KEK/J-PARC-PAC 2019-10
Jan. 20, 2019

J-PARC Program Advisory Committee

for the Nuclear and Particle Physics Experiments

at the J-PARC Main Ring

Minutes of the 27th meeting held
16(Wed.)-18(Fri.) January 2019

OPEN SESSION:

1. Welcome and Mandate to the Committee: K. Tokushuku (KEK)
2. J-PARC Center Report: N. Saito (J-PARC/KEK)
3. J-PARC Accelerator Status & Plan: F. Naito (J-PARC/KEK)
4. T2K (E11)/T2K-II(E65) Status and Plan of T2K including Beamline Upgrade and T2K-II Proposal: A. Ichikawa (Kyoto)
5. Report from the Neutrino Beam Line Review Panel: K. Tanaka (J-PARC/KEK)
6. Report from the ND280 Upgrade Review Panel: T. Sumiyoshi (TMU)
7. T2K/T2K-II ND280 Upgrade: M. Zito (Saclay)
8. E14 (KOTO): H. Nanjo(Osaka)
9. E21(COMET): Y. Kuno (Osaka)
10. E34(g-2/EDM): T. Mibe (J-PARC/KEK)
11. E61(NuPRISM/TITUS): M. Hartz (IPMU)
12. E71 (NINJA): T. Fukuda (Nagoya)
13. E07 (Double Strangeness): J. Yoshida (JAEA)
14. E40 (Measurement of the Cross Sections of Σp Scattering): K. Miwa (Tohoku)
15. E15 (A Search for Deeply-bound Kaonic Nuclear States by in-flight ^{3}He(K^{-}, n) Reaction): M. Iwasaki (RIKEN)
16. E56 (Sterile Neutrino Search): T. Maruyama (J-PARC/KEK)
17. FIFC Report: S. Uno (KEK)
18. Hadron Hall & SX Beam Status, Schedule and Target R&D Plan:

H. Takahashi (J-PARC/KEK)

19. E16 (Spectral Change of Vector Mesons in Nuclei):
S. Yokkaichi (RIKEN)
20. E57 (Strong Interaction Induced Shift and Width of Kaonic Deuterium):
J. Zmeskal (SMI-OeAW)
21. E03 (Measurement of X-ray from Ξ^- Atom): K. Tanida (JAEA)
22. E42 (H dibaryon): J.K. Ahn (Korea)
23. E72 (Search for a Narrow Λ^* Resonance using the p(K^-, Λ)η Reaction with the hypTPC Detector): K. Tanida (JAEA)
24. P73 ($^{3}_{\Lambda}H$ and $^{4}_{\Lambda}H$ Mesonic Weak Decay Lifetime Measurement with $^{3,4}He(K^-,\pi^0)^{3,4}_{\Lambda}H$ Reaction): Y. Ma (RIKEN)
25. P74 (Direct Measurement of the $^{3}_{\Lambda}H$ and $^{4}_{\Lambda}H$ Lifetimes using the $^{3,4}He(\pi^-,K^0)^{3,4}_{\Lambda}H$):
A. Feliciello (INFN Torino)
26. E70 (Spectroscopic Study of Ξ-hypernucleus, $^{12}_{\Xi}Be$ via the $^{12}C(K^-, K^+)$ Reaction):
T. Nagae (Kyoto)
27. P75 (Decay Pion Spectroscopy of $^{5}_{\Lambda\Lambda}H$ Produced by Ξ-hypernuclear Decay):
H. Fujioka (Titech)
28. K1.8/K1.8BR Request Summary & K1.8 Floor Plan (mid-term):
M. Ukai (J-PARC/KEK)
29. Beam Time Schedule in 2018-2021 T. Kobayashi (J-PARC/KEK)

CLOSED SESSION:

Present: I. Adachi(KEK), N. Aoi (Osaka/RCNP), M. Blanke (KIT), D. Harris (FNAL), Y. Itow (Nagoya), F. Le Diberder (CNS/IP2N3/LAL), A. Ohnishi (Kyoto/YITP), S. Kettell (BNL), R. Kitano (KEK), M. Kuze (Tokyo Inst. of Tech.), J. Pochodzalla (Mainz), H. Tamura (Tohoku), A. W. Thomas (Adelaide), N. Xu (LBL), R. Yoshida (Chair, JLab), K. Tokushuku (KEK-IPNS Director), T. Kobayashi (KEK-IPNS Deputy Director) and N. Saito (J-PARC Director)

1. PROCEDURAL REPORT

The minutes of the 26th J-PARC-PAC meeting (KEK/J-PARC-PAC 2018-27) were approved.

2. LABORATORY REPORT

2-1 Welcome and Mandate to the Committee (Katsuo TOKUSHUKU, KEK IPNS director)

The director of the Institute of Particle and Nuclear Studies (IPNS), Katsuo Tokushuku, welcomed the Program Advisory Committee (PAC) members.

After a brief introduction of KEK-IPNS, he described the J-PARC history along with the beam power development of the J-PARC Main Ring (MR). He explained ongoing experiments and proposals and reported actions made after the 26th PAC meeting; stage-2 approvals were given to the experiments, E45, E56, E69, and E34. Two new proposals (P74 and P75) and one updated proposal (P73) have been submitted to this PAC meeting, about which he requested the PAC to make evaluations. He mentioned that there was one Letter of Intent for studying parton distributions with Drell-Yan process. He explained also experiments requesting stage-2 approval in this meeting; E65, E70, and E72 submitted (or updated) Technical Design Reports (TDRs) and E71 prepared a note in response to the last PAC meeting outcome. Finally he summarized a list of experiments whose progress/status to be reviewed in this meeting.

Tokushuku explained the J-PARC MR and Hadron Hall mid-term plan; the Hadron Hall primary target replacement is expected in 2019 after which beam power upgrade in the slow extraction (SX) mode will reach above 50kW. Long shutdown is scheduled in 2021 to install the new power supply system for MR magnets. Preparation status of this upgrade can be found in F. Naito's presentation in this meeting. MR operation power is expected to reach the design power of 750 kW in the fast extraction (FX) mode and beyond 80kW in SX mode respectively after installing the new power supply system.

Tokushuku reported the status of the KEK budget in FY 2019, which was announced by MEXT in December 2018, and showed a plan based on that. Following the indications from the MEXT budget allocation, such as an increased emphasis on new projects, KEK/J-PARC will put higher priority on the completion of the upgrade. The MR power upgrade is scheduled in FY2021, SX target upgrade in 2019, high-p beam line construction in FY2019, and COMET phase-I facility construction in FY2022. Regarding COMET facility construction, a plan to accelerate the beam delivery is also considered. With this constraint the proposed beam operation scenario from January 2019 to March 2020 as follows;

- Retain the February-June 2019 MR running period as already planned,
- No MR operation in Autumn 2019, and
- No MR operation in January-March 2020 unless we get extra resources.

