

J-PARC Program Advisory Committee
for the Nuclear and Particle Physics Experiments
at the J-PARC Main Ring
v1.3

[To be approved at the 43rd PAC meeting
KEK/J-PARC-PAC 202X-XX
XXX XXX, 2026]

Minutes of the 42nd meeting held on
July 8 (Wed.) – 10 (Fri.), 2026

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1 Open Session

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3. Neutrino Facility Status & Plan,
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4. E11/E65: T2K operation and hardware status [NU],
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6. E71: (NINJA) [NU],
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7. J-PARC Accelerator Status & Plan,
Yoichi Sato (J-PARC/KEK)
8. FIFC Report,
M. Nakao (KEK)
9. E100: Neutron Lifetime Measurement with Pulsed Cold Neutrons [MLF],
Kenji Mishima (RCNP, Osaka Univ.)
10. E99: Study of Discrete Symmetries in Polarized Epithermal Neutron Optics
[MLF],
Hiroyuki Shimizu (Nagoya Univ.)
11. E56/E82: (JSNS²/JSNS²-II) [MLF],
Takasumi Maruyama (KEK IPNS)
12. E34: ($g - 2$ /EDM) [MLF],
Tsutomu Mibe (KEK IPNS)
13. E21: (COMET) [C-line],
Hajime Nishiguchi (KEK IPNS)
14. Hadron Facility Status & Plan,
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15. E16: Measurements of Spectral Change of Vector Mesons in Nuclei [B-line],
Kazuya Aoki (KEK IPNS)
16. T112+T113: [B-Line],
Kotaro Shirotori (RCNP, Osaka Univ.)

17. E70/E96/E75-1/E94/E90: K1.8 Experiments with S-2S, Including E94 [K1.8],
Toshiyuki Gogami (Kyoto Univ.)
18. E80: Systematic Investigation of the Light Kaonic Nuclei [K1.8BR],
Fuminori Sakuma (RIKEN)
19. E57: Measurement of the Strong Interaction Induced Shift and Width of the
1s State of Kaonic Deuterium at J-PARC [K1.8BR],
Florin Sirghi (LNF-INFN)
20. E72/E104/E45: K1.8BR Status and plan [K1.8BR],
Shuhei Hayakawa (Tohoku Univ.)
21. E63: K1.8 Status and plan [K1.8],
Mifuyu Ukai (KEK IPNS)
22. E63/E72/E104/E45: K1.8 & K1.8BR Plan [K1.8BR, K1.8],
Toshiyuki Takahashi (KEK IPNS)
23. E14: (KOTO) [KL],
Koji Shiomi (KEK IPNS)
24. E107: (KOTO II) [new KL],
Hajime Nanjo (Osaka Univ.)
25. Beam Time Schedule,
Takeshi Nakadaira (KEK IPNS)

2 Closed Session

Present:

Mayumi Aoki (Kanazawa Univ.), Sean Dobbs (Florida State Univ.), Laura Fabbietti (Tech. Univ. of Munich), Kaori Fuyuto (KEK), Nobuaki Imai (Univ. of Tokyo), Hirokazu Ishino (Okayama Univ.)[†], Daisuke Jido (Inst. of Science Tokyo), Kyungseon Joo (Univ. of Connecticut)[†], Georgia Karagiori (Columbia Univ.), Yasuhiro Kishimoto (Tohoku Univ.), Cristina Lazzeroni (Univ. of Birmingham)[†], Makoto Oka (RIKEN)[†], Mauro Piccini (INFN Perugia), Xin Qian (BNL), Àngels Ramos Gomez (Univ. of Barcelona), Kimiko Sekiguchi (Kyoto Univ.) Joachim Stroth (Goethe Univ. Frankfurt), Yuji Yamazaki (Kobe Univ.), Taku Yamanaka (Chair, KEK),

Naohito Saito (KEK-IPNS, Director), Takeshi Komatsubara (KEK-IPNS, Deputy Director) and Takashi Kobayashi (J-PARC Center, Director)

([†]: Former member)

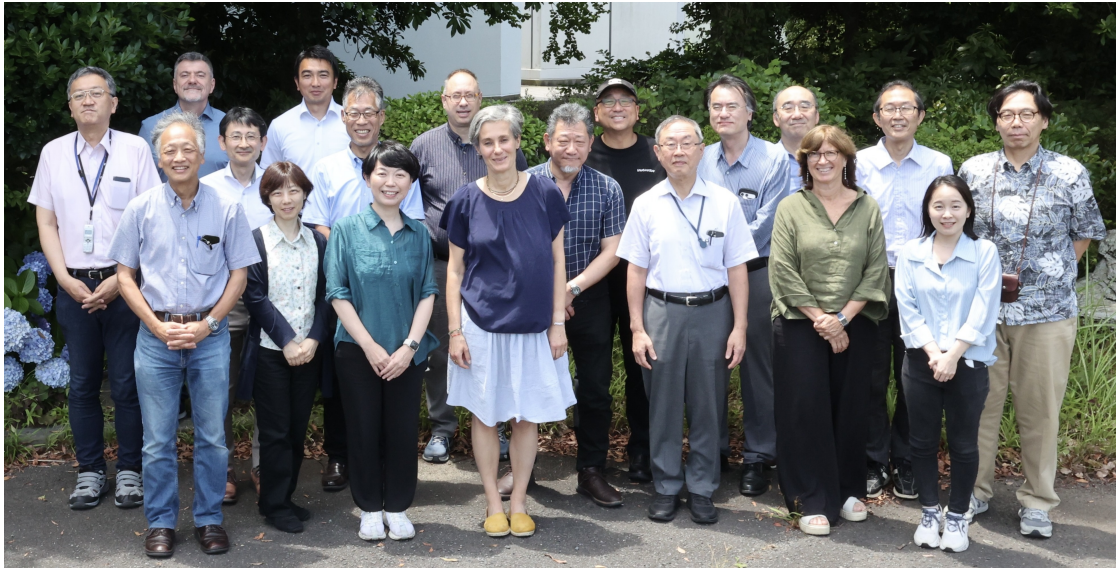


Figure 1: From left: T. Komatsubara, T. Yamanaka, M. Piccini, Y. Yamazaki, M. Aoki, T. Sekiguchi, T. Kobayashi, K. Sekiguchi, S. Dobbs, L. Fabbietti, N. Saito, K. Joo, M. Oka, H. Ishino, D. Jido, À.R. Gomez, N. Imai, K. Fuyuto, Y. Kishimoto.

3 Procedural Report

The minutes of the 41st J-PARC-PAC meeting (KEK/J-PARC-PAC 2026-5) were approved.

4 Laboratory Reports

4.1 Welcome and J-PARC Center Report (Takashi KOBAYASHI, J-PARC Center Director)

The J-PARC Director, Takashi Kobayashi, gave a welcome address and showed the changes in the membership of the committee.

Kobayashi then introduced the J-PARC accelerator complex, which is operated by the J-PARC Center, jointly organized by KEK and JAEA. JAEA operates the 400 MeV LINAC, the 3-GeV Rapid Cycling Synchrotron (RCS), and the Materials and Life Science Experimental Facility (MLF). KEK operates the 30-GeV Main Ring (MR), the Neutrino Experimental Facility (NU), and the Hadron Experimental Facility (HD). The 3-GeV proton beam for MLF reached the design beam power of 1 MW in 2024. Currently, MLF is operated at a lower beam power of 700 kW to extend the lifetime of the neutron production target from one year to two years.

