Report of the KEK/J-PARC

Muon Advisory Committee (MAC)

MAC-2024

February 2025

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Executive Summary

The Muon Advisory Committee (MAC) met on February 20 and February 21, 2025, in the KEK Tokai #1 Building to review the progress and prospects since the last MAC meeting in February 2024. All presentations were provided prior or during the meeting on the respective Indico website (https://kds.kek.jp/event/53431/) which is important for documentation and for MAC's efficient discussions in the Executive Sessions and the writing of this review report. The MAC thanks the MUSE staff for their considerable efforts put into the preparation of the material and the efficient running of the meeting.

The MAC appreciates the overview talks on J-PARC by the director Takashi Kobayashi and on MLF by the head of the Materials and Life Science Division Toshiya Otomo. The MAC especially thanks the special reviewers for their presentations, on the DeeMe Progress Review by Hiromi Iinuma (Ibaraki University / KEK IPNS) and the Laser Review Committee by Masayuki Katsuragawa (University of Electro-Communications, Tokyo).

The MAC thanks its former members Hiroshi Amitsuka (Hokkaido University), Andrew MacFarlane (University of British Columbia), and its former chair Thomas Prokscha (PSI) for their long-standing service and advice.

The MAC welcomed three new members, Makoto Fujiwara (TRIUMF), Adrian Hillier (ISIS), and Yoko Sugawara (Kitasato University). Klaus Kirch was acting as the new MAC chair.

The main parts I – III of this document are by no means meant as comprehensive summaries of the contents of the respective review presentations. These are available at the Indico site mentioned above. We rather give an excerpt of the items that MAC found most relevant for this review.

I Facility Overview

J-PARC Overview

Director Prof. Kobayashi gave the overview presentation of J-PARC. A great achievement was the stable operation of the 1MW proton beam to MLF during April/May 2024, and the long period of operation, at 800 kW, of the Main Ring (MR) before and after the summer maintenance period. On June 24, the MLF stopped the user operation one week early due to water found in the helium neutron target containment. On June 27, the neutrino program of the MR had to be stopped 5 days early due to the failure of cooling tower motors. Perhaps the most critical was a small leakage of the liquid Hg target circuit, that has led to a significant loss of beam time in the second half of the year. The restart of the MLF and MR had to be delayed due to the necessary MLF target maintenance. Measures have been taken to mitigate the problem, however, recently only beam operation at 100kW to the MLF was safely possible but sufficient to resume MR operation at 800kW from Nov 21 to Dec 23. Another intervention and reassembly from the middle of March to April 7 of 2025 should hopefully solve the problem and allow again for MLF operation at full power.

The construction of the new SOKENDAI Joint Research Center / J-PARC Experimental Equipment Development Building was started which will give ample opportunity for scientists to benefit from synergies, e.g., from shared equipment. A number of issues have surfaced in 2024 caused by aging equipment.

The operational budget of J-PARC has been mostly flat 2022-24 at about 154.9 Oku-yen (in absolute numbers and disregarding inflation, especially energy cost), and is reduced for 2025 to 152.3 Oku-yen. Some compensating effects of supplementary funding has happened over the years, however, the budget situation appears very tight. For JFY2025, substantial resources for ‘aging counter measures’ are provided as supplementary funding to J-PARC (KEK 6.06 Oku-yen, JAEA 16.2 Oku-yen). This is welcomed to ensure future reliable operations.

MLF Overview/Charges to MAC

Professor Otomo reported the status of the MLF facility. The stable and continuous operation at the designed power of 1 MW was a highlight of the 2024A term. The mitigation of pitting in the Hg neutron target by helium bubbling proved successful. As a result, the long-life target will be used for two years, reducing the need for annual target changes.

However, three consecutive incidents — the water leakage in the helium vessel of the neutron source due to an excessive extension of the pillow seal, a malfunctioning of the servo amplifier of the power manipulator used in the target handling operation, and the failure of a mercury pump flange — has led to the cancellation of the user program since late June 2024. The prolonged beam-off period has hindered research progress and significantly impacted the work

of graduate students and young researchers. Adequate budget allocation, time, and human resources must be secured to prevent such unforeseen long beam shutdown periods.