He requested the PAC to provide a recommendation on the guide-line regarding beam time allocation in the short term (until March 2020) based on the above scenario. He also

reminded the committee that it took a whole FY2021 for the MR upgrade work and therefore no beam would be delivered to users in that fiscal year.

The financial situation in FY2020 is not clear yet. KEK will make an effort to deliver user beam time as long as possible, keeping the upgrade program on schedule. There may, however, be a situation that KEK needs to take a compromise plan, with less beam time. He asked the PAC provide guidance concerning the beam sharing between the FX and SX, in the case that the operation in the FY2021 is only 4 months or even only 2 months, in order to optimize J-PARC particle and nuclear physics programme outcome.

After several clarifications, the committee took note of the mandates. The guideline of the beam allocation in FY2020 was discussed in the closed session and the recommendation is written in a separate section of the minutes.

2-2 J-PARC Center Report (Naohito SAITO, J-PARC Center Director)

The J-PARC Director, Naohito Saito, welcomed the PAC members. He explained the operation status and beam power history of two accelerators, RCS and MR. Saito mentioned the MR power upgrade plan to 1.3-MW anticipated after the magnet power supply system upgrade. There are two ingredients to achieve this beam power upgrade; rapid cycle operation down to 1.16 sec realized by MR power supply renewal, installation of high-gradient RF cavity, collimator improvement, and rapid-cycle pulse-magnet for injection and extraction, and more protons in an acceleration bucket realized by RF power system and feedback system stabilizing the beam. Regarding high-power operation of RCS above 1-MW has already been tested in a trial as he reported in the previous PAC meeting. He explained the major Material and Life Science Facility (MLF) projects for which high-power beam operation is beneficial. He mentioned two particle physics projects anticipating 1-MW class RCS beam; sterile neutrino search JSNS^2 (E56) and precise measurement of muon g-2/EDM (E34). Status reports of these experiments are given at this PAC meeting.

Saito explained J-PARC budget history of both JAEA and KEK and described J-PARC efforts in this condition to realize planned investment for future. He emphasized importance of timely upgrade of MR power supply, gaining understanding by public and MEXT, wide cooperation across different experiment facilities as well as collaborations with universities, institutions, and industries, improvement of an access to the J-PARC campus, and continuous challenge to increase budget allocation by the government.

Before closing his presentation, Saito explained the Japan Science Council (JSC) Master Plan 2020 of which discussion has recently started at J-PARC/KEK. J-PARC is discussing to propose that the following projects be listed in the JSC Master Plan 2020;

- MR and neutrino facility upgrades,
- Hadron Hall extension, COMET Phase-II facility construction, and muon g-2/EDM facility construction,

- Construction of MLF second muon target station,
- Heavy ion acceleration in MR,
- R&D work of ADS and PIE facility, and
- Operation of J-PARC

Saito mentioned also various activities such as international collaborations on radiation damage, establishment of J-PARC branch of Nagoya university in October 2018, and collaborations with academia and industry.

2-3 J-PARC Accelerator Status (Fujio Naito, J-PARC/KEK)

Fujio Naito summarized the J-PARC accelerator status and plan. First, he presented the operation summary since the last PAC meeting in July 2018. There was no beam operation scheduled for MR from October to December 2018. MLF was stably operated with 500 kW beam power. Accelerator studies at the LINAC and the RCS with a high beam current of 50 to 60 mA and a long pulse width of 0.6 ms were performed. The RCS beam power of 1.2MW equivalent was successfully demonstrated in this beam study for a future high beam power operation of the MLF.

Naito reported a summary of MR maintenance work and a status of MR preparation for 2019 operation. All maintenance work is on schedule for MR beam operation. Some parts of the MR were exposed to the air while installing new beam monitors and therefore vacuum scrubbing by beam is required at the beginning of next beam operation.

Naito showed the status of MR upgrade. The overall scheme and schedule of the MR upgrade was explained. For FX, the high repetition rate scheme will be adopted and the cycle period will be shortened from 2.48 s to 1.32 s for 0.75MW and to 1.16s for 1.3MW operations. For SX the residual activity will be mitigated for 100kW operation. New magnet power supplies for main magnets which are necessary to realize high repetition rate and to improve the stability of the flat top current is under preparation to be installed in JFY2021 long shutdown. The first new power supply for the bending magnet was examined with the actual load. Design output current with an anticipated cycle period of 1.29s was successfully confirmed. In addition, some of MR devices were tested at high repetition rate. New 2nd harmonic RF system was successfully tested for 1.32 s operation. New FX septum magnet, FX-SM30, was also tested with the 1.16 s and 3850A of the flat-top current successfully.

Naito showed an operation schedule and study plans of the MR. The fixed operation schedule from January to March and a tentative operation schedule from April to July are introduced. An accelerator study with three days in the middle of January 2019 is scheduled. In this period, some of studies will be conducted to increase the number of protons per pulse toward future high-power FX operation. The MR tuning for SX is scheduled on February 8th. Study items to recover 50kW beam, to improve the duty factor

of the beam spill and to suppress the instability during the de-bunching process are planned.

2-4 FIFC Report (Shoji UNO, IPNS, KEK)

Shoji Uno presented a report from the Facilities Impact and Finance Committee (FIFC). He reported discussions at the 10th meeting held on Dec. 19th, 2018 at Tsukuba campus. FIFC discussed the feasibility of E70 and E72, both of which request stage-2 approval after TDR submission. FIFC also discussed E71, in which the setup of the experiment was significantly modified from the previous FIFC review. Rik Yoshida (J-Lab.), the chairperson of J-PARC PAC, was invited as an observer.

E70: The purpose of the E70 experiment is to study Ξ-hypernucleus ${}^{12}_{\Xi}Be$ through ^{12}C(K^-, K^+)Ξ reaction. In this experiment, the technology for all detectors is basically well known and the trigger rate is quite low. Thus the FIFC thinks this experiment is feasible. However, there are several comments as listed below. These are described in more details in the review report.