Fast extraction (FX) to NU achieved stable operation at 900 kW in early 2026. A maximum beam power equivalent to 1 MW was also successfully demonstrated. Slow extraction (SX) to HD achieved stable 100 kW operation on April 4.

Kobayashi then reported on the beam operation status during the period from autumn 2025 to summer 2026. Beam operation from late 2025 to early 2026 was generally stable. Hadron and neutrino operations began in November, and the high-intensity neutrino operation in early 2026 was extremely stable. However, most of the beam operation planned for JFY 2026 before the summer shutdown had to be canceled because of a fire that occurred on April 7 and a subsequent MR electrical equipment problem.

The fire started at a 6.6 kV power cable at an electrical substation for the MR. Its cause was identified as local heating associated with “shrink-back” of the cable sheath, which had damaged the copper shielding tape beneath the sheath. Because similar cables are used at many locations, extensive inspections were carried out. MLF operation resumed on June 1 after completion of the safety checks.

However, MR operation could not be resumed because of the failure of an MR high-voltage disconnecter. As the disconnecter could not be repaired by the end of June, the remaining MR operation before the summer shutdown had to be canceled.

Kobayashi also reported on the operational budget. KEK received 52.3 Oku-yen for J-PARC operations, and 4.76 Oku-yen for measures for aging infrastructure. Hyper-K received a construction budget of 15.43 Oku-yen. Electricity prices have risen significantly, from 8 yen/kWh in 2010 to 27 yen/kWh in 2026. The

increasing costs of electricity, labor, and materials pose a serious challenge to J-PARC operations, as the operational budget has remained unchanged.

The revised schedule includes five weeks of MR power-supply tuning in the autumn, followed by the start of beam operation in late November. No beam operation is planned in January 2027 because of scheduled power outages. For the remainder of the fiscal year, 69.5 days of beam operation can be provided if additional electricity funding is secured. The PAC was asked to make recommendations under the assumption that the additional funding would be secured.

4.2 Welcome and Mandate to the Committee (Naohito SAITO, KEK IPNS Director)

The director of the Institute of Particle and Nuclear Studies (IPNS), Naohito Saito, welcomed the PAC members.

Saito first expressed his appreciation to the former members, whose term ended in March 2026, for their strong support for J-PARC, and welcomed new members who joined the PAC in April 2026.

Saito then presented recent achievements of the MR. During the FX run from January to March 2026, the MR was operated stably at 900 kW with very low beam loss. Owing to this high-power operation, T2K collected more data than expected. This stable and high-power beam delivery was achieved through dedicated accelerator tuning and studies performed sequentially from the LINAC to the MR, as well as countermeasures applied against aging equipment in previous years. Several single-shot pulses corresponding to a 1 MW beam power were also successfully accelerated. For SX, the MR achieved stable beam operation at 100 kW. However, the SX run was terminated on April 7 due to a fire at a 50-GeV substation. Extensive investigations found that the fire was caused by a “shrink-back” effect near a connector of a 6.6 kV cable. On June 1, after comprehensive safety inspections of all similar cable connections, the LINAC and RCS started resumed operation for MLF user operation. For the MR, however, a 22-kV power switch could not be turned on. Because the switch could not be repaired by the end of June, all beam time before the summer shutdown was canceled.

Saito then reported on the recent progress in the HK project. The excavation of the huge cavern was completed in July 2025, and the large water tank is currently under construction. The delivery of all 20,000 50-cm PMTs marked an important milestone. Regarding the Intermediate Water Cherenkov Detector (IWCD), excavation of the detector pit and detector engineering design work are underway. Full-scale data taking is scheduled to begin in JFY 2028.

Saito reported that a new physics program called BISCOTTEE is being planned to measure the cross section of neutral-current quasi-elastic interactions of neutrinos with oxygen nuclei using high-intensity short-baseline accelerator neutrinos. This interaction is one of the limiting sources in the search for the diffuse supernova neutrino background. To determine the location of the BISCOTTEE detector, a test experiment, P116, was proposed. P116 aims to measure neutron backgrounds

induced by the neutrino beam at the Neutrino Monitor Building. P116 was evaluated by the PAC chair, the FIFC chair, and the head of J-PARC Particle and Nuclear Physics Division, and the proposal was approved as a test experiment, T116. T116 will be conducted in the spring of 2027.

Documents submitted to this PAC meeting are one new proposal regarding a test experiment at the Neutrino Experimental Facility (P116), one report from E36, and one Technical Design Report from E100 for the Stage-2 Approval request. The Technical Design Report was reviewed by the FIFC meeting held for this PAC meeting.

Saito described the role of PAC as evaluating new proposals, along with requests for the Stage-1 Status and the Stage-2 Approval and providing recommendations to the IPNS and J-PARC directors. He also requested that the PAC assess the progress in ongoing experiments and provide advice on beam-time allocation before summer 2027, as well as guideline for the upcoming fiscal years.

Saito also explained the outlook for MR operation in the coming years which had been presented at the previous PAC meeting. Efforts are currently being made to increase the available beam time. Because beam time is limited, it will be necessary to define priorities among approved experiments based on evaluation criteria such as readiness for data taking and data analysis, as well as publication plans.

Finally, Saito explained that new ideas and proposals are being collected to formulate the “KEK Vision 2026”. The Vision will be used to prioritize projects and create a shortlist for future funding requests. An open symposium will be held in July to provide an opportunity for discussions among communities.

4.3 J-PARC Accelerator Status (Yoichi SATO, J-PARC/KEK)

Yoichi Sato presented the recent achievements, operational status, and near-future upgrade plans for the J-PARC accelerators. He highlighted that the beam power ramp-up has progressed steadily as planned through continuous hardware upgrades and optimization of beam dynamics tuning.

In the Main Ring FX mode, he reported the successful establishment of stable 900-kW user operation for the NU from January to March 2026, as well as a successful 1-MW demonstration in February 2026. These achievements were enabled by shortening the operation cycle from 1.36 s to 1.28 s and adopting the New-Arc Beam Optics, which successfully reduced beam losses. For SX, stable 100-kW user operation for the HD was achieved on April 4, 2026, by shortening the repetition cycle to 4.24 s, as well as by suppressing beam instability with a newly installed diffuser system and optimized RF settings.

Regarding accelerator reliability, Sato introduced two new metrics defined by the J-PARC Accelerator Technical Advisory Committee: scheduled availability (A_s) and effective availability (A_e). He noted that while A_s dropped significantly in JFY 2023 and JFY 2024 due to fire incidents and target-related failures, A_e has consistently remained above 85–90%. This indicates that the accelerators

can operate stably during effective operational periods once the infant failures associated with the recent upgrades have been resolved.

Looking ahead, he outlined the mid-term plan to achieve a beam power of 1.3 MW for FX by JFY2028 (with a shorter 1.16 s cycle) and to exceed 150 kW for SX to support the HD hall extension. To mitigate ongoing issues such as infant failures of IGBT modules in the power supplies and aging infrastructure, he stated that trial countermeasures and strategic hardware replacements will be implemented during the regular summer shutdowns.

4.4 Neutrino Facility Status and Plan (Tetsuro SEKIGUCHI, J-PARC/KEK)

Tetsuro Sekiguchi reported an overview of the J-PARC Neutrino Experimental Facility.

The facility was originally designed and constructed for the Tokai-to-Kamioka long-baseline neutrino oscillation program and has been operating since 2010 for the T2K experiment (E11/E65). Notably, the J-PARC neutrino beam utilizes the off-axis (OA) neutrino beam method for the first time, in which the neutrino beam direction toward the far detector is set at a specific angle (OA angle) relative to the incident proton beam direction. The OA angle of 2.5 degrees was selected for the T2K experiment, resulting in a narrow neutrino energy spectrum with a peak energy of 600 MeV where the neutrino oscillation effect is maximized at Kamioka.