A stable number of research proposals and the increasing number of publications are encouraging. The high proportion of proposals from international researchers is highly valued to show the facility's global role. However, it is important to monitor the trend to ensure international and domestic researchers' well-balanced use of the facility.

Present Status of Muon Science Laboratory

Prof. Shimomura provided a comprehensive report on the four MSL facilities, the seven beamlines and their respective managing organizations, inter-university research proposals, key achievements, scientific highlights, and updates on domestic and international collaborations.

Regarding the organization, the number of staff members increased by two from the previous year, bringing the total to 50. While some staff members received promotions, the number of permanent staff remained unchanged. A significant organizational transition is anticipated in the next fiscal year, as Prof. Shimomura is set to retire from his role as Head of MSL. The MAC recommends that KEK (or J-PARC) ensures a seamless transition, viewing this as an opportunity to appoint personnel with a medium- to long-term vision, as well cultivating leadership and essential skills within the organization.

The number of inter-university research proposals has remained stable. The MAC acknowledges and appreciates the steady increase in publications and the role of each beamline in generating distinctive scientific output.

The acquisition of external funding has been remarkably successful. In addition to securing new large-scale Grants-in-Aid for Scientific Research, three of the eight projects under the newly established K Program shows that muon science is gaining significant attention and recognition. The MAC commends the team for successfully securing funding for new projects. However, in terms of workload, the limited number of permanent staff remains a concern.

Efforts are underway to enhance collaboration with universities and research institutions across Japan, particularly in interdisciplinary projects that integrates the arts and sciences. Simultaneously, there is an increasing emphasis on strengthening collaborations with international institutions. The MAC recommends further efforts to attract additional foreign collaborators and users, leveraging workshops and other outreach initiatives to broaden global engagement.

Facility (MUSE) Overview

The present status of the MUSE facility was presented by Prof. Kawamura. Inter-University Research Programs (IURP) and S1 programs are steadily conducted.

Research on the Integration of Arts and Science has been started as a part of the facility project. As one of the examples, elemental analysis of the golden Shachihoko (imaginary fish) from the Nagoya Castle was shown. In the U-line, a new beam profile monitor has been installed to optimize the overlap between the muonium and the excitation and ionizing laser. For the laser system, a new amplifier crystal and a new window of the gas cell have been installed leading to a much increased intensity and much longer stability of the laser. In the H-line, the last focusing magnets, a new beam profile monitor, and a slit system were installed.

The lab considers the deterioration of some devices installed during the construction stage before 2008 as very serious. The preparation plan for new muon production targets and the storage plan for the used targets was shown. As a mitigation measure for troubles with the drive of the rotating target that occurred in 2022, a new abnormality detection method has been established to prevent similar problems in the future.

As a consequence of other problems, the replacement of the heat exchanger of the refrigerator of the D-line decay solenoid is planned for 2025. In the S-line, the replacement of the FETs for the high-voltage kicker power supplies with SiC MOS-FETs is ongoing, as a measure against the increasing failure rate.

II MUSE Facility Activity

Muon Source (Target)

Dr. Matoba presented an overview of the target design. It was good to hear that the spare target has been constructed. This is important to ensure the secure running of the muon facility. The plan for ensuring there is always a spare target is very thorough. This, clearly, requires continual funding from the obsolescence budget. Improvements in working practices and methods have been well worked through and should reduce errors. Separating the target assembly instead of cutting the target system is being introduced, this is a cheaper option and reduces the highly active waste storage. However, it may result in a small increase in radiation for staff.

The analysis of the torque data by Mr. Sunagawa was very impressive and the advanced analysis using the spectral centroid method should lead to advanced warning of the issues with the target system. This was demonstrated with historical data and this type of analysis shows the issue with the feed-through could have been observed. It was not clear if an issue with the

bearings would be detected, due to lack of data. It was good to hear that off-line tests should address this, and the MAC committee endorses this approach.

The failure mechanisms of the target system were discussed, the graphite appears to remain undamaged and the target failure might be due to the bearings likely to result from temperature gradients.

D-line and instruments

The D-line was presented in talks by Dr. Takeshita, Mr. Yuasa, and Dr. Umegaki.