For this experiment, better momentum resolution is a key to know the fine structure in the missing mass distribution. E70 group explained that improved momentum resolution for outgoing K^+ and K^- beam can be obtained owing to the optics of a new S-2S spectrometer and the calibration using S-2S, respectively. However there was no clear description about how these improvements will be achieved. In addition, the active target made of scintillation fibers is one of the key devices to improve the momentum resolution, although a beam test with a realistic active target has not yet been performed. FIFC requested the group to perform the test. FIFC requested also to confirm the present performance of the aerogel Cherenkov counter because it has long been used for other experiments. FIFC pointed out that there is no description about the DAQ system in the TDR, which should be included.

E71(Ninja): The purpose of this experiment is to measure neutrino interactions in water for understanding neutrino-nucleus interactions and reducing systematic uncertainties of the T2K experiment. After the review in the previous FIFC, the setup has been significantly modified. In this new setup, the Ninja detector is located inside the WAGASCI setup and thus no INGRID is required any more. FIFC reported that basically there is no serious technical issue in this configuration. FIFC commented that construction schedule and installation procedure should be carefully discussed with the WAGASCI group.

E72: The purpose of the E72 experiment is to search for a possible narrow Λ* resonance around 1665 MeV via the p(K^-, Λ)η reaction, which has been seen at the Belle experiment. The experiment utilizes the same spectrometer (the superconducting Helmholtz dipole magnet, the Time Projection Chamber and the TPC hodoscope) to be used in the E42/E45 experiments. In addition, the same liquid hydrogen target as the E45 experiment will be used. The FIFC members understand this experiment is feasible and easier than E45. Some minor comments are described in the review report.

Detailed discussions at the FIFC meeting are summarized in a separate report.

2-6 Hadron Hall & SX Beam Status and Target R&D Plan (Hitoshi Takahashi, J-PARC/KEK)

Hitoshi Takahashi reported on the status and schedule of the Hadron Experimental Facility. The report included the status of beam operation, construction of the high-p/COMET beam lines, and upgrade plan of the production target (T1).

The last beam operation of the facility was completed in June 2018. The maximum beam power of 51 kW was achieved, and whole system of the hadron beam line worked stably without any serious problems during the beam time. The next SX beam time is scheduled from February to April, 2019.

An upgrade plan for the T1 target was reported. The next target will be an indirectly water-cooled type capable of accepting the primary beam power of up to 90 kW. It is now being manufactured and will be installed in fall 2019. Furthermore, another type of target, a rotating target operated with direct cooling with water or He gas, is being developed for the future power upgrade above 90 kW. This is called a "euro-coin" type target composed of a nickel disk with a gold or platinum edge. The status of the fabrication of the 90-kW target and the R&D works for the rotating target was reported.

Construction work for the high-p/COMET beam lines is in progress. Following equipment was installed last year; (1) special magnets in the branching section, (2) collimators, beam monitors, and vacuum devices in the Switch-yard tunnel, (3) magnets and shields in the high-p experimental area, and (4) power supplies for newly installed magnets in the hadron hall. Takahashi showed the construction schedule of the high-p beam line. The beam line is expected to become available in winter JFY2019.

3. EVALUATIONS OF THE PROPOSALS AND STATUS OF THE ONGOING EXPERIMENTS

E11/E65 (T2K and T2K-II)

The E11 (T2K) experiment is a long-base neutrino oscillation experiment from J-PARC to Super-Kamiokande. The experiment reported its current status and future prospects in the near term, and its plan for E65 (T2K-II).

The PAC heard highlights from results in 2018. 15 anti-ν_e events are newly reported in December 2018 which include a background of 9.4 events with no ν_e appearance. Based on these and the neutrino statistics, the 2-sigma interval for δ_{CP} is now [-2.966, -0.628] (Normal Hierarchy).

The status and preparation for the next run was also reported. Mitigation of the Horn 1 leak was discussed and the spare Horn 1 will be ready by March 2019. Refurbishment of the far detector Super-Kamiokande in preparation for SK-Gd was carried out this past summer and the detector will be back online filled with pure-water shortly. Gd-loading will be scheduled after Oct. 2019 at the earliest. WAGASCI/babyMIND located at 1.5 degrees from the beamline axis is now integrated into T2K and preparation is successfully going on to be ready by the next run. With new efforts of Near Detector measurements, systematic errors will be reduced.

T2K made a beam request of 11.4e20 POT (~6 months) in FY2020 before the FY2021 shutdown. This new statistics, in addition to the current planned data, might provide 3-sigma exclusion of δ_{CP}=0 and 99% for CP violation. Even with less beam (such as total 4 months including the FY2020 run), there might be still a chance to get 3-sigma rejection of δ_{CP}=0. This prospect is important in view of the international competition to measure neutrino CP violation. The PAC appreciates their beam request and acknowledges it is reasonable if funding could allow for 9 months per year of accelerator operations.

T2K-II aims for a substantial improvement in δ_{CP} sensitivity by two major upgrades: a beamline power increase from 0.75 MW to 1.3 MW, and an upgrade of the ND280 detector. The PAC heard an initial report from the ND280 upgrade review committee (ND280UG) and follow-up discussion by the experiment.

The ND280UG review committee recognized the importance of the ND280UG to reduce systematic errors related to the neutrino flux and cross sections to obtain a world-leading result on δ_{CP} establishing CP violaion with the highest possible statistical significance . The High Angle TPC (HA-TPC) and Time of Flight system (TOF) are designed to cover the entire kinematical acceptance with established technology. The Super-Fine Grained Detector (S-FGD) is very attractive in that it provides a full 3-dimential view of the vertex with lower momentum threshold. The ND280UG committee recognized the basic feasibility of construction, with two suggestions; 1) recognizing the technical challenge of S-FGD assembly of 2 million cubic scintillators and suggested that the assembly procedure be more completely documented and that alternative assembly techniques be investigated and 2) a Japanese liaison for detector integration be assigned to enable tight communication with supporting Lab staff. In closed session the PAC heard details of project planning regarding cost, man-power and the status of various international budget requests. Overall, the PAC agreed with the positive conclusion from the ND280UG review committee.

The PAC also heard a report from the review committee for neutrino beamline upgrade as described in an updated TDR. This report was provided after discussions in the previous PAC meeting. The review committee communicated with the team for upgrade work in many important details. They found most parts are well organized, while they pointed out some critical ways to mitigate possible risk in schedule and cost, project organization, and especially tritium contaminating cooling water. The review committee does not find any serious unresolved technical problem in the revised TDR. Final conclusions will be made after one more iteration with the team. The PAC supports to continue the review to improve the plan.

In summary the PAC congratulates the collaboration for the successful design work for the upgrade plans both for ND280 and the neutrino beam line. The PAC recognizes that the ND280 and beam line upgrades are important and indispensable to improve the systematic and statistical uncertainties, respectively. The PAC encourages KEK and the T2K group to make all the efforts to accomplish the neutrino beamline upgrade and the ND280UG construction by the end of 2021 in accordance with MR intensity upgrade.