The facility consists of the primary proton beamline, the secondary beamline, the near neutrino detectors located at 280 m from the neutrino production target, and relevant utilities for these components. Two types of near detectors, an on-axis detector called INGRID and an off-axis detector called ND280, are installed in the pit of the Neutrino Monitor (NM) building. On the B2 floor of the NM building, other experiments are utilizing the experimental area in addition to the T2K near detectors. These include E71 (NINJA, which has completed data taking), E83 (SUBMET, which is at the data-taking stage), and T116 (to be conducted during the next beam time).

Sekiguchi presented an update on the operation status. Since the beginning of beam operation in 2010, the accumulated number of protons on target (POT) has reached 5.65×10^{21} with fractions of 58.8% and 41.2% in ν and $\bar{\nu}$ beam operations, respectively. In JFY 2025, 2.30×10^{20} POT were collected at a beam power of 750 kW in November and December 2025, which is approximately 87% of the expected POT assuming a beam power of 800 kW and an efficiency of 85%. After dedicated beam tuning at the MR and upstream accelerators, highly stable beam operation at 900 kW was successfully achieved during the February–March 2026 operation. Consequently, 7.96×10^{20} POT were collected, reaching 100% of the expected POT assuming a beam power of 900 kW and an efficiency of 85%.

Sekiguchi also reported the ongoing neutrino beamline upgrade toward achieving 1.3 MW beam power for the Hyper-Kamiokande (HK) experiment. The MR beam power is being increased year by year through several hardware upgrades

during each summer shutdown, and it will reach 1.3 MW by JFY 2028. The first stage of the neutrino beamline upgrade was completed during the long shutdown in JFY 2021–2022. The upgrade included an increase in the horn current from 250 kA to 320 kA, resulting in a 10% increase in the neutrino flux at the far detector, and a faster operation cycle of 1.36 s (compared with 2.48 s before the upgrade). In JFY 2026, the second stage of the upgrade will be conducted. It will include target upgrades (replacement with a new target capable of 1.3 MW operation and an upgrade of the target He circulation system), reinforcement of the cooling capacity of the secondary beamline water cooling system, and realization of a fully remote maintenance scheme for the beam monitors and relevant vacuum components in the final focusing section of the primary proton beamline. After the upgrades in JFY 2026, the neutrino beamline will be ready for the 1.3-MW beam operation. He also emphasized the importance of dedicated beam commissioning and beam studies to achieve a stable beam operation at each stage of the beam power increase. Thus, allocation of dedicated beam commissioning time will be necessary before the start of HK physics operation in JFY 2028.

Sekiguchi also provided an update on the status of HK construction. The excavation of the HK detector cavern was completed in July 2025, and construction of the water tank and the associated water system is progressing steadily. A new near neutrino detector, the IWCD, located 850 m away from the neutrino production target, is also under construction. The detector is movable vertically in a 48-m-deep and 10.4-m-diameter pit to cover various OA angles from 1.5 to 4 degrees, where peak neutrino energy varies with the OA angle. Pit excavation is currently ongoing and is expected to be completed by summer 2028. Subsequently, detector commissioning will start in summer 2028.

4.5 Hadron Facility Status and Plan (Hiroaki WATANABE, J-PARC/KEK)

Watanabe reported the current status and future plans of the Hadron Experimental Facility. The 30 GeV primary proton beam is transported through the A-line to the T1 production target, which supplies secondary particles to the K1.8BR, K1.8, and KL beamlines. The B-line branches from the A-line and serves the high-momentum beamline, while the C-line branches from the B-line to serve COMET.

The SX run began on April 2, and stable operation at 101 kW was demonstrated with the T1 target, achieving an important mid-term goal. The beam power was then lowered to 96 kW to reduce the load on the target. On April 7, the SX run had to be terminated due to the fire explained by Kobayashi. The total user operation time was 50 h 49 min, corresponding to 9.8% of the planned 517 hours.

The temperature rise of the T1 target measured at one of the thermocouples exceeded the calculated value by 20%, while no significant change in the cooling-water flow rate was observed. This discrepancy indicates degradation of the thermal conductivity of the gold target due to radiation damage. To keep the target

temperature below the design limit, the beam power should be restricted to less than 96 kW. The target lifetime is determined mainly by thermal fatigue. It has experienced approximately 2.7×10^6 heat cycles, whereas the design lifetime is 10^7 cycles. With the beam power limited as described above and assuming 60 days of beam operation per year at less than 96 kW, the current target should remain usable until around 2032. Fabrication of a spare target began in April 2026 and will take 2.5 years to complete. In addition, a beam-free cooling period of more than six months will be required before the target can be replaced.

During simultaneous A- and B-line operations in November 2025, the temperature of an airtight hut and a sub-tunnel located between the beam switchyard and the HD power supply building reached 50°C. B-line operation was suspended to protect the DC power cables. To lower the temperature, four 16-kW air conditioners were installed in the building in February–March 2026, and an existing 4.5-kW air conditioner was relocated to the airtight hut. Additional fans, ducts, and a portable air conditioner were installed to ventilate the sub-tunnel. The temperature was reduced to 35°C during the April run, but the fire on April 7 interrupted the operation before thermal equilibrium was reached. The cooling measures appear to be effective, but longer periods of simultaneous A- and B-line operation remain to be demonstrated.

The main planned projects for HD are the K1.8BR-area modification, construction of the SP line, and preparation of a spare T1 target. The SP line is described later. Because a new application from a facility cannot be submitted to the Nuclear Regulation Authority until its preceding modification has been inspected, any delay in the K1.8BR inspection would also delay the SP-line project. The SP-line budget must be executed by the end of JFY 2030. The COMET C-line undergoes an independent regulatory process.

The K1.8BR modification, originally planned to start from May 2026, was postponed because of the fire, and is now scheduled for January–April 2027. The Hadron Facility cannot accept beam during this four-month period and will be ready to resume beam operation in May 2027. An additional two months will be required to install a new set of detector in K1.8BR, during which the K1.8 beamline can operate. Regulatory approval for the modification has already been obtained, and the corresponding facility inspection must be completed before summer 2027 to allow timely submission of the SP-line application.

The SP-line project, approved under the JAXA Space Strategy Fund, will provide a mass-separated secondary proton beam of up to 200 MeV to test, for example, single-event effects in semiconductor devices for space applications. The expected intensity is 10^7 protons per spill, which is considered sufficient for these tests. The plan is to construct the beamline over five years and start commissioning in 2030. Construction will proceed in stages and require separate regulatory applications and inspections. The B-line experimental area will require modifications to the concrete shielding, but no major changes to the existing beam transport components.

Polarity changers will be installed on all B-line magnet power supplies during

the summer 2026 shutdown to enable the transport of negatively charged secondary particles starting in November 2027. However, B-line operation requires, in advance, the restoration of the electrical substation equipment damaged in the fire, as it supplies 6.6 kV power to most B-line magnet power supplies in the beam switchyard. Two recovery options are being considered to start beam operation in November.

A rotating production target is being developed for beam powers exceeding 150 kW. Candidate designs include a so-called “Euro Coin” design, in which a target ring made of gold, platinum, or tungsten is supported by a ring made of nickel or copper, and an “all-tungsten disk” design devised to reduce the cost. The target would be rotated and cooled by helium gas, and the rotation system satisfies the basic requirements. Fatigue analysis showed that the current all-tungsten disk design is not acceptable, and the geometry is being optimized to reduce thermal stress. The target design is planned to be finalized within three years.