It was very pleasing and impressive to see that 0 days were lost due to the beamline issues. Indeed, the only lost time was due to issues with the neutron target. However, there is a potentially serious issue with the refrigerator (a leak from the high-pressure line to the low-pressure line) for the D-line decay solenoid. This has the potential to cause significant lost beamtime. The issue is currently under investigation, and there are a few potential causes. A possible repair of the refrigerator was suggested, based on that the leak position had been narrowed down by pre-investigation to be either in the heat exchanger or a gas pipe in the vacuum chamber. For both possibilities, the team expects to be able to undertake the repair by a replacement of the affected components during the next service period (Jul-Oct 2025). It appears that the related cost can be covered within the available budget or managed to be obtained. The MAC recommends that this is given the highest priority. A later replacement of the whole refrigerator system from the early 2000s has been discussed but is not presently intended. This would be rather expensive, and the MAC recommends investigating all possible renewal options for the future.

The compressed air lines have also caused some issues and a replacement program. In addition, a new monitoring program for the magnet power supplies, with an automatic cut off, has been introduced as a result of the fire in the hadron hall. This measures the current, voltage and therefore resistance to each coil. It might be possible to monitor each coil pack to have additional diagnostics.

The D1 spectrometer can now have a laser system. This, potentially, may open new science areas in condensed matter. The negative muon lifetime method for elemental analysis is impressive and enables high sensitivity for light elements. The installation of additional detectors and operation of the elemental analysis in the D2 area has been improved.

The science program could be expanded into many other areas. A room for heritage science in the new building, which includes fluorescent x-ray XRD, X-ray CT, SEM, Microscope 3D scanner, and a storage for cultural heritage samples, is welcomed and should make J-PARC an

excellent resource for multi-model analysis. However, it was unclear how all this new equipment will be resourced. A program for developing sample environment is encouraged, in particular pressure, and other techniques. A welcome addition could be the ability to have a dilution refrigerator on the S1 instrument to reduce the requested time pressure on the D1 instrument.

The D1 instruments share the beamtime (about 50/50) with D2 instrument and an "every second" beamtime scheduling scheme has been implemented to have enough time for complicated setups. Considering that D1 allows for a comprehensive program (neg/pos muons, dilution refrigerator, etc.) and complex setups, the limited team makes a heroic effort running the user support, creating a steady output. In fact, they have even managed to increase the scientific output to a similar level as S1 (scaled to the available beamtime).

The MAC recommends a clear long-term plan for strengthening the staff (with a new-generation, due to the career progression of a senior scientists due to the retirement of the group leader) at D1. It is not only for adding FTEs to cover complex setup and heavy user support, but also for having dedicated competence matching the diverse scientific program available at D1.

Specifically, the MAC strongly recommends that dedicated staff for establishing a user program for high-pressure research is made available, since it will create completely new and unique capabilities at D1. For this development MAC recommends that D1 staff connects with the high-pressure team of the neutron instrumentation. Despite some technical differences, synergy effects could be found, and mistakes avoided.

S-line and muSR instruments

MAC heard a presentation by Dr. Nishimura.

Previous problems with the power-supplies for the S-line kicker are being resolved with new SiC MOSFETs. No problems have occurred with the new power supplies. The budget is secured for replacing all power supplies and work in progress. The MAC congratulates the team for this important success.

The S1 instrument conducts many short (2-3 days) experiments, generating a large workload for beamline staff. However, there is an ongoing transition with the addition of a new generation of support staff that seems to handle the task extremely well. They have, in addition, implemented several upgrades: (i) The relocation of solenoid air valves to the outside of the shielding for easier access, (ii) new metal hoses for He recycling, (iii) a new high torque motor for the cryostat lifter, and (iv) a new (safety) fence for the platform.

The team is continuing its collaboration with the neutron sample environment staff and has created a roadmap and framework for the setup of magnets and dilution refrigerators. The MAC strongly supports continuing on this path.

The publication rate for S1 is now steady with about 20 articles/year. Funding has been secured for the construction of the S3 area which has started with a scientific aim at ion battery research, utilizing a monochromatic beam, which will be ideally suited for in-operando measurements of battery cells. The MAC thinks that a more permanent installation of the CYCLOPS spectrometer in the S4 area is worth pursuing.