E14 (KOTO)

The goal of the KOTO experiment is the search for the flavour and CP-violating rare decay $K_L \to \pi^0 \nu\bar{\nu}$ which is a very sensitive probe of physics beyond the Standard Model. With the 2015 data set KOTO has set the world's best limit on the branching ratio to be below 3×10^{-9}. With the combined 2015-18 data set, the limit is expected to be below the Grossman-Nir bound, and ultimately KOTO aims to obtain sensitivity to the Standard Model at 3×10^{-11}.

At the PAC meeting, KOTO presented the status of the 2016-18 data analysis. Significant improvements have been achieved in the data analysis, employing new algorithms for background reduction and acceptance improvement at high rate. The collaboration expects that the analysis will be finalized in 2019.

KOTO summarized the 2018 detector upgrade, including the installation of an MPPC array showing impressive performance. KOTO requests budget for a 20cm iron wall to shield neutrons from the primary beam line. The preparation for beam is currently ongoing and is expected to be completed on time. KOTO requests at least two months of beam time in FY2020.

In November 2018, KOTO had a technical review by US DOE. The reviewers were convinced by KOTO's plan for increasing the sensitivity and reducing backgrounds, and provided many helpful comments to the collaboration. A concern was raised about the possible loss of manpower by one US institution potentially leaving the collaboration. The PAC shares this concern.

The PAC congratulates KOTO on the recent publication of the results from the 2015 run, on major achievements made in the current upgrade, and on the very positive outcome of the DOE review. The PAC finds the current KOTO beam request to be reasonable and recognizes its importance in making progress towards KOTO's ultimate goal as presented to the DOE review. In view of the currently ongoing experiment NA62 measuring the complementary $K^+ \to \pi^+ \nu\bar{\nu}$ decay, KOTO is encouraged to maintain visibility and publish their results on the 2016-18 data set in a timely fashion.

E21 (COMET)

The E21 (COMET) is a large international collaboration that aims to observe charged lepton flavor violation (CLFV) through the μ to e transition in muonic Aluminum atom, thereby probing very high energy scale for possible New Physics processes.

The focus of the status report presented to PAC was on Phase I of the program, which

uses a lower intensity beam and a simplified apparatus, with respect to Phase II. Phase I should allow a 100 fold improved branching ratio limit, with respect to the present available limit, and Phase II another improvement of a factor 100.

The collaboration posted on arXiv the first part (i.e. the summary intended for publication) of its TDR for Phase I. The complete TDR is under preparation. The collaboration provided inputs to the upgrade of the European Strategy for Particle Physics, through a joint white paper from COMET-MEG-Mu2e and Mu3e collaborations, and a COMET specific white paper.

On the detector side, significant progresses were presented covering most of the apparatus components. Not mentioned were Trigger and DAQ, tracking codes, computing resources needs and the status of the Physics analysis preparation, although the latter was expected by PAC to be discussed at this meeting. The PAC also expected to learn more on the "extinction ratio issue" presented at last PAC meeting, but lack of beam time did not allow the collaboration to make progress on it. The funding situation is deemed satisfactory.

Concerning Phase II, sensitivity studies, refinement and optimization are underway and could be a topic for the next PAC meeting.

A rough overall schedule was shown for approved, planned and considered CLFV experiments up to 2035. But, owing to the MEG-II and Mu2e competition, it would be useful to present a detailed timeline-chart that lead to a timely commissioning and start of data taking, for Phase I. PAC would appreciate such a presentation for the next meeting.

The PAC congratulates the COMET collaboration for its steady progresses and achievements.

E34 (g-2/EDM)

The E34 (g-2) experiment aims to measure the anomalous magnetic moment (g-2) and electric dipole moment of the muon. E34 received Stage-2 approval from the IPNS director in November 2018. The pioneering technique developed for this purpose is very innovative. This should lead to a g-2 measurement with the same precision as that of the BNL experiment within a few years of data taking, but with vastly different systematics.

The collaboration reported significant progress in many areas—both component prototyping and design developments. At this meeting the PAC heard about improvements in H1-line construction, power substation preparation, beam bunch structure of accelerated M^-, B-field shimming to produce a field that is uniform to 0.454ppm, the new H-line design, and an improved NMR probe. A test module for the positron tracking detector was assembled and test results were shown. The precision required on the muon beam profiles in the longitudinal and radial directions was presented, as informed by the end-to-end simulation. A first measurement was made of the muon beam bunch structure. A TDR summary paper was submitted to arXiv: 1901.03047 on January 10, 2019.

The collaboration did not provide an updated cost estimate or schedule based on the progress made and when resources are expected to become available. As is clear from the presentation, there are many disparate elements that need to come together and be integrated to achieve the science goal of the experiment. Having an updated cost estimate and schedule would allow better understanding of budget needs as a function of time.

The PAC supports the E34 request for Lab support on H-line construction as possible.

E61 (NuPRISM/TITUS)

E61 is a proposal to build a ~1kt intermediate water Cherenkov detector to study neutrino interactions at various off-axis angles in the T2K/Hyper-K neutrino beam lines. These measurements are designed to reduce the uncertainty on neutrino interactions in Super-K and Hyper-K far detector spectra predictions, by measuring different near spectra at several off-axis angles.

E61 presented progress in site investigation. A total of four candidate sites were presented, each with different advantages and disadvantages. E61 is now working with companies to advise on site selection as well as the detector lifting mechanism, including the possibility of only filling the cylinder of water to some fixed distance above the detector height. E61 is looking at cost-benefit optimizations, for example, the scientific impact of reducing the range of available off axis angles in order to reduce the excavation cost. Advances in photosensor development at both TRIUMF and INFN were presented.

E61 continues negotiations to become part of the Hyper-Kamiokande experiment, and as such any request for beam time will become part of requests from T2K-II or Hyper-Kamiokande. They are working to develop a prototype test beam program at either CERN or Fermilab, which is not the purview of this committee. E61 does request continued support from the Lab for the site and facility design. The committee encourages this continued support. The committee encourages Lab management to develop a plan for reviewing the coordinated E61 and Hyper-Kamiokande effort.

