omega \rightarrow \pi^0\gamma$ is now dropped from 8.9% to 1.5%. This reduces the previous rate estimate by a factor of ~6.

4) The effects of the holes in the CsI detector array have been simulated. Since these holes would cause energy leakage, resulting in an effect similar to a mass shift, the study shows the importance to minimize the energy leakage in the CsI detectors (either by a fiducial cut or by upgrading the CsI array to remove the holes).

5) Simulation for the $\pi^0\pi^0$ background has been performed. The contribution of this background is shown to be rather large.

The PAC remains convinced of the importance of the physics goals of the proposed P26 measurements. A conclusive measurement to confirm or disprove the predicted modification of a vector meson's mass in nuclear medium due to partial restoration of chiral symmetry is very important. The revised proposal clearly reflects the considerable recent effort by the proponents of the proposal. However, the PAC is not convinced that the proposed measurement is capable of reaching the stated physics goals. In particular, it is crucial to determine and subtract the $\pi^0\pi^0$ background reliably. Moreover, measurements of nuclear mass dependence (A-dependence) are expected to provide important additional handles for identifying possible mass-shift signals. Further studies are required before a strong case for the proposed measurement can be made. Some specific issues identified by the PAC are listed below, but the experimenters are also encouraged to perform additional studies.

1) Detailed simulation for measurements using several different nuclear targets (including possibly the hydrogen target) is needed to understand how the nuclear mass dependence can help the identification of mass-shift effects.

2) It is expected that there should be a strong correlation between the reconstructed ω invariant mass and its momentum, if mass is indeed shifted for ω mesons decaying in nuclei. The experimenters should examine this correlation and other promising ways to determine the mass modification in nuclei.

3) One could consider modifying the CsI arrays to remove or minimize detector holes, even at the expense of smaller solid angle coverage. This would lead to much reduced lower-mass tails, allowing cleaner observation of possible signals.

The PAC recommends that this proposal be deferred, and encourages the proponents to submit a revised proposal when a convincing case for a definitive measurement can be made.

6. **P31:** (Spectroscopic study of hyperon resonances below $\overline{K}N$ threshold via the (K^-, n) reaction on deuteron)

The PAC heard the presentation of the revised P31.

The PAC recognizes the importance of studying the I=0 Λ (1405) resonance with in-flight K^- initiated production reactions, such as d(K^-,n), in order to confront and supplement other in-flight data, in particular the recent electromagnetic production reaction data from SPring-8 and from JLab. This should help resolve the nature of the Λ(1405) within a coupled-channel $\overline{K}N$-$\pi\Sigma$ description and provide input for models of K^- mesons embedded in nuclei.

The proponents showed that the background from the I=1 Σ(1385) component is expected to be small and could be estimated based on the angular distribution of the outgoing neutron. This will also help the extraction of the $\Sigma^0\pi^0$ decay mode of the Λ(1405) which should provide the clearest identification of the Λ(1405). The symmetric acceptance for the $\Sigma^+\pi^-$ and the $\Sigma^-\pi^+$ modes helps to extract the I=0 component by canceling the interference contribution between the I=0 and I=1 amplitudes.

The PAC therefore recommends granting the P31 proposal a stage 1 status provided an addendum on the revision of the original proposal is appended to the original proposal.

7. **E06:** Measurement of T-violating Transverse Muon Polarization in $K^+ \rightarrow \pi^0 \mu^+ \nu$ Decays (The TREK Experiment)

The PAC heard a report on TREK (E06). Significant new external funding from the US and Canada was secured. Grant applications have been (re)submitted to the Japanese funding agencies. A full-size polarimeter chamber was exposed to muon and pion beams in TRIUMF and the results will be reported in the coming meeting.

The K1.1BR beam line will be completed during 2010, and the groups from the TREK collaboration will lead the commissioning. Plans for the timely transport from KEK to J-PARC of the cryogenic plant associated to the superconducting spectrometer should be developed.