The MAC is very pleased to see that the S1 instrument has now fully transitioned into a "workhorse" instrument, steadily creating important output. MAC congratulates the "S-team" for their excellent work!

S2 Instrument

Prof. Uetake reported the experimental progress of "Precision measurement of the Muon mass by 1S-2S laser spectroscopy of muonium" at the S2-line.

Silica aerogel was used to form vacuum muonium, and improvements in the 244 nm laser system was achieved using BBO crystals without AR coating. Sufficient beam quality and more than 3 mJ output pulse energy were available with no significant degradation.

Compared to the RAL data (1999), the statistics have improved by a factor of 300, in principle allowing for an improvement in the precision of the muon mass from 820 ppb to 80 ppb. The systematics from the Doppler effect is expected to be improved by using an optical cavity. A new Grant-in-Aid for Scientific Research (S) was secured in 2024.

The MAC congratulates the team on their progress and encourages them to publish an intermediate result as soon as possible, without compromising the detailed systematics investigations.

U-line and instruments (USM and TμM)

The team keeps making steady progress with U-line as presented by Dr. Kanda. Following the MAC recommendations, the team has made significant efforts to characterize the beam to ensure optimal temporal and spatial overlap with the laser light. Currently, a muon rate 330 μ/sec at intermediate focus, with an estimate of 230 μ/sec at the sample position has been obtained. Recent improvement (×5) in laser pulse energy would yield >1000 μ/sec at the sample. The MAC is pleased with these developments. Unfortunately, neutron target problems hindered experimental demonstration of such numbers (this will be done as soon as the beam is back).

For USM, the team has followed the previous recommendation of the MAC to also follow a development of a "LEM-type" cold rare gas moderator. A demonstration of this setup was

planned for June 2024, but it was unfortunately cancelled due to neutron target problems. The MAC is anyway very pleased to see that this parallel and possibly complementary path is being realized.

Previous problems with shifts of beam position with momentum scans have been resolved. The scientific program has also slowly started with e.g. CuO films. The MAC recommends that the team now make a strategic plan to identify an ideal path for additional first science experiments and present the MAC with the strategy.

For the TμM instrument project, many key milestones were reached, as shown by Prof. Nagatani: The cyclotron was ready in June 2024 to accelerate USM but the test was cancelled due to neutron target problems. The conceptual design for a multi-step beam-cooler is done and construction of the first two steps has started. The superconducting lens system is being designed. The MAC is very impressed with the progress and looks forward to the tests of the cyclotron. The 1st TμM workshop was held in Aug 2024. The principle, design and future applications were discussed. 36 persons participated. The MAC fully supports this significant development. However, we want to emphasize that the upgrade to 40 MeV is critical and entirely contingent on the completion of the H-line extension building.

U-line (LASER)

MAC congratulates the laser team on major improvements to the already impressive Lyman-alpha laser system, as presented by Dr. Oishi.

The laser team is one of the world leaders in the field of coherent sources of vacuum ultraviolet radiation. The replacement of the LiF window with MgF2 has resulted in a factor of 2 improvement in pulse energy and enhanced operational stability, with no significant degradation over 10 days.

Because of the proton beam problems, they were not able to use the new laser system for the ultra-slow muon production, but they expect more than 1000 ultra slow muons per second to be produced. The MAC looks forward to such a demonstration in 2025.

The team identified the possible risks in terms of the long delivery time of CLBO crystals, and Lyman alpha optics. The MAC supports the team’s effort to find solutions for these issues.

The MAC reiterates last year’s recommendations regarding the development of a strategy to ensure a longer-term and sustainable operation. Without additional mature laser experts, it would not be possible to sustainably operate the facility.

Report from the Laser Review Committee

Prof. Katsuragawa reported for the Laser Review Committee which was installed on the initiative of the MAC and met for the second time. The last review was held on Dec, 20, 2024 with three laser experts attending.

In the review in 2023, the committee recommended the team focus on an interim goal of producing 1000 per second ultra-slow muons. The improvements in the laser performance, achieved in 2024, is expected to yield ~1700 USM per second. The laser committee described the improvements as an 'amazing achievement' (a finding shared by the MAC).