E71 (NINJA)

E71 (NINJA) is an experiment to study neutrino-water interactions with an emulsion-water sandwich detector. The original plan was to put the emulsion-water sandwich in front of one module of the INGRID detector. But since the time of the last PAC the plan has changed, and now NINJA plans to place the emulsion water target in the middle of what is now the WAGASCI detector: by placing NINJA in this new location there is the possibility that muons leaving NINJA can be momentum and charge analyzed by BABY-MIND. This allows NINJA to measure muon neutrinos and antineutrinos separately and NINJA showed some event rates for neutrinos and antineutrinos separately in both the forward and reverse horn current beam.

It is important to make sure that this new configuration does not negatively impact their physics program: either because of changes to WAGASCI acceptance, or detector

downtimes that may be associated with NINJA installation. The NINJA-WAGASCI hybrid plan was approved by T2K, therefore we assume that to first order there are minimal schedule and acceptance issues associated with the new configuration. FIFC reviewed NINJA and reported that they saw no technical issues associated with this new detector configuration plan, but they also advise that the construction schedule and installation schedules should be carefully managed with the WAGASCI group.

NINJA presented several possible event observables for both 1-proton/0-pion and 2-proton/0-pion charged current interactions. They showed the different sources of those events (quasielastic, 2p2h, and resonance production). There were preliminary evaluations of the systematic uncertainties that would be associated with extracting cross sections to constrain neutrino interaction models. NINJA also presented some event distributions with model predictions that came from their initial test run.

The committee is encouraged that the new detector configuration will increase the chances of NINJA providing important constraints to neutrino interaction models. We are happy to see more detailed discussion of the background subtraction strategies.

NINJA plans to run parasitically with T2K and therefore does not need additional beam time past what T2K has requested. They do need minimal resources to help with detector installation and power. Because the resource requests of this experiment are not high and the new configuration gives it more physics reach, the committee encourages the experiment to continue their plans to integrate into the WAGASCI detector and analysis configuration and to take data. The committee recommends that the Laboratory provides the modest resources needed to mount the experiment. We encourage NINJA to continue discussions with T2K to develop an analysis plan to provide useful constraints to cross section models.

While the committee was not completely satisfied with the answers provided to the questions about systematic uncertainties in extracting cross sections from event distributions, with the new configuration and the progress in understanding their measurements, and given the minimal cost and impact, we recommend stage 2 approval.

E07 (Double Strangeness)

This experiment deals with a systematic study of doubly strange hypernuclei with a hybrid emulsion method. It represents a significant increase in capacity compared with the earlier work as KEK-PS E373, with an order of magnitude increase in the number of Ξ^- stops.

The experiment had 50 hours of exposure in April 2017 and 23 days in May-June 2017. The photographic processing was completed in February 2018. With 53% of the emulsion sheets scanned at least once, 22 events with double strangeness systems have been observed.

Amongst the results so far, we note that the MINO event in which a double Λ Be nucleus was found is in press at PTEP. In the IBUKI event the nucleus ${}^{15}_{\Xi}C$ was discovered with a binding energy of 1.3±0.2 MeV.

We congratulate the group on the results achieved and urge them to complete the analysis of the remaining sheets as soon as possible.

E40 (Σp)

E40 collaboration reported recent results of Σp scatterings from the pilot run in June 2018. Utilizing the high intensity pion-beam, 20M/spill, and the large acceptance detector, the experiment successfully identified the Σ^- p elastic scatterings and $\Sigma^- p \rightarrow \Lambda n$ inelastic scatterings in the proof of principle run.

With the improved SCH trigger counter, adding additional EASIROC board, and the DAQ efficiency, the experiment is expected to collect 15 times of Σ^- p scattering data in the 2nd run. In addition, the Σ^+ p scattering data will also be collected.

The primary goal of the experiment is to study YN interactions. The success of the feasibility run warrants the future physics data taking. The PAC endorses the scheduled 2nd run and looks forward to the timely completion of the data analysis. The PAC also encourages the experiment to compare its new results with all available model calculations.

E15 (Deeply-bound Kaonic Nuclear States)

PAC heard an analysis report of the E15 experiment, which is searching for deeply bound kaonic nuclei, K^-pp, via the exclusive data of $^3He(K^-, \Lambda p)n$ reactions. Identifying a proton and a Λ, they investigated the Λp invariant mass and the associated missing-mass spectra. Since in this analysis a direct detection of the neutron is not required, the statistics could be significantly enhanced (by about a factor of 50) compared to the original proposal.

The data from the second and final running period, which accumulated 43×10^9 kaons on target, provides a clear signal for a K-pp subthreshold enhancement. Decomposing the observed distribution in a quasi-free KN component, a background and a resonant part, a clear Breit-Wigner shaped spectrum compatible with a state bound by about 47 MeV and a width of 115MeV was observed.

The PAC congratulates the E15 collaboration on this important observation. The committee was pleased to see the timely publication of this result and is looking forward to further detailed analyses. While the interpretation in terms of K^-pp is quite appealing, the committee is convinced that these high-quality data provide an excellent basis for further detailed theoretical considerations. The PAC encourages the collaboration to explore the possibilities for further systematic studies on other light kaonic nuclei in future experiments.

E56 (Sterile Neutrino Search)

The JSNS2 experiment (E56) will search for eV scale sterile neutrinos with an improved stopped muon source compared to LSND.

JSNS2 reported on the election of a co-spokesperson Soo-Bong Kim of Seoul National University. The experimental plan calls for assembly of the detector January through April, followed by filling in May and physics in June.

Liquid scintillator (LS) was produced at the RENO site in Korea and transported to Japan. Daya Bay is providing the Gd-LS, which is going through customs paperwork now. The acrylic tank will be shipped from Taiwan (Nakano) to Japan in February. FADC electronics and PMTs will come from Double Chooz (10 inch instead of the previous 8 inch PMTs). FADCs are in hand, but PMTs have been delayed. A backup plan to buy new PMTs would need to be implemented almost immediately if needed for the June run. University of Michigan has funds for electronics and trigger upgrade. The LED calibration system has been produced in the UK and should be delivered in March. Veto reflectors and optical barriers have been installed. The vessel is now ready for PMT installation.

A safety working group has reviewed safety issues. Radioactive materials storage and fire safety paperwork are in progress.

The PAC is pleased to see the rapid progress of the experiment since our last meeting

The schedule of PMT delivery from Double Chooz is clearly of concern for a June 2019 beam run and should be carefully watched.

Continued effort to obtain funding for the second detector is strongly encouraged.

E16 (Spectral Change of Vector Mesons in Nuclei)

The aim of the E16 experiment is to carry out a systematic study of the spectral change in vector mesons, especially the φ-meson, in nuclei by measuring the e^+e^- invariant mass distribution. Some model calculations predict the spectral change for vector mesons in hot and dense matter, and the observation of such an effect is one of the important measurements in hot/dense QCD.