The PAC would like to repeat that the TREK experiment has a very intriguing and possibly significant physics case. Final state interactions can induce a non-zero muon transverse polarization P_T on the 10^{-5} level; a genuine T-violating asymmetry can arise only on the 10^{-6} level within the standard model. On rather general grounds one can argue that P_T cannot exceed the 10^{-3} level no matter what dynamics generates this direct T violation. New Physics models where CP symmetry is broken by the exchange of scalar fields could produce P_T in the range of 10^{-4} to 10^{-3}, in particular if the coupling to leptons were enhanced. E06 would thus be the first experiment exploring this range, where an unambiguous signature for such New Physics scenarios could surface.

A Letter of Intent submitted by the TREK collaboration outlines the possibilities to extend the physics program to include tests of lepton universality in leptonic kaon decays and searches for neutral heavy leptons. Some of this program could be addressed before the full intensity for the slow-extracted beam is achieved. The PAC welcomes the preparation of a proposal to assess this additional physics capability.

8. **E11:** Tokai-to-Kamioka Long Baseline Neutrino Oscillation Experiment (The T2K experiment)

Progress for the neutrino beam and the T2K experiment has been very impressive over the past six months. The beam with all three horns installed was successfully commissioned during November and December 2009 with 4×10^{16} protons delivered to the target with up to 50 kW of beam power. The beam monitoring equipment worked well, beam losses were small, and there was good beam stability. Some maintenance and improvements will be made during FY2010 including the installation of a collimator in the primary beam line and a new horn power-supply that can run at 320 kA. In addition, a spare horn and target will be constructed before the summer when a test of the remote maintenance scenario will take place. The PAC congratulates the laboratory and collaboration for the great progress on the neutrino beam and believes that the accelerator complex is now ready to provide beam for an extended T2K data run.

There has been equally impressive progress on the ND280 near detector for T2K. Almost all of the detector components are now operational and ready for beam. First neutrino events have been recorded in the INGRID modules and in the near detector without the magnet energized. Additional power has been installed in the ND280 hall to reduce electrical interference between systems and to allow the near detector magnet to run at the originally planned 2 kG field. The magnet is currently scheduled to be closed and energized in late January with commissioning of the detectors with B-field beginning then. The detector readout is also being commissioned and it is expected that useful data can be collected during the data run in spring 2010. A T2K analysis steering group has been established to coordinate the analysis of the full experiment. The group is developing a plan for analyzing the data with a goal of having some initial results at the end of the summer 2010 and first significant oscillation results in the following summer. Again the PAC congratulates the laboratory and collaboration for the successful completion (almost) of the near detector and applauds this important milestone.

With the beam and detectors now operational, it is important that high intensity beam now be delivered to the T2K experiment. The plan is to provide fast spill beam for the February through June period starting at 40 kW and ramping up to a beam power of 100 kW for May and June. After the summer shutdown, neutrino beam is to begin at 150 kW for the time period until June 2011 with a few months set aside for slow spill running. This plan should provide an integrated data sample at the goal level of 100 kW×10^7 seconds and lead to a 90% CL sensitivity level of $\sin^2 2\theta_{13} \sim 0.05$. This will keep the T2K experiment as one of the leaders in the worldwide neutrino oscillation program. For this reason, it is very important that priority and effort be given to providing neutrino beam over this period at the highest practical intensity.

9. **E14:** Proposal for $K_L \to \pi^0 \nu\bar{\nu}$ Experiment at J-PARC (The KOTO Experiment)

The KOTO collaboration aims to search for the CP violating transition $K_L \to \pi^0 \nu\bar{\nu}$ with single-event sensitivity close to standard model expectations.

The final result from the pilot experiment KEK-E391a was presented. The improved analysis of the data lead to the upper limit $B(K_L \to \pi^0 \nu\bar{\nu}) < 2.8 \times 10^{-8}$ (90%CL), which represents an improvement of about a factor of three over the previous limit.

The preliminary phase of the neutral beam survey took place at the end of last year. The alignment of the collimators was successfully performed. The analysis of a data sample based on about 1.5×10^{15} p.o.t. showed a clean $K_L \to \pi^+\pi^-\pi^0$ signal. These events were reconstructed using two electromagnetic calorimeters and two finely segmented hodoscopes. The data should allow the clarification of the kaon yield which cannot be predicted reliably by simulation packages of hadronic interactions. A data Monte Carlo comparison suggests a kaon yield per proton from a nickel production target about two times larger than the most conservative prediction on which the proposal was based. In the upcoming continuation of the beam survey, data will also be collected with a magnetic spectrometer in order to reconstruct a sample of CP-violating $K_L \rightarrow \pi^+\pi^-$ decays. The measurement of the core neutron to kaon ratio is another important objective of the beam survey. The PAC was impressed by the progress and reiterates the importance of completing the beam survey in order to assess the ultimate sensitivity of the experiment.