5 General Remarks and Recommendations

The PAC congratulates IPNS and J-PARC on steady improvements in the facility, beam power and beam quality. The MR FX mode achieved stable 900-kW operation and successfully demonstrated 1-MW-equivalent beam shots, while introducing new beam optics to reduce beam loss. There is also an upgrade plan to achieve 1.3 MW beam power for Hyper-Kamiokande (HK) operation. The SX achieved a stable 100-kW operation, and there is a plan to increase the beam power to 130 kW and improve the beam spill structure.

Despite those improvements and achievements, the PAC has two major concerns.

The first is the reliability of accelerator operation. The SX operation in spring 2026 was terminated after only 50 hours of beam time because of a fire, followed by a failure of a high-voltage power switch. Reliable operation of the accelerators and associated equipment is essential, as improvements in beam power would have little value without reliable beam delivery. To minimize aging-related failures and the resulting loss of beam time, sufficient budget should be allocated for strategic replacement of aging equipment, and careful inspections should be carried out to identify potential problems before they lead to failures.

The second concern is the budget for accelerator operation. KEK is relying on supplemental funding to cover the electricity costs for accelerator operation. Without this funding, the beam time available in JFY 2026, including the final beam period for T2K, will be significantly reduced. The budget required to execute the full planned beam program should therefore be secured.

The beam time for SX was delayed because of the fire, and the beam time scheduled for November is even shorter than the originally planned for spring 2026. This situation severely limits the running time of the multiple experiments scheduled to use the K1.8BR and K1.8 beamlines before the K1.8BR modification, to the extent that any further disruption could significantly compromise their

physics output. J-PARC should make every effort to allocate 26 days of beam time in November to ensure successful execution of these experiments.

The total POT for T2K will fall 30% short of the original goal of 10×10^{21} . Nevertheless, the PAC understands that this represents the best possible optimization to for the transition from T2K to HK, taking into account the overall project schedule and the available human resources.

For the HK operation period, the PAC would like to reiterate that having only one SX operation cycle per year will have a significant impact on the user community and may not be practical for some experiments. The PAC therefore strongly recommends that KEK and the user community work together to secure additional funding to increase the number of SX operation cycles.

The PAC would like to reiterate the suggestion made at the last PAC meeting to create a web page listing all approved experiments, with links to each experiment's web page containing its scientific outputs, such as publications.

The PAC would like to ask the presenters to adhere to their allocated presentation times. The PAC may enforce a stricter time management at future meetings.

6 Evaluations of the Proposals and Status of the Ongoing Experiments

6.1 E11/E65 (T2K)

The T2K experiment presented the status of the beam, detectors, and analysis, as well as plans for JFY 2027 and beyond. It also summarized the oscillation results highlighted at the Neutrino 2026 Conference, and presented exciting progress in muon neutrino cross-section measurements with the upgraded near detector. Additional developments aimed at improving event collection efficiency and analysis performance are also underway.

Near and far detector operations are progressing well. Beam operations had also been progressing well, with highly stable 900-kW operation achieved from January through March 2026, including several short tests at 1 MW. To date, the collaboration has accumulated 5.65×10^{21} POT, with 58.8% collected in the forward horn current (FHC) mode and 41.2% in the reverse horn current (RHC) mode. During JFY 2025, the collaboration collected a record-breaking 1.0×10^{21} POT. However, two months of beam operation were lost during JFY 2026 before the summer shutdown due to a fire in April, and a failure of an MR high-voltage disconnecter in June 2026.

The collaboration expects to be ready for the upgraded 1.3-MW beam after JFY 2026. The upgrades to the helium vessel and decay volume are driving the schedule for beam readiness, which is currently projected to be as late as February 2027 rather than the earliest possible date of January. It was encouraging for the PAC to hear that the collaboration is working with the contractor to clarify the timeline for this upgrade as soon as possible.

Data taking with HK is expected to begin in 2028. The PAC was pleased to learn that the T2K and HK leadership teams are coordinating on agreements for data sharing and handoff of experimental operations. The PAC looks forward to hearing, at a future PAC meeting, that both plans and timelines have been mutually agreed upon by the two collaborations. The PAC would also like to hear, at a future PAC meeting, about the plans for completing T2K-only analyses, and for preserving T2K data and analysis pipeline in the HK era.

The collaboration presented new sensitivity projections, assuming a total projected beam delivery of 7.13×10^{21} POT, which is significantly lower than the original target of 10×10^{21} POT. This reduction is driven in part by the two months of beam downtime resulting from the recent fire and the MR disconnect failure. To achieve this exposure, the collaboration requests 88 days of physics running from February through May 2027. The PAC endorses this request.

6.2 E71 (NINJA)

The NINJA (E71) experiment measures (anti)neutrino–nucleus cross sections in the sub-multi-GeV region using nuclear-emulsion detectors at J-PARC. With its high sensitivity to low-energy protons, the measurement is expected to play an important role in constraining charged-current 2p2h and ν_e charged-current interactions relevant to current and future neutrino oscillation experiments. The PAC was pleased to hear of the substantial progress made since the previous meeting. The PAC congratulates the NINJA Collaboration on the successful completion of the E71c beam exposure. Development of all 1,900 emulsion films was completed by mid-June 2026 with an outstanding efficiency of 99.6%. The collaboration is now proceeding with film scanning and subsequent data analysis. The newly installed FROST large scintillation tracker and LES2 large emulsion shifter operated successfully throughout the run, enabling a target mass 1.33 times larger than in previous runs. With the E71c campaign, the originally requested E71 exposure of 1.0×10^{21} POT in the FHC mode was achieved and exceeded. In addition, 0.5×10^{21} POT of antineutrino (RHC) data were collected for the first time. The collaboration also presented a concrete, staged publication roadmap. NINJA is one of the core research activities of a new JSPS Core-to-Core Program (JFY 2026–2030), titled "International Research Hub for Promoting Theoretical and Experimental Research Using Neutrino–Nucleus Interactions".

Looking ahead to the physics reach, the PAC notes that improved neutrino–nucleus cross-section measurements provide an important opportunity to reduce the systematic uncertainties that currently limit oscillation analyses, including the uncertainty on $\Delta m_{\mu\mu}^2$, which is an important input to future determinations of the neutrino mass ordering in the coming years. NINJA’s unique capability to measure low-energy protons and exclusive final states is well matched to this goal, and the PAC encourages the collaboration to keep this connection to oscillation physics clearly in focus. To fully realize this physics potential, the PAC emphasizes the importance of high-statistics cross-section measurements. The PAC encourages the collaboration to capitalize on the substantial datasets now available and

to further improve event-selection efficiency using advanced analysis techniques, including AI/ML. Such developments will enable expansion of the analyzed fiducial volume beyond the current central region, maximizing the available statistics for both inclusive and exclusive cross-section measurements and strengthening the experiment’s overall physics reach.

The PAC also reiterates two recommendations from the previous meeting. First, the PAC strongly encourages the collaboration to continue its close engagement with the T2K experiment by sharing data and analysis techniques and to define a concrete strategy for incorporating NINJA cross-section measurements, including future results, into T2K oscillation analyses. Second, the PAC again encourages the collaboration to strengthen its engagement with the theory community. The newly launched international research hub is a welcome development, and the PAC looks forward to seeing it foster concrete theory–experiment collaborations on neutrino–nucleus interaction models. The PAC also looks forward to reviewing the first physics results from E71 and the collaboration’s forthcoming publications at future meetings. These results are expected to make important contributions to the global neutrino-interaction physics program.