The stage-2 status was approved to the E16 experiment in the previous PAC meeting for initial data taking ("Run-0", 40 shifts), where the experimental configuration consists of 6(SSD)+8(GTR)+4(HBD)+4(LG). The E16 group reported that the production of each detector component is ongoing in a stable manner and a preparation of the magnetic field mapping is underway. The E16 Run-0 detector system should be completed and installed by September 2019. As was indicated in the previous PAC report, the committee finds the construction schedule is very tight. Considering that the high-p beamline construction is going on in parallel to the E16 installation activities, some potential risk in their integration schedule has to be noted.

In addition, the committee is concerned about a delay in ASD readout electronics preparation, which could be related to a problem on human resources. The E16 group thinks this delay can be recovered in this year.

The E16 group presented task sharing inside the collaboration. However, the committee still encourages the E16 group to increase human resources, and the committee heard that a discussion on the Taiwan group participation is in progress.

The PAC committee considers a careful monitoring of the E16 progress is necessary to get ready for data taking in 2020. The committee invites the E16 group to deliver a report of updated status on the Run-0 detector preparation together with the long-term plan for Run-1 in the next PAC meeting.

E57 (SDD)

E57 aims at a pioneering measurement of X-rays from K^--d atoms. A precision measurement of the shift and width of the 1*s* state by the strong interaction will provide unique information on the kaon-neutron interaction at threshold. Prior to stage-2 approval, the collaboration intends to validate their Monte Carlo estimates of backgrounds by a short test measurement with a liquid hydrogen target.

The pilot run has been approved in the July-2018 PAC and will be performed in spring 2019.

The PAC is looking forward to hear the outcome of this test run in the next PAC meeting. Depending on the background situation found during that pilot run, E57 will finalize the beamtime request for the deuterium run.

The PAC is very happy to see that E57 is ready for data taking. Having finished the pilot run successfully, the PAC will be pleased to consider recommending stage-2 approval during the next PAC meeting for the main physics run. Considering the outstanding importance of this measurement, the PAC strongly endorses the J-PARC management to undertake all possible measures in the attempt to provide an appropriate running period for this important experiment before the long shutdown which is due to the main ring power supply upgrade.

E03 (X-ray from Ξ^- Atom)

The measurement of the strong interaction shift in Ξ-atoms offers the possibility of placing important new constraints on the Ξ-nucleus interaction about which we know far too little. This information will complement that coming from the measurements of Ξ-hypernuclei.

Experiment E03 proposes to measure the X-rays following the capture of a Ξ^- into atomic levels about an Fe nucleus. It is ready to run, having been delayed for some time because of the need for higher intensity and the committee acknowledges that it is now appropriate to press ahead with high priority.

The committee recommends the requested 3 days of commissioning and 19.5 days of data taking to be accommodated at the earliest opportunity.

E42 (H particle)

The E42 experiment aims to identify the H-dibaryon, S=-2 and B=2 six quark state (uuddss), in the $^{12}C(K^-, K^+)H$ reaction at K1.8. Measurements of the ΛΛ, Λpπ$^-$ and Ξ$^-$p final states with good mass resolution and high statistics will provide key information on the possible H-dibaryon, which has been searched for the past 40 years including at the previous E176, E224 and E522 experiments at KEK-PS. Recent theoretical estimates using the lattice QCD and the chiral EFT suggest the existence of the H particle around the NΞ threshold. If evidence for the H-dibaryon is found, it will provide a precious information to understand QCD and will receive world-wide recognition.

The E42 hyperon spectrometer consists of a time projection chamber (HypTPC) and a superconducting Helmholtz magnet. Stage-2 status was approved in July 2017. In this PAC meeting, the E42 group reported the status of preparation, the long-term test of the magnet, the high-rate beam test of HypTPC at HIMAC, prototype tests for TPC Hodoscope and water Cherenkov detector, and simulation results with a full E42 geometry. The PAC finds that the E42 experiment will be ready in early 2020.

The E42 group requested the beam time for the commissioning run of the spectrometer (13 h), the test run (4 days), and the physics run (31 days). The PAC supports the request by the collaboration.

E72 (Λ^* Resonance)

The E72 aims to confirm the narrow Λ resonance at ~1665 MeV just above the Λη threshold and to determine its spin and parity. The proposal was stage-1 approved after the PAC meeting in January 2018, and the proponent requests a stage-2 approval in the present PAC meeting.

The existence of this resonance is conjectured based on a recent analysis of the Belle data in the pK$^-$ invariant mass in the $\Lambda_c \rightarrow$ p K$^-$ π^+ decay, as well as partial wave analysis with the Crystal Ball data for the K$^-$p $\rightarrow$Λη reaction. The latter suggests the resonance to have a spin-parity of $3/2^+$ (P wave) or $3/2^-$ (D wave). These spin-parity assignments, if established, would indicate that this resonance is quite exotic and promote studies of hadron physics via exotic objects.

The E72 will measure the differential cross sections and the Λ polarization in the K$^-$p $\rightarrow$Λη reaction around the threshold with ~734 MeV/c K$^-$ beam at K1.8BR line in order to confirm the existence of the resonance and determine its spin-parity. The experimental method is straightforward; it identifies an η in the missing mass by measuring a Λ with the newly-developed Hyperon Spectrometer, which will be also employed in the stage-2 approved experiments, E42 and E45. Although the E72 will be ready by December 2019, the collaboration agrees with running the E72 at K1.8BR after the E42 at K1.8 if the K1.8 beam line is available.

The TDR was submitted and reviewed by FIFC with several minor comments. In the present PAC meeting the proponent answered almost all the questions and requests from the previous PAC and the FIFC meetings, such as optimization of the magnetic field and

the trigger, beam momentum calibration, updated yield estimate, and so on. A long-term test of the Helmholtz magnet requested by FIFC is not yet done but is scheduled. The E72 requests a beam time of 21 days to measure the polarization with an accuracy of 0.05.