Good Progress was also reported for the work on the construction of the KOTO detector. In order to complete the program of the beam survey and to start the commissioning and calibration of the CsI calorimeter, the collaboration has requested 50 days of beam in JFY2010.

10. **Muon Task Force Report and E21:** An Experimental Search for Lepton Flavour Violating mu-e Conversion (The COMET experiment)

The COMET experiment aims to improve the experimental sensitivity for detecting muon-to-electron conversion by 4 orders of magnitude beyond the current measured limit. Measurements at this sensitivity level would probe the region of conversion rates expected by many well-studied new physics models of SUSY-GUT variety. As such, COMET could become one of the flagship experiments at J-PARC later in the decade.

The committee was pleased to hear detailed reports from the Muon Task Force (MTF) on studies since the 8^{th} PAC meeting, regarding the proton source and the "beam extinction" (fraction of residual protons between bunches incident on the detector) required by the experiment. The MTF reported on a new "symmetric" scheme of bunch loading in the MR which will likely lead to more stable running but lengthens the time between bunches from 1.2 μsec to 1.8 μsec. This increased bunch period, now identical to the bunch period of the competing Mu2e experiment, will affect the COMET sensitivity and needs to be studied by the collaboration.

The extraordinary beam extinction required by the experiment ($1\text{x}10^{-9}$) is one of the most important performance-parameters and is critical to the eventual success of the experiment. At the 8^{th} PAC meeting the MTF presented preliminary results of single-bunch studies of the RCS and MR which suggested that a beam extinction of $1\text{x}10^{-5}$ could be achieved internally with the accelerator complex. At this meeting the MTF presented a systematic study of extinction in the Linac, RCS, and MR which will be very useful in developing a model of extinction for the aggregate accelerator complex. The MTF did not present a schedule for the next round of aggregate accelerator extinction tests. The PAC encourages continued, focused efforts in this area and looks forward to the next round of aggregate extinction measurements with the beam timing and intensities closer to the requirements of the experiment.

Achieving a beam extinction of 1×10^{-9} will likely require a multiplicative system external to the accelerator complex. The COMET and Mu2e collaborations have collaborated on an “AC Dipole” system that suppresses protons that are out of phase from the primary bunch train frequency. This scheme requires operating ferrite magnets at a high frequency, and it has proven difficult to fabricate and operate the associated ferrite material at the required frequencies. The Mu2e experiment will continue to develop the required ferrite performance. The MTF and COMET experiment are now pursuing a different strategy using an external kicker system based on magnetic alloy materials. The PAC supports a broad approach here but encourages the MTF and COMET collaboration to remain in close contact with the Mu2e experiment while developing these critical external extinction systems.

The COMET collaboration reported some progress on the solenoid development, beam extinction measurements, calorimeter R&D studies and detector simulation development. The re-design of the pion production/capture solenoid wound with aluminum stabilized super-conductor and improved shielding of the coil is particularly notable, and now is very similar to the Mu2e design. The COMET collaboration is preparing for neutron irradiation tests of the production solenoid conductor later this year, and the PAC looks forward to these measurements as well as reports on continued progress on other detector systems.

The PAC also heard information on progress towards growing the collaboration and increasing the personpower on the experiment. The collaboration noted that two new groups will join the collaboration soon, The University of Glasgow (UK) and the BINP institute in Novosibirsk Russia. The PAC is pleased to learn of this growth but remains concerned about the size of this collaboration for this very challenging measurement. The Mu2e experiment in the US is gaining momentum with growing support from funding agencies and now projects first data in 2017-2018. The PAC encourages the COMET collaboration to continue growth to keep pace with the Mu2e collaboration. Progress toward Stage-2 approval will require a technical design report and a funding model for the experiment as well as sufficient growth of the collaboration.