6.3 E100 (Neutron lifetime)

The E100 experiment aims to measure the neutron lifetime using the beam method at the MLF BL05 beamline, with a target precision of 5 s in Phase-1 and an ultimate goal of 1 s in Phase-2. The PAC recognizes the importance of the collaboration’s core scientific motivation: resolving the longstanding 9.7-s (4.8σ) discrepancy between beam-method and bottle (storage)-method measurements of the neutron lifetime. Unlike other beam experiments, which determine the neutron lifetime by counting protons from neutron beta decay, E100 counts electrons from the decay. The electron signal is normalized in situ using the neutron capture reaction ${}^3\text{He}(n, p){}^3\text{H}$, measured in the same detector, providing an approach whose dominant systematic uncertainties are largely independent of those in proton-counting beam experiments.

The PAC welcomes the substantial procedural and technical progress reported since the previous PAC meeting. A revised Technical Design Report was submitted and reviewed by the FIFC, and the collaboration responded to the FIFC action items including safety documentation, an organization chart, a systematic-uncertainty table for the 5-s target, and a beam-time breakdown. During the June 2026 commissioning run, E100 collected the first physics data with the superconducting solenoid and the multilayer TPC.

Despite the substantial progress, the PAC remains concerned about the background levels and projected systematic uncertainties. In particular, the origin of the external background is not yet understood. In the pilot data, the measured background with the magnetic field was significantly higher than predicted by simulation, resulting in a larger statistical uncertainty than that in the field-free configuration. In addition, the excessive firing rate of the cosmic-ray veto indicates the presence of an additional unidentified background source. The PAC considers

resolving the origin of these external backgrounds to be the highest priority, as they pose a significant risk to achieving the Phase-1 target precision of 5 s.

Regarding the systematic uncertainties, the PAC shares the FIFC’s request for a complete item-by-item breakdown and is not yet convinced that the current estimates are sufficiently well justified. The magnetic-field background suppression and the $\beta/{}^3\text{He}(n,p){}^3\text{H}$ discrimination both rely on Monte Carlo simulations that do not yet agree with the data. For example, the pulse-height distributions differ significantly between simulation and the pilot data, and the simulated signal-region contamination is substantially lower than that observed experimentally. The PAC encourages the collaboration to continue prioritizing these issues and to provide a comprehensive, itemized description of how each systematic uncertainty is evaluated. Uncertainty values based on estimates rather than data-driven studies should be explicitly identified. The collaboration should also demonstrate the validity of the simulation through detailed comparisons with data, including the relevant distributions, and present a clear strategy for establishing the reliability of the quoted systematic uncertainties. The PAC cautions that simply accumulating additional statistics is unlikely to resolve these discrepancies, and recommends dedicated calibration and systematic studies, including magnetic-field and gas-pressure scans, to validate the underlying models and reduce the associated uncertainties.

The PAC also echoes the FIFC’s concern regarding human resources. The organizational structure presented indicates that the analysis effort is supported by very limited personnel, which the PAC considers insufficient for a measurement expected to be ultimately limited by systematic uncertainties. For an experiment of this complexity, the availability of adequate personnel is critical, and the current shortage should not be underestimated. The PAC therefore strongly encourages the collaboration to strengthen the analysis team, particularly through the recruitment of early-career researchers and students, whose contributions will be essential to improving the simulation, understanding the backgrounds, and reducing systematic uncertainties.

Accordingly, the PAC encourages the collaboration to make full use of the pilot-run beam time to characterize and understand the background, as requested by the FIFC. Before proceeding to the Phase-1 5-s measurement, the PAC expects the collaboration to identify the origin of the observed backgrounds and to present a comprehensive, data-validated evaluation of the associated systematic uncertainties. The PAC looks forward to reviewing the updated TDR and associated progress that will enable E100 to achieve its important scientific goals.

6.4 E99 (Epithermal neutrons)

E99 aims to study time-reversal invariance violation (TRIV) using an epithermal neutron beam. The experiment plans to measure the spin asymmetry of polarized neutrons scattered from polarized ${}^{139}\text{La}$ nuclei at the p -wave resonance, providing a complementary probe of CP-violating interactions beyond the Standard Model. At this PAC meeting, the collaboration presented the current status of the Phase-I physics run, the performance of the Phase-I experimental system, and the planned

path toward the Technical Design Report (TDR).

The PAC congratulates the collaboration on the demonstrated performance of the Phase-I experimental system, in particular the successful measurement with both the polarized target and polarized beam. In addition, the achieved neutron and target polarizations exceed the originally targeted values, marking a significant technical milestone for the experiment.

The projected sensitivity is based on statistical precision, while most systematic uncertainties are expected to be evaluated and corrected using energy-dependent observables measured outside the resonance region. The PAC notes, however, that a quantitative breakdown of the expected systematic uncertainties and their contributions to the overall experimental sensitivity has not yet been presented.

The PAC encourages the collaboration to prepare and perform full Monte Carlo simulations with realistic geometry, neutron beam profiles, detector performance, and backgrounds, and to analyze the simulated data to extract the TRIV effect and evaluate its systematic uncertainties. The PAC looks forward to a TDR that includes a comprehensive list of systematic effects, their magnitudes and their evaluation methods. Such documentation will provide an essential basis for the future evaluation of the experiment by the PAC.

6.5 E56/E82 (JSNS²/JSNS²-II)

The JSNS²/JSNS²-II experiment aims to perform a direct test of the long-standing LSND anomaly using the J-PARC MLF as a neutrino source. It provides a unique and important cross-check of the LSND result. At this PAC meeting, the collaboration presented results based on the 2022 and 2024 data sets, which were also reported at the Neutrino 2026 Conference. The “2022+2024” analysis uses data from two of the five data-taking runs collected with the near detector, more than doubling the data set used in the previous 2022 analysis. The collaboration presented a number of improvements to the analysis. The PAC congratulates the collaboration on this progress, as well as on the recent publication of the previous result based on the 2022 data set.

The PAC encourages the collaboration to incorporate additional data into the analysis, which would approximately triple the statistics relative to the “2022+2024” result. However, this should be done only after demonstrating consistent detector and analysis performance over the full period of data taking, before unblinding additional data, and ideally after the planned analysis improvements have been incorporated. Sensitivity projections for JSNS² (Asimov significance) suggest that the current exposure could reach the 3σ sensitivity to the LSND hypothesis, assuming further analysis improvements. The PAC encourages the collaboration to pursue these improvements with a high priority.

The commissioning of the far detector is still in progress, as the collaboration continues to investigate the origin of the unexpectedly high beam-induced neutron background. A major contributor to this background is the BL05 beamline at the MLF. The PAC was not able to assess how effective additional shielding

would be, as the exact origin and energy spectrum of the neutrons are still under investigation. The PAC reiterates its recommendation from the previous PAC meeting, urging the collaboration to prioritize neutron background studies and mitigation strategies with MLF experts. It is essential that the MLF support the establishment of additional shielding infrastructure where justified and necessary to mitigate these backgrounds.

6.6 E34 ($g-2$ /EDM)

E34 aims to measure the anomalous magnetic moment and electric dipole moment of the muon at the J-PARC MLF H-line using a novel technique based on a cold surface-muon beam, muon acceleration, and injection into a compact storage magnet. This approach provides a complementary measurement of the muon $g-2$ with systematic uncertainties that are distinct from those of the conventional “magic-gamma” technique.