The PAC does not find any problems and concerns to perform the experiment. For efficient use of the whole J-PARC beam time, the PAC requests the E72 to formulate the run schedule in two parts. The first part is dedicated to the discovery of the resonance, and the second to its detailed study. The PAC also asks for detailed discussion for the actual analysis on the spin and parity. The PAC expects the E72 to submit a run plan in the next meeting, where the PAC considers recommendation of a stage-2 approval

P73 ($^{3}_{\Lambda}H$ and $^{4}_{\Lambda}H$ mesonic weak decay lifetime measurement with ^{3,4}He(K^-,π^0) $^{3,4}_{\Lambda}H$)

P74 (Direct measurement of the $^{3}_{\Lambda}H$ and $^{4}_{\Lambda}H$ lifetimes using the ^{3,4}He(π^-,K^0) $^{3,4}_{\Lambda}H$ reactions)

The lightest strange baryonic nuclear system is the hypertriton, $^{3}_{\Lambda}H$, and found to be just bound. Like the deuterium or the tritium nucleus for conventional baryon interactions, the $^{3}_{\Lambda}H$ provides an important benchmark for any strong interaction theory dealing with strange baryons. Its small Λ binding energy B_Λ of only 130 keV found in emulsion studies implies that the Λ hyperon has a rather extended wave function. Despite such a small binding energy a $^{3}_{\Lambda}H$ lifetime significantly shorter than the Λ lifetime, as reported recently by several heavy-ion collision experiments (STAR@RHIC, HypHI@GSI and ALICE@LHC). This presents one of the most intriguing puzzles in hypernuclear physics.

P73 aims at a novel precision measurement of the $^{3}_{\Lambda}H$ lifetime which does not rely on the decay vertex distribution as in the recent heavy ion studies. Instead, P73 proposes a direct measurement of the decay time distribution in the ^{3}He(K^-,π^0) $^{3}_{\Lambda}H$ reaction. Similarly, the P74 collaboration uses the ^{3,4}He(π^-,K^0) $^{3,4}_{\Lambda}H$ reaction to produce the light hypernuclei. Like P73, also P74 measures the decay time distribution to determine the hypernuclear lifetimes. Even if the short lifetime of the hypertriton will be 'only' confirmed by P73 and/or P74, it is certainly desirable to improve its statistical and, in particular, its systematic uncertainty in order to guide future precise structure calculations.

The experiments are conceptually quite similar: the decay time is determined event-by-event by the time difference between the incoming beam particle and the decay pion from the hypertriton decay. The associated π^0 or K^0 are used as a tag for event selection.

There are, however, significant differences in the adopted method as well as in the stage of the proposal. These open issues prevent a final decision on the two proposals:

- The ^{3,4}He(π^-,K^0) $^{3,4}_{\Lambda}H$ reaction studied by P74 has potentially less background, since the missing mass can be used as a selection criteria. However, the presented Monte Carlo simulations are too schematic to allow a quantitative judgement on the benefits of this method. More detailed calculations, taking into account e.g. beam interactions, possible secondary interactions, random coincidences and realistic (and proven) detector performances are clearly

required. Many details of the experimental apparatus are still missing in order to judge the validity of this measurement. The simulation has to rely on well-founded properties of the used detectors and not just on design performances.

- The PAC appreciates the effort made by the P73 collaboration to provide rather advanced simulations. Compared to the ^{3,4}He(π^-,K^0) $^{3,4}_{\Lambda}H$ reaction, the ^{3}He(K$^-$,π^0) $^{3}_{\Lambda}H$ method seems to suffers from significantly larger background. However, it provides slightly larger yields. Nevertheless, arguments leading to the quoted systematic error in the lifetime measurement of 20 ps should be presented more comprehensibly.

The J-PARC PAC understands the importance of the hypertriton lifetime measurement. Indeed, J-PARC aims at the best possible measurement of the hypertriton lifetime. However, one has to consider the limited resources and the limited amount of beamtime available at J-PARC. Only one such experiment can be envisioned to be carried out in foreseeable future.

The PAC thinks that the information provided by the two collaborations so far, is not sufficient to draw a final decision on the optimal approach. Making use of common knowledge and synergies, the PAC encourages each of the two competing collaborations to design the best possible apparatus to perform this important measurement. Special emphasis should be given to possible systematic uncertainties and how these uncertainties will be quantified and eventually controlled.

In the next PAC meeting we will anticipate the recommendation for stage-1 approval of one hypertriton lifetime measurement.

E70 (Spectroscopic Study of Ξ-hypernucleus)

The E70 experiment aims at observing bound states in the S=-2 hypernucleus, $^{12}_{\Xi}$Be, via the ^{12}C(K$^-$,K$^+$) reaction to enhance the understanding of the ΞN interactions which is barely known. The binding energies of the states provide the real part of the potential while the width gives the imaginary part, which is relevant to the strength of the ΞN-ΛΛ coupling in the Ξ-hypernucleus. These information is important to understand the generalized nuclear force models extended to the flavor SU(3) and also to reveal the roles of hyperons in the neutron stars. However, experimental information is very scarce.

In the preceding experiment, E05, about 50 events of enhancement have been observed over the background level in the bound state region of the $^{12}_{\Xi}$Be spectrum. However, the resolution and the statistics were not enough to determine the binding energy and the width of the state. The proponent then updated the proposal as E70 to revisit the $^{12}_{\Xi}$Be nucleus with improved energy resolution from 5.4 MeV to 2 MeV by introducing an active scintillation fiber target and a newly constructed magnetic spectrometer named S-2S.

The technical design report (TDR) was submitted following the suggestion by the PAC25 held in January, 2018 and was reviewed by the FIFC. The FIFC concluded that

the experiment may be feasible, while several concerns on the S-2S spectrometer, the active target, the aerogel Cherenkov counter, and the data acquisition system, have been raised. These questions were addressed during the presentation in the PAC meeting and we found the response to be generally satisfactory. However, the PAC would like to have an opportunity to examine the updated TDR in some details before recommending the stage 2 approval. We anticipate to this recommendation in the next PAC meeting with an updated FIFC report.

P75 (Decay Pion Spectroscopy of $_{\Lambda\Lambda}^{5}H$)

The newly proposed experiment P75 aims to detect the $_{\Lambda\Lambda}^{5}H$ hypernucleus, presumably the lightest double Λ hypernucleus, and to measure its binding energy via the ^{7}Li(K^-,K^+) reaction in coincidence with sequential weak decays at K1.8 beamline. The experiment provides invaluable information on the Λ-Λ interaction, particularly the effect of the ΛΛ-ΞN mixing by combining with the other ΛΛ hypernuclear data such as $_{\Lambda\Lambda}^{6}He$.