11. **SKS spectrometer status:**

T. Takahashi presented the status of the SKS spectrometer and the experiments to be run on the K1.8 beamline. Six experiments (E03, E05, E07, E10, E13, and E19) have been approved as stage-2 experiments. All but E07 will use the SKS spectrometer. As discussed in the previous PAC meeting, the E19 experiment which searches for pentaquarks with $\pi^- p \rightarrow K^- X$ reaction will run first after the spectrometer commissioning.

The detectors to determine the beam momentum are working well. The SKS magnet was cooled down at the beginning of October and excited up to 2.485 T. The liquid hydrogen target is ready.

The beam tuning with the two electrostatic separators was performed. The kaon fraction at the beam momentum of 1.8GeV/c was found to be about 8% at a half of the nominal operational voltage. The optimal operation points for the pion and kaon beams were being surveyed. For the E19 setup, 500k pions per spill can be obtained with the MR at 240W operation.

The 20-millisecond time structure of the pion beam was observed in the run on December 13, 2009 when the EQ magnet was off and the RQ magnet was on in the spill feedback system of slow extraction. The time corresponds to the ripple frequency of the MR power supplies. With this spill structure, the E19 experiment can be performed up to 500k pions per spill. If the time structure is improved, the experiment will be able to run with even higher intensity.

In January and February 2010, the calibration of the beam and SKS spectrometer is planned using the $\pi^- p$ elastic and $\pi^- p \rightarrow K^+ \Sigma^-$ reactions. If possible, pion-induced $^{12}{}_{\Lambda}C$ production reaction will also be used. In the fall of 2010, the first phase of the E19 experiment can be completed with a 10 day run with 240W MR operation. If the structure in the mass distribution observed by the E522 experiment at KEK-PS originates from the pentaquark production, E19 can confirm it with 10σ significance in this first phase. The second phase of the E19 experiment requires a longer run with 3 different beam momenta to reach the proposed sensitivity.

12. **E17:** (Precision spectroscopy of Kaonic ^{3}He 3d$\rightarrow$2p X-rays)

This experiment is to measure the 3d $\rightarrow$ 2p X-rays of kaonic helium-3 atoms, which will show a shift of up to 10eV depending upon the depth of K^- nucleus potential. The experiment aims to measure the shift with 2 eV precision. Together with the data already taken by the same group with a helium-4 target at the KEK-PS, an important test can be made for the existence of deeply bound kaonic nuclei.

Eight silicon drift detectors (SDDs) have been tested. The energy resolution of 150 eV (FWHM) for the Mn-Kα X-ray was obtained. Further optimization is underway. A combined test with the ^{3}He target in the cryogenic condition was performed.

Commissioning of the K1.8BR beamline is ongoing. A preliminary estimate of the kaon yield was presented. By using a nickel production target and 240W MR running, numbers of particles per spill is 444 and 120 for K^+ and K^- respectively. With these numbers and taking improvements in the detector acceptance after the proposal submission into account, the E17 group requests 30 kW*MR_weeks to complete the program. By using the platinum target, the number will be reduced by a factor of two.

7. RECOMMENDATIONS FOR BEAM TIME ASSIGNMENT FOR THE PERIOD FROM JANUARY, 2010 TO JUNE, 2011

As discussed in the previous meeting, the PAC endorses the JPNC proposal to carry out the E19 (Pentaquark search) in the K1.8 line and the E17 (K^- ^3He *3d-2p* X-ray spectroscopy) in the K1.8BR line during the initial running.

The PAC also endorses the proposed beam-time plan for the period from January 2010 to June 2010.

It is very difficult to make a detailed plan after the summer shutdown since there are large uncertainties in the expected beam power and the quality of the slow extracted beam. However, the PAC considers that the following two issues have the highest priorities;

- Timely delivery of neutrino beam at the highest intensity practical to the T2K experiment in order to maximize the sensitivity of a θ_{13} measurement that will be competitive with other international programs.

- The commissioning of the slow extraction to understand the machine parameters needed to reduce the beam losses and improve the spill structure. Based on these studies, a long term plan to increase the beam intensity for the hadron hall experiments should be made and a schedule should be developed within the expected profile of the beam power.

Taking these points into account, the following guidelines are recommended.