The baseline sensitivity of the E34 experiment on $g-2$ is 450 ppb. The collaboration is now aiming for a precision of 100 ppb by upgrading the experimental design to achieve a measurement that surpasses the current precision. The improvement is expected to come primarily from increasing the beam energy to 600 MeV in combination with higher muon polarization. An initial study has identified no fundamental obstacles to scaling up the experiment. The collaboration has therefore decided to proceed with detailed studies and to prepare a Conceptual Design Report over the next 6–12 months. The PAC looks forward to the report, including a comprehensive evaluation of the systematic uncertainties associated with the new design. Regarding the planned expansion of the collaboration reported at the last PAC meeting, an LoI is being prepared for the collaboration with INFN.

Major progress in muon beam development was reported at this PAC meeting. The muon source intensity has increased by two orders of magnitude, reaching 10 Hz, owing to improvements in the power and quality of laser beam, as well as the resolution of the issues reported at the previous PAC meeting. In addition, the produced muons were successfully accelerated to 0.34 MeV in June 2026 using the RFQ installed in the H2 beamline last year. The beam intensity was also studied as a function of the magnet currents and was found to be in fair agreement with simulation. The PAC encourages the collaboration to further investigate the remaining differences between the measurements and the simulation.

The muon injection scheme for the storage magnet was tested with electrons in 2025, and the results have been accepted for publication in PRL. For the positron detector, the hit-rate capability was evaluated using the MLF H-line muon beam, demonstrating that the tracking inefficiency due to pile-up at the expected hit rate of 1.4 MHz is negligible.

A two-stage plan to extend the experimental building was presented at the last PAC meeting. A funding request from KEK to MEXT has been submitted for the construction of the first stage, which will accommodate the muon accelerator operating at its full design intensity. The experimental storage magnet will be

installed in the second stage of the extension. The scientific objective for the first stage is to demonstrate acceleration at the design beam intensity and quality, while also providing a beam for Experimental Area A, where other experiments, such as a transmission muon microscope, will be carried out.

The PAC congratulates the collaboration on its achievements, in particular the increase in beam energy and intensity and the progress toward the realization of the experimental building. The PAC emphasizes that the timely implementation of the project is essential for enhancing the scientific impact of the $g-2$ /EDM experiment and for promoting the use of the monochromatic muon beam in other applications. Regarding the new high-precision measurement with 600-MeV muons, the PAC considers that it should be proposed as a new experiment, because the proposed upgrade involves a change in the physics goals as well as revisions to the project schedule and cost.

6.7 E21 (COMET)

The COMET experiment is designed to search for a muon-to-electron conversion without neutrino emission in an aluminium target at the new C-line of the Hadron Experimental Facility. The original strategy involved two phases; Phase-I, with a beam power of 3.2 kW, and Phase-II, with 56 kW. Phase-I would achieve a sensitivity 100 times better than the current experimental limit. While Phase-I has received the Stage-2 Approval, a new early phase, Phase-1 LI, (or LI for short), was devised to enable the collection of data as soon as possible, before the Phase-1. Phase-1 LI uses a lower beam power (10% of the Phase-1) and reduced iron shielding to lower the cost. Phase-1 LI would achieve a SES comparable to the current limit. COMET data taking with 8-GeV protons is mutually exclusive with both FX and SX operations.

At the 38th PAC meeting in July 2024, following the report of the Review Committee for COMET, the PAC agreed that taking data at the reduced intensity of Phase-1 LI as early as possible is the correct strategy. The COMET Promotion Task Force is closely monitoring the progress in the project.

The grant application during JFY 2025 was successful, providing sufficient financial resources to conduct the Phase-1 LI experiment. Progress in efforts to obtain contributions from outside Japan was also reported.

All four superconducting magnets had been installed. During excitation of three of the four magnets, a quench occurred, causing one of the magnets, the Transport Solenoid, to be displaced. Although the displacement was within the acceptable limit, the interiors of the solenoids will be visually inspected for possible damage. An external review committee will be formed to ensure the safe re-excitation of the magnets.

The preparation status of the physics detector and the beam detector was presented. While significant progress has been made in detector construction and commissioning, some preparation tasks for mass production are still ongoing.

The target date for the LI run was revised to accommodate delays due to the quench incident and the detector construction. The collaboration proposed di-

viding the LI run into two steps, a commissioning run in mid-2028 with a beam intensity of 1% of that for the LI run, followed by the full LI run. The commissioning run focuses on the physics detector. Not all the detector channels are required for this purpose. A preliminary schedule toward the commissioning run was presented.

The COMET commissioning run will be conducted with operation of the C-line only, although simultaneous operation of the A- and C-lines would enable more efficient use of the 8-GeV beam. This decision was made to avoid possible interference between the A-line operation and the regulatory radiation safety inspection required for the C-line operation.

The PAC congratulates the collaboration on the progress made in both the experimental and financial aspects of the project, particularly the successful funding application, which has been a major concern for the realization of the LI run. The PAC requests that the collaboration proceed with the highest degree of caution in recovering from the solenoid quench incident.

The PAC appreciates that the collaboration has quickly revised the strategy toward the LI run in response to delays in beamline and detector preparation. Since the two-step scheme was presented without detail in this meeting, the PAC requests that the collaboration present a detailed plan for the new scheme. In addition, because the production and commissioning schedule remains extremely tight even with the two-step scheme, the PAC again requests that the collaboration report its progress comprehensively at forthcoming PAC meetings. One possibility would be to include a concise summary of the activities of the COMET Promotion Task Force.

6.8 E16 (Vector meson in nucleus)

E16 was approved for 300 hours of beam time for the physics run, following the recommendation of the 40th PAC held in July 2025. In November 2025, E16 had 144 hours of beam time (Run 1a), with 6.7×10^9 protons recorded per spill. At the PAC meeting, the collaboration demonstrated successful operation of the detector system based on the analysis of a substantial fraction of the recorded events. The demonstrated results include successful tracking in a magnetic field, position resolutions reaching $130 \mu\text{m}$, a clear Cherenkov light signal observed with the HBD modules, and electron identification based on the correlation between the momentum measured with SSD and GTR trackers and energy measured with the lead glass modules (ECAL). A very preliminary dilepton invariant mass spectrum based on $\sim 30\%$ of the collected data shows clear peaks corresponding to the ω and ϕ vector mesons. The widths of these peaks are, however, broader than those obtained previously because some tuning and calibration procedures have not yet been applied.

The committee congratulates the collaboration on the publication of its first physics paper based on 51 hours of data collected in 2024 (Run 0e). Cross sections for ϕ production on C and Cu targets were measured, and their mass-number

dependence was found to be consistent with the $p - p$ cross sections measured by other experiments.

A rough assessment based on the figures presented suggests a lower ϕ yield than that projected in the original proposal submitted in 2017. The PAC encourages the collaboration to clarify the detection efficiency for the current configuration including HBD modules and quadruple-GEM, and to estimate the total number of ϕ mesons expected from the 300 hours of running.

To enable a comprehensive study of the system performance including a detailed analysis of the ω and ϕ line shapes, the committee recommends that the remaining beam time of Run 1 beam time be allocated this year. Ideally, to minimize interference with other experiments, the E16 run should be scheduled before the potential T112 and T113 runs.

6.9 T112+T113 (B-Line)

Two test experiments, T112 and T113 had been approved to run at the B-line.

The primary objective of T112 is to evaluate the properties of the negatively charged secondary particle beam at the high-momentum beam line. The experiment will measure the intensity, profile, and particle composition / purity of the beam.

The objective of T113 is to demonstrate radiographic imaging using multi-GeV muons at the B-line. The method uses multiple Coulomb scattering of high-energy muons to reconstruct the internal structure of dense materials. At the previous PAC meeting, T113 presented simulation studies showing that the target structure can be reconstructed with the required precision using a total of 5 million events collected at multiple rotation angles. The updated proposal raises the muon energy from 3 GeV to 6 GeV to shorten the beam time.