The laser committee recommends clarification of the physical mechanism for the improvements due to the new MgF2 window and publishing their findings.

The laser committee reiterated the need for a longer-term manpower strategy for the development and operation of the laser system, estimating that the effort will require 3-4 dedicated senior laser experts.

The MAC appreciates the report by the laser expert committee and emphasizes the importance of these reviews. In the future, they will take place every two years.

H-line

Dr. Yamazaki presented the status of the H1 beamline which can deliver ~$1x10^8$ surface muons and ~$4x10^8$ negative cloud muons (at ~50MeV/c), amounting to almost half of the U line intensity, which has the world record for the highest intensity pulsed muon beam. The H line is the basis for not only for the MuSEUM experiment, the DeeMe experiment and the new high precision μX-ray measurements, but also for the muon accelerator experiment and the muon g-2 experiment. Currently, the beam to the H1 area is complete and running, and components for H2 area are being installed and commissioned. The MAC was pleased to see the progress made during JFY2024.

The development of the muon cooling via the ultra-slow muon production scheme has been developed at U1A, and the muon acceleration scheme is being developed at U1B, with a K-project. The progress of these projects with the lasers and accelerator technologies are well reflected in the design and the developments for the H line. The muon acceleration, which will be conducted at the H line, will open a new area of the muon usage. It enables, both, the muon g-2 experiment and the novel muon transmission microscope (TμM). The MAC strongly supports the development of the H line, including the building extension towards the east, which is essential for the development of the next generation of muon experiments and applications.

Possible interferences of the capture solenoid HS1 with the S line front-end quadrupole magnets SQ1-3 and the proton beamline components were discussed. This appears under control but MAC recommends a careful analysis of the interference and consideration of

countermeasures, such as automatic warnings or even correction schemes across all the beamlines.

Human resource development

The MAC heard a report by Prof. Koda. The MAC appreciates the steady development of graduate student education through a series of well-structured initiatives. The number of students has seen a significant increase, which is highly commendable.

The MAC is particularly impressed by the wide range of outreach and educational programs, including internship programs, schools, and symposia. These initiatives effectively contribute to student engagement and academic growth.

The first off-site meeting of the inter-university research program in Nasu took place in the summer of 2024. Special evening sessions were organized for students, allowing them to engage in discussions with researchers conducting cutting-edge studies. This initiative provided an invaluable opportunity for direct communication between students and facility staff. The MAC strongly recommends the continuation of such activities to further enhance student learning and collaboration.

The MAC also encourages collecting information about theses (national and international users, also students not supervised at J-PARC) completed using the J-PARC infrastructure and compiling them together with other key performance numbers.

III Science Projects (S-type proposals)

Research on the integration of arts and sciences

Dr. Tampo updated MAC on the ongoing activities.

The team hosted the ninth edition of the research symposium on “Integration of Arts and Sciences” with civic lectures which effectively promotes mutual understanding among scientists, the expansion of the potential user base, and the knowledge of research using muons, neutrons, and photons. A new international network of heritage scientists, which organized a meeting on Cyprus, including members from all five muon facilities worldwide and synchrotron radiation researchers in Europe, is another promising step for future progress.

The creation of a new category of research proposals for non-natural-science researchers is highly valued, enabling independent access to MUSE and use of muons by heritage specialists, promoting sciences in a new dimension.

Results of the muonic X-ray measurements of remnant ornaments (Shachihoko) at the top of the Nagoya castle and of Roman coins contained in a bottle excavated in Syria remarkably show the power of the non-destructive muonic X-ray elemental analysis from the surface to a few hundred microns in depth revealing a metal surface treatment technique used in the past.

Status of MuSEUM

The status of the MuSEUM experiment was presented by Dr. Strasser. It aims to perform a high field measurement of muonium hyperfine splitting (MuHFS) at the 2 parts per billion level, improving the previous measurement at LAMPF by a factor of 6. Combined with the on-going 1s-2s spectroscopy on muonium at J-PARC and PSI, MuHFS will provide a stringent test of bound state QED without the uncertainties due to the hadron structure. The MuHFS measurement will also have an impact on the muon g-2 measurement.

The currently planned measurement is at 1.7T (same as the previous LAMPF measurement), but the team plans to take