- The overall priority should go to the T2K experiment and as much beam as possible should be delivered. During this period, slow extracted beam should be scheduled including a run in the month of October 2010 and another one-month run before June 2011. The detailed running scenario for spring 2011 should be decided after seeing the progress of the T2K experiment and the quality of the slow extracted beam.

- As for the beam time sharing between the E17 and E19 experiments, the PAC considers that the E19 has priority to complete the first phase of their program.

- The platinum production target should be used for most of this period unless the KOTO experiment has a special request for short periods of running with the nickel target.

- Close discussions with the accelerator group should be made focusing on increasing the physics beam time by optimizing machine study and maintenance periods during the run.

The situation of the accelerator is rapidly changing so that the PAC will update the recommendation at the following meetings. Feedback and suggestions from the JPNC will be very valuable for assessing the run during this period.

8. DATE FOR THE NEXT J-PARC PAC MEETING

The date for the 10th PAC meeting is 16-18 July 2010. The tentative date of the 11th meeting is 14-16 January 2011.

The tentative agenda is;

- Status report on J-PARC
- Reports from the T2K and KOTO experiments
- Report from the g-2 collaboration
- Visit to the J-PARC facilities

9. FOR THIS MEETING, THE J-PARC PAC RECEIVED THE FOLLOWING DOCUMENTS:

- Minutes of the J-PARC PAC meeting held on 17-19, July 2009 (KEK/J-PARC-PAC 2009-9)
- Experimental Proposal for J-PARC (P32): Towards a Long Baseline Neutrino and Nucleon Decay Experiment with a next-generation 100 kton Liquid Argon TPC detector at Okinoshima and an intensity upgraded J-PARC Neutrino beam (KEK/J-PARC-PAC 2009-10)
- Experimental Proposal for J-PARC (P33): Measurement of Neutron Electric Dipole Moment (KEK/J-PARC-PAC 2009-11)
- Experimental Proposal for J-PARC (P34): A New Measurement of the Muon Anomalous Magnetic Moment g−2 and Electric Dipole Moment at J-PARC (KEK/J-PARC-PAC 2009-12)
- Experimental Proposal for J-PARC (P35): A test experiment to measure sub-GeV flux in the on-axis direction at the J-PARC neutrino beam (KEK/J-PARC-PAC 2009-13)
- LOI for J-PARC: Measurement of $\Gamma(K^+ \rightarrow e^+\nu)/\Gamma(K^+ \rightarrow \mu^+\nu)$ and search for heavy sterile neutrinos at J-PARC (KEK/J-PARC-PAC 2009-14)
- Report from the P31 proponents (KEK/J-PARC-PAC 2009-15)
- Revised Proposal for J-PARC (P26): Direct measurements of ω mass modification in $A(\pi^-,n)\ \omega$ reaction and $\omega \rightarrow \pi^0\gamma$ decays (KEK/J-PARC-PAC 2009-16)
- Report from the P26 proponents (KEK/J-PARC-PAC 2009-17)

---- J-PARC PAC Approval summary after the 9th meeting ---

Proposals

	(Co-)Spokespersons	Affiliation	Title of the experiment	Approval status (PAC recommendation)	Slow line priority		Beamline	Leading Referees (new, leaving referees)
					Day1?	Day1 Priority		
E03	K.Tanida	Kyoto U	Measurement of X rays from Ξ^- Atom	Stage 2			K1.8	Gal, Nakamura, Nakano, Kishimoto
P04	J.C.Peng; S.Sawada	U.of Illinois at Urbana-Champaign; KEK	Measurement of High-Mass Dimuon Production at the 50-GeV Proton Synchrotron	Deferred			Primary	En'yo Shaevitz, Kumano, Nagae, Gross-Pendekamp
E05	T.Nagae	Kyoto U	Spectroscopic Study of Ξ-Hypernucleus, $^{12}{}_{\Xi}$Be, via the ^{12}C(K^-, K^+) Reaction	Stage 2	Day1	1	K1.8	Gal, Nakamura, Nakano, Kishimoto
E06	J.Imazato	KEK	Measurement of T-violating Transverse Muon Polarization in $K^+ \to \pi^0 \mu^+ \nu$ Decays	Stage 1			K1.1BR	Ceccucci, Hagiwara, Yamamoto, Tschirhart, Bigi, Kleinknecht
E07	K.Imai, K.Nakazawa, H.Tamura	Kyoto U., Gifu U., Tohoku U.	Systematic Study of Double Strangeness System with an Emulsion-counter Hybrid Method	Stage 2			K1.8	Gal, Nakamura, Nakano, Kishimoto
E08	A.Krutenkova	ITEP	Pion double charge exchange on oxygen at J-PARC	Stage 1			K1.8	En'yo, Nagai, Kumano
E10	A. Sakaguchi, T. Fukuda	Osaka U	Production of Neutron-Rich Lambda-Hypernuclei with the Double Charge-Exchange Reaction (Revised from Initial P10)	Stage 2			K1.8	Gal, Nakamura, Nakano, Kishimoto
E11	T. Kobayashi	KEK	Tokai-to-Kamioka (T2K) Long Baseline Neutrino Oscillation Experimental Proposal	Stage 2			neutrino	Hagiwara, Mori, Shaevitz, Bigi
E13	T.Tamura	Tohoku U.	Gamma-ray spectroscopy of light hypernuclei	Stage 2	Day1	2	K1.8	Gal, Nakamura, Nakano, Kishimoto
E14	T.Yamanaka	Osaka University	Proposal for $K_L \to \pi^0 \nu \nu$-bar Experiment at J-PARC	Stage 2			KO	Ceccucci, Hagiwara, Yamamoto, Tschirhart, Bigi, Kleinknecht
E15	M.Iwasaki, T.Nagae	RIKEN, Kyoto	A Search for deeply-bound kaonic nuclear states by in-flight 3He(K-, n) reaction	Stage 2	Day1		K1.8BR	Nakano, Nakamura, Kumano
E16	S.Yokkaichi	RIKEN	Electron pair spectrometer at the J-PARC 50-GeV PS to explore the chiral symmetry in QCD	Stage 1			High p	Nagai, Peng, Kumano, Nagae, Gross-Perdekamp
E17	R.Hayano, H.Outa	U. Tokyo, RIKEN	Precision spectroscopy of Kaonic ^{3}He 3d->2p X-rays	Stage 2	Day1		K1.8BR	Nagai, Shimoura, Kumano
E18	H.Bhang, H.Outa, H.Park	SNU, RIKEN, KRISS	Coincidence Measurement of the Weak Decay of $^{12}{}_{\Lambda}$C and the three-body weak interaction process	Stage 1			K1.8	Gal, Nakamura, Nakano, Kishimoto
E19	M.Naruki	KEK	High-resolution Search for Θ^+ Pentaquark in $\pi^- p \to K^- X$ Reactions	Stage 2	Day1		K1.8	En'yo, Shimoura, Kumano
E21	Y.Kuno	Osaka U	An Experimental Search for $\mu - e$ Conversion at a Sensitivity of 10^{-16} with a Slow-Extracted Bunched Beam	Stage 1			New beamline	Hagiwara, Mori, Shaevitz, Tschirhart, Bigi, Kleinknecht