The present proposals provides an updated implementation plan, including the readiness of the detector components and beam-line operation, and the beam-time allocation.

T113 should be conducted prior to T112. The PAC encourages the proponents and the laboratory to continue close coordination so that these test experiments can be carried out with minimum impact on other running experiments including E16. The PAC looks forward to a report comparing the achieved performance with the stated criteria for each test item.

6.10 K1.8 experiments (K1.8)

The K1.8 area hosts several Stage-2 approved experiments at different stages of development. During this PAC, the status of E70, E75-1, E63, and E94 was discussed, and the committee makes the following recommendations.

E70 aims to measure Ξ hypernuclei with the S-2S spectrometer via the missing-mass method, using the reaction $^{12}\text{C}(K^-, K^+)_{\Xi}^{12}\text{Be}$, with the $^{12}\text{C}(\pi^+, K^+)_{\Lambda}^{12}\text{C}$ and $p(\pi^+, K^+)\Xi^-$ reactions used as calibration channels. Data taking was completed in May 2025, and the number of events observed in the region of interest for ^{12}Be is

consistent with expectations. This analysis was finalized without using the active fiber target (AFT). Differential cross sections for some calibration reactions were also extracted at beam momenta of 1.6 and 1.8 GeV/ c , providing new constraints on the hypernuclear production mechanism. The collaboration is currently refining the calibration, reconstruction, and energy-loss corrections.

The committee congratulates the E70 collaboration on the completion of data taking and the publication plan for 2026. The committee also considers it very important that the E70 collaboration provide solid benchmark measurements in parallel with the completion of the data analysis.

E75-1 constitutes the first phase of the search for the Ξ hypernucleus ${}^7_{\Xi}\text{H}$, produced via the ${}^7\text{Li}(K^-, K^+){}^7_{\Xi}\text{H}$ reaction with the S-2S spectrometer, and is a precursor to the subsequent E75-2 search for its conversion to ${}^5_{\Lambda\Lambda}\text{H}$. E75-1 is planned to receive beam in Spring 2027, requesting approximately 12 days of physics data taking.

The committee did not review a dedicated status report for E75-1 at this meeting. The committee encourages the collaboration to present a detailed proposal update, reflecting the best calibration and reconstruction methods established through the E70 analysis.

E63 aims to perform a precise measurement of the ${}^4_{\Lambda}\text{H}(1^+ \rightarrow 0^+)$ γ -ray transition energy using the Hyperball-J germanium detector array, via the ${}^7\text{Li}(K^-, \pi^-)$ reaction, in order to study the large charge-symmetry breaking (CSB) previously established by E13 in the $A = 4$ hypernuclear system. Germanium spectroscopy is expected to improve the energy resolution from the > 70 keV (FWHM) achieved with earlier NaI-based measurements to below 5 keV, which is required to make a meaningful comparison with theory. In the commissioning run in November 2025, about 2.5 days of beam time were used to verify the beamline detectors, the germanium array, and the DAQ; all systems were confirmed to work as expected. Building on the previously approved 17 days@80 kW ($\equiv$ 16 days@90 kW: 5 days for start-up/commissioning + 11 days for physics), the collaboration requests a minimum of 11.5 days@96 kW for the remaining run (2 days for commissioning/calibration, 9.5 days for physics data taking) in Fall 2026. The committee congratulates the collaboration for the achieved results and was convinced that the hadron-plus- γ detector system satisfies the required resolution and performance as demonstrated during the commissioning. Noting that the requested statistics are close to achieve the planned precision, the committee recommends keeping the duration of the production beam time to 13 days (3.5 days for commissioning/calibration, 9.5 days for physics data taking) in Fall 2026.

E94 aims to perform a new-generation Λ hypernuclear spectroscopy with the (π^+, K^+) reaction on ${}^7\text{Li}$, ${}^{10}\text{B}$, and ${}^{12}\text{C}$ targets at $p_{\pi} = 1.05$ GeV/ c using the S-2S spectrometer. Its missing-mass resolution of 0.7–1.4 MeV/ c^2 (FWHM) and an accuracy of 100–127 keV/ c^2 (including systematic error) provide sufficient sensitivity to probe the charge-symmetry breaking beyond the $A = 4$ system, where existing mirror hypernuclear data ($\Delta B_{\text{diff}} > 200$ keV) are not accurate enough. New, accurate missing-mass data have already been obtained for $A = 10$ (${}^{10}_{\Lambda}\text{B}$) and $A = 12$

($^{12}_\Lambda\text{C}$). A prototype of the new acrylic Cherenkov counters upgraded for both E75 and E94 showed good performance in the November 2025 beam test. The PAC recognizes the progress made and looks forward to the forthcoming report.

6.11 E80 (Light kaonic nuclei)

The E80 experiment aims to study K^-ppn nuclei produced by a K^- beam impinging on a ^4He target at the upgraded K1.8BR beamline. The decay products from the kaonic nuclei will be measured using a new cylindrical detector system (CDS). The proposal was granted the Stage-2 Approval following the recommendation of the 38th PAC meeting in 2024. At the 42nd PAC meeting, the E80 proponents reported on the status of their preparations.

The K1.8BR beamline is planned to be upgraded from January 2027. At the 42nd PAC meeting, the E80 proponents requested a one-week commissioning run in June 2027 with the full setup after the K1.8BR update. They also requested one shift of beam time in late 2026, prior to the K1.8BR upgrade, for beam tuning without the D5 magnet. Obtaining beamline parameters in late 2026 would allow the 2027 commissioning run to start promptly with optimized initial settings.

The PAC recognizes the achievements of E80, including the preparation of the CDS, electronics, and DAQ systems. The PAC also appreciates the facility’s efforts in preparing for the K1.8BR beamline upgrade. Consequently, the PAC endorses one shift of beam time for beam tuning during the next period of SX in 2026, followed by a commissioning run with the full setup after the K1.8BR upgrade. Furthermore, the PAC expects the proponents to present both the experimental status and the progress of the ongoing theoretical investigations at the coming PAC meeting.

6.12 E57 (Kaonic deuterium)

The E57 experiment, originally proposed in 2014 and updated in 2015 with a more detailed simulation study, aimed to perform precision spectroscopy of kaonic atoms at J-PARC using a stopped K^- beam. It planned to employ transition-edge sensor (TES) microcalorimeters as a complementary approach to the SIDDHARTA-2 experiment at Frascati. After the Stage-1 Status was granted following the recommendation of the 20th PAC, the collaboration carried out SDD-based commissioning measurements of kaonic lithium in 2018 and kaonic ^4He and hydrogen in 2019, collecting approximately 6 hours of K^- - ^4He and 90 hours of K^- - p data. In parallel, SIDDHARTA-2 completed the measurement of the kaonic-deuterium X-rays with SDDs; the corresponding $\bar{K}N$ and $\bar{K}p$ scattering parameters, extracted using the Deser–Trueman formula, are reported in a paper currently under submission.

The Frascati group found that a substantial improvement in the precision of the the energy-shift measurement would require not only improved energy resolution but also an entirely new experimental concept. For this reason, the original E57 proposal is now being revised for a systematic, high-precision kaonic-atom program using heavier stable-isotope targets, such as lithium, beryllium, and boron, to

access the $3d \rightarrow 2p$ transition. Theoretical predictions by J. Óbertová *et al.* [Phys. Rev. C **112**, 055201 (2025)] indicate that strong-interaction shifts and widths increase rapidly with atomic number, as summarized in Table 1.