The ^{7}Li(K^-,K^+) $_{\Xi}^{7}H$ reaction is identified by employing the S2-S Spectrometer which has been constructed for the coming E70 experiment to study the ^{12}C(K^-,K^+)$^{12}_{\Xi}$Be reaction. In addition, a π- and a proton from weak decays of the double hypernuclei produced from $_{\Xi}^{7}H$ will be measured by the Cylindrical Spectrometer (CDS) borrowed from the SPring-8/LEPS group. The proponent claims that $_{\Lambda\Lambda}^{5}H$ is expected to be abundantly produced from $_{\Xi}^{7}H$ and that it is identified and its mass is measured from mono-energetic π- in the $_{\Lambda\Lambda}^{5}H \rightarrow {}_{\Lambda}^{5}He + \pi^-$ decay. In addition, $_{\Lambda}^{5}He$ is identified via an energetic proton from nonmesonic weak decay of $_{\Lambda}^{5}He$.

The idea to produce double hypernuclei in the (K^-,K^+) interactions using a very light target as Li is quite appealing, since the production yield will not be spread over many exit channels. The method to identify $_{\Lambda\Lambda}^{5}H$ via both mesonic and nonmesonic weak decays is also unique. The PAC is pleased to hear this new idea of producing and investigating double Λ hypernuclei besides the emulsion method.

However, the PAC has several concerns on the proposal. Besides direct production of doubly strange systems by the ^{7}Li(K^-,K^+) $_{\Xi}^{7}H$ reaction, also quasi-free produced Ξ- generated in a primary interaction may introduce secondary nuclear reactions within the thick lithium target. These Ξ^- + ^{7}Li interactions may lead to the production of addition double hypernuclei, twin hypernuclei, as well as free Λ's. These reactions can e.g. be modeled by transport model calculations, thus providing information on possible background. Estimate of such various backgrounds as well as optimization of the experimental conditions are required.

The most difficult problem in this experiment is that the $_{\Lambda\Lambda}^{5}H$ yield depends on the unknown cross section of ^{7}Li(K^-,K^+)$_{\Xi}^{7}H$ and the unknown decay branching ratio to $_{\Lambda\Lambda}^{5}H$. They request a beam time of 60 days. Since the requested beam time is quite long, better estimate of the yield is desired. The proponent is encouraged to make every effort to improve the estimate, combining various theoretical methods such as the direct reaction calculation of Λ emission from the Ξ-nucleus, preequilibrium transport model

calculations, and statistical decay of double Λ nucleus in addition to the direct reaction calculation of Ξ nucleus formation already shown in the presentation. Meanwhile the E07 data as well as the E05 pilot-run data may provide quantitative information on the Ξ-nuclear potential, which would benefit to the yield estimate.

The PAC encourages the proponent to update the proposal for a stage-1 approval. The requested beam time should be finally revised, taking into account the data taken by E70.

4. Summary of BEAM TIME ALLOCATION from October 2019 to June 2020

The committee is deeply impressed by the outstanding quality of the experiments, both on-going and newly proposed, presented at this and previous PAC meetings. These experiments constitute a world-class program with great potential for discovery across a broad range of scientific areas, from neutrino oscillations to physics beyond the Standard Model and hypernuclear physics. Such a program is made possible by the unique and outstanding facilities available at J-PARC, which attracts researchers from all over the world. Such world-wide interest also means that the program attracts significant funding investments from outside J-PARC and Japan. The committee has been very pleased and impressed with the continuous effort and projects at the J-PARC facilities to improve its capabilities to deliver cutting edge science.

However, it has been apparent to the committee for some time that the lack of available beamtime in the last several years has led to severe delays and compromises in carrying out the proposed experimental program. It is therefore with great concern that the committee learns that J-PARC operation may be even more constrained over the coming years. Such a scenario will not only result in even more delays in the existing research programs, but will likely do great harm to the future viability of J-PARC, as physicists, both domestic and international, inevitably look elsewhere for competitive projects at facilities that can support their research in a timelier way. Researchers, having made commitments elsewhere, will be slow to return to J-PARC even if operation time improves in the further future.

The committee strongly recommends that every effort be made to restore the beamtime availability at J-PARC to at least 6 months per year during the period of upgrades towards 1.3MW and to the full 9 months per year afterwards, so that the world-wide scientific community can benefit fully from the unique facilities at J-PARC.

In response to the request to evaluate the allocation of beamtime in case there are as little as 4 months (or even just 2 months in the worst case) of running possible in JFY 2020, the committee reviewed the current beamtime requests from all of the approved experiments. The committee concludes that even in the case of such severe limitations on operations, the available time should be divided approximately equally between the hadron program (SX) and the neutrino program (FX). There are proposed hadron hall experiments that can conclude in an order of one or two months and deliver important results. The neutrino program can gain valuable experience for operations with the new near detectors (WAGASCI/ baby MIND) as well as with Gd doped SuperK that will be available for JFY2020. In addition, there are prospects that even one or two months of

running for the neutrino program in JFY 2020 combined with the scheduled running in JFY2019 could bring meaningful improvements in the significance of CPV results from T2K.

5. DATES FOR THE NEXT J-PARC PAC MEETING

The next J-PARC PAC meeting will be held July 16-18, 2019.

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

- Minutes of the 26th J-PARC PAC meeting held on 18-20 July, 2018 (KEK/J-PARC-PAC 2018-27)
- Proposals
  - P73 experiment: (revised proposal) ${}^{3}_{\Lambda}H$ and ${}^{4}_{\Lambda}H$ Mesonic Weak Decay Lifetime Measurement with ${}^{3,4}He(K^-,\pi^0){}^{3,4}_{\Lambda}H$ Reaction (KEK/J-PARC-PAC 2019-6)
  - P74 experiment: Direct measurement of the ${}^{3}_{\Lambda}H$ and ${}^{4}_{\Lambda}H$ lifetimes using ${}^{3,4}He(\pi^-,K^0){}^{3,4}_{\Lambda}H$ (KEK/J-PARC-PAC 2019-8)
  - P75 experiment: Decay Pion Spectroscopy of ${}^{5}_{\Lambda\Lambda}H$ Produced by Ξ- hypernuclear Decay (KEK/J-PARC-PAC 2019-9)
- Technical Design Reports
  - T2K ND280 Upgrade Technical Design Report (KEK/J-PARC-PAC 2019-1)
  - Technical Design Report for E70 (KEK/J-PARC-PAC 2019-2)
  - J-PARC Neutrino Beamline Upgrade Technical Design Report (KEK/J-PARC-PAC 2019-3)
  - Technical Design Report on the Experiment E72 (KEK/J-PARC-PAC 2019-5)
- Reports
  - Response to the J-PARC Neutrino Beamline Upgrade TDR Review Results (KEK/J-PARC-PAC 2019-4)

- Letter of Intent
    - Studying Generalized Parton Distributions with Exclusive Drell-Yan process at J-PARC (KEK/J-PARC-PAC 2019-7)