---- J-PARC PAC Approval summary after the 9th meeting ---

E22	S. Ajimura, A. Sakaguchi	Osaka U	Exclusive Study on the Lambda-N Weak Interaction in A=4 Lambda-Hypernuclei (Revised from Initial P10)	Stage 1			K1.8	Gal, Nakamura, Nakano, Kishimoto
T25	S. Mihara	KEK	Extinction Measurement of J-PARC Proton Beam at K1.8BR	test experiment			K1.8BR	-
P26	K. Ozawa	U. Tokyo	Direct measurements of omega mass modifcation in A(pi$^-$, n)omega reaction and omega -> pi0 gamma decays	Deferred			K1.8	Peng, Nakamura Kumano, Shimoura
E27	T. Nagae	Kyoto U	Search for a nuclear Kbar bound state K^-pp in the d(π^+, K^+) reaction	Stage 1			K1.8	Gal, Nakamura, Nakano, Kishimoto
P28	H. Fujioka	Kyoto U	Study of isospin dependence of kaon-nucleus interaction by in-flight 3He(K- ,n/p) reactions	approved as a part of E15			K1.8BR	Gal, Nakamura, Nakano, Kishimoto
P29	H. Ohnisi	RIKEN	Study of in medium mass modification for phi meson using phi meson bound state in nucleus	Deferred			K1.1	Kumano, Nagai, Peng, Nagae, Gross-Perdekamp
E31	H. Noumi	Osaka U	Spectroscopic study of hyperon resonances below KN threshold via the (K^-,n) reaction on Deuteron	Stage 1			K1.8	Gal, Nagai, Shimoura
T32	A. Rubbia	ETH, Zurich	Towards a Long Baseline Neutrino and Nucleon Decay Experiment with a next-generation 100 kton Liquid Argon TPC detector at Okinoshima and an intensity upgraded J-PARC Neutrino beam	Test Experiment			K1.1BR	Ceccucci, Shaevitz, Yamamoto, Kleinknecht
P33	H. M. SHIMIZU	KEK	Measurement of Neutron Electric Dipole Moment	Deferred			Linac	Shaevtiz, Tschirhart, Bigi, Gross-Perdeckamp, Kleinknecht, Yamamoto
P34	N. Saito, M. Iwasaki	KEK, RIKEN	An Experimental Proposal on a New Measurement of the Muon Anomalous Magnetic Moment g-2 and Electric Dipole Moment at J-PARC	Deferred			MFL	Mori, Tschirhart, Yamamoto, Bigi, Gross-Perdeckamp
P35	T. KAJITA	ICRR, Tokyo	A test experiment to measure sub-GeV flux in the on-axis direction at the J-PARC neutrino beam	to be Decided by E11 and Lab				Ceccucci, Shaevitz, Yamamoto, Kleinknecht

Status report in PAC9

Decision in PAC9

		(Co-)Spokespersons	Affiliation	Title of the experiment	PAC discussion
−	LoI	P.Aslanyan	Laboratory for High Energy, JINR	Study of Exotic Multiquark States with Λ-Hyperons and K^0_S Meson Systems at JPARC	−
−	LoI	T.Nakano	RCNP, Osaka U	Study of Exotic Hadrons with S=+1 and Rare Decay $K^+ \to \pi^+ \nu$ ν-bar with Low-momentum Kaon Beam at J-PARC	−
−	LoI	S.Choi	Seoul National University	Study of Parton Distribution Function of Mesons via Drell-Yan Process at J-PARC at High-p beamline	−
−	LoI	Y.Kuno	Osaka U	An Experimental Search for $\mu^- - e^-$ Conversion at Sensitivity of 10^{-18} with a High Intense Muon Source, PRISM	
−	LoI	Y.Kuno	Osaka U	An Experimental Search for μ − e Conversion at a Sensitivity of 10−16 with a Slow-Extracted Bunched Beam	2nd meeting
−	LoI	T.Kajita	ICRR, Tokyo	A letter of Intent to extend T2K with a detector 2 km away from the JPARC neutrino source	3rd meeting
−	LoI	K. Itabashi	RIKEN	Spectroscopy of eta mesic nuclei by (pi-,n) reaction at recoilless kinematics	−
−	LoI	M.Iwasaki	RIKEN	A new appoach to study the in-medium phi(1020)-meson mass	−
−	LoI	K.Ozawa	Univ. Tokyo	Combined measurements of nuclear omega bound state and omega mass modification in p(pi-,n)omega reaction	−
−	LoI	K. Miwa	Tohoku U.	A Hyperon-Nucleon Scattering Experiment using a SCIFI-MPPC System	−
−	LoI	H. Tamura	Tohoku U.	Gamma-ray spectroscopy of hypernuclei at K1.1	−
−	LoI	H. Tamura	Tohoku U.	Study of Σ-N interaction using light S-nuclear systems	−
−	LoI	K. Tanida	Tohoku U.	Search for Θ^+ hypernuclei using (K^+, p) reaction	−
−	LoI	N. Saito	KEK	New Measurement of Muon Anomalous Magnetic Moment g-2 and Electric Dipole Moment at J-PARC	−
−	LoI	F. Sakuma	RIKEN	Double Anti-kaon Production in Nuclei by Stopped Anti-proton Annihilation	−
−	LoI	J. Imazato	KEK	Measurement of Γ(K+→e+ν)/Γ(K+→m+ν) and search for heavy sterile neutrinos at J-PARC	−