Table 1: Predicted strong-interaction shift and width of the $3d \rightarrow 2p$ transition in light kaonic atoms, and the precision goals of the upgraded E57 program.

Atom	Transition energy (keV)	Shift pred. (eV)	Shift goal (eV)	Width pred. (eV)	Width goal (eV)
$K^{-6,7}\text{Li}$	~ 15	-3	1	54	2
$K^{-9}\text{Be}$	~ 28	-37	3	247	5
$K^{-10,11}\text{B}$	~ 44	-180	8	760	20

The PAC recognizes the importance of the physics addressed by the E57 experiment and encourages the collaboration to submit a new proposal. The proposal should include

- a thorough discussion of where the strong interaction is expected to leave a more significant signature than in existing kaonic-atom data,
- a demonstration that the TES sensors can achieve the required resolution to resolve the predicted strong-interaction effects summarized in Table 1, and
- a full discussion of systematic uncertainties.

The PAC further recognizes the leading role of the Frascati group and its Japanese collaborators in developing TES sensors capable of providing 10–20 eV FWHM resolution over the full relevant energy range, and encourages the collaboration to pursue a resolution below 10 eV.

6.13 Current K1.8 and K1.8BR experiments (K1.8 and K1.8BR)

The representatives presented the run plans for the Stage-2 approved experiments—specifically E63 at the K1.8 beamline, and E72, E104, and E45 at the K1.8BR beamline along with the current status of these experiments. Although these experiments were originally allocated beam time in Spring 2026, they were all postponed due to the fire incident and the consequent beam time cancellation.

To adjust to this situation, the proponents presented a minimal beam time plan of 25.8 days under the 90 kW operation mode (estimated to be 22 days under the 96 kW mode). This optimized plan reflects a strategic compromise made considering the scientific priority of their physics outputs. Additionally, two days are requested for the start-up of the MR and beamlines of HD, before any experiment can run.

The PAC recognizes that all these experiments are ready to run, and strongly recommends that the facility allocate beam time for them during the next slow-extraction period starting in November 2026. The PAC also notes that there is

no safety margin left in this plan and urge the IPNS and J-PARC Directors to allocate 26 days of beam time following the experiments' requests. Considering that the K1.8BR beamline is scheduled for an upgrade from January 2027, the PAC strongly recommends completing E72, E104, and the first phase of E45 in K1.8BR, and E63 at K1.8 in the fall run 2026. The priority for conducting these experiments is in this order.

6.14 E14 (KOTO)

The KOTO experiment (E14) searches for the rare CP-violating decay $K_L \rightarrow \pi^0 \nu \bar{\nu}$ using the neutral beamline of HD. The branching ratio is precisely predicted by the Standard Model (3×10^{-11} with a theoretical uncertainty of about 2%) and is sensitive to a wide range of new physics models, making this decay an excellent probe of physics beyond the Standard Model.

KOTO received a high-quality beam for 36 hours and collected data with very high efficiency in April 2026 before the fire incident.

The collaboration presented, for the first time, the single-event sensitivity (SES) for Run92 (2024) and Run93 (2025) data samples, obtaining an SES of 4.22×10^{-10} , more than a factor two lower than that obtained with the 2021 data. The collaboration is continuing to improve the analysis of $K_L \rightarrow \pi^0 \nu \bar{\nu}$. The expected background contamination has been reduced relative to previous analyses without compromising the signal acceptance, which has in fact increased by 4%. In addition, advanced analysis techniques have been introduced to improve the rejection of the halo $K_L \rightarrow \gamma\gamma$ background, as reported at the previous PAC.

The KOTO collaboration has a broader physics program beyond the primary $K_L \rightarrow \pi^0 \nu \bar{\nu}$ analysis, maximizing the physics output from the collected data. These analyses improve the collaboration's understanding of the data, benefiting the primary analysis while also providing valuable opportunities for younger collaborators to take leading roles in advanced efforts.

Concerning the detector upgrade, this year the collaboration plans to install a new in-beam charged-particle counter: a scintillator film housed inside a dedicated vacuum chamber. This upgrade is expected to reduce the accidental loss due to vetoing charged particles from 8% to 4% while simultaneously reducing the maintenance effort compared with the previous gas-chamber-type detector.

The collaboration requires 120 net days of running at 95 kW to reach a sensitivity for the $K_L \rightarrow \pi^0 \nu \bar{\nu}$ decay at the level of the Grossman-Nir limit ($BR = 4.1 \times 10^{-10}$). Reaching such a sensitivity would be a milestone not only for KOTO collaboration but also for the broader particle physics community, as it would strongly constrain many exotic new physics models.

The PAC congratulates KOTO on significant progress made in the analysis of 2024 and 2025 data sets and on the publication of the searches for the decays $K_L \rightarrow \gamma X$ (X : invisible), $K_L \rightarrow \pi^0 \pi^0 \gamma\gamma$, and $K_L \rightarrow \pi^0 \pi^0 X (X \rightarrow \gamma\gamma)$. The PAC endorses the KOTO beam request and recommends that beam time for KOTO remain a high priority for J-PARC, avoiding long periods without beam delivery to maintain a strong and active collaboration.

6.15 E107 (KOTO II)

E107 (KOTO II) aims to precisely measure the extremely rare decay $K_L \rightarrow \pi^0 \nu \bar{\nu}$, one of the most sensitive probes of physics beyond the Standard Model, with a design sensitivity sufficient to establish the Standard Model signal at more than the 5σ level. The experiment also plans to investigate other rare neutral-kaon decay channels, including $K_L \rightarrow \pi^0 \ell^+ \ell^-$, to further probe potential contribution from new physics. It is expected to become the world's only dedicated experiment for rare K_L decay studies following the completion of the current KOTO experiment. The proposal was scientifically approved and granted the Stage-1 Status at the 39th PAC meeting.

The collaboration reported steady progress toward the Technical Design Report (TDR). The PAC appreciates the establishment of an expanded international collaboration, the organization of dedicated working groups, and the continued R&D efforts supporting the preparation of the TDR.

The PAC also notes the progress in the study of the Hadron Experimental Facility extension. In particular, the collaboration presented the T1.5 design, in which a new target is installed upstream of the existing beam dump, as the baseline configuration for pursuing the Stage-2 Approval. The PAC recognizes this as an important milestone for the project. The PAC encourages the collaboration to continue improving both the facility and detector designs.

The PAC appreciates the collaboration's continued efforts to strengthen its international collaboration and funding prospects. The PAC looks forward to further progress toward the Stage-2 Approval.

7 Dates for the Next J-PARC PAC Meeting

The next J-PARC PAC meeting will be held in January 2027.

8 Documents Received

For this meeting, the J-PARC PAC received the following documents.

- Minutes of the 41st J-PARC PAC meeting held on January 21 - 23, 2026 (KEK/J-PARC-PAC 2026-5)
- Proposals:
 - P116: Proposal of a test experiment. BISCOTTEE Phase-0: Measurement of accelerated neutrino-induced neutron background at the J-PARC (KEK/J-PARC-PAC 2026-6)
- Technical Design Reports:
 - E100: TDR for the E100 Experiment: Neutron Lifetime Measurement with Pulsed Cold Neutrons (KEK/J-PARC-PAC 2026-7)
- Reports:
 - E36: Status of E36 Measurement of $\Gamma(K^+ \rightarrow e^+\nu(\gamma))/\Gamma(K^+ \rightarrow \mu^+\nu)$ (R_K) using the TREK detector system (KEK/J-PARC-PAC 2026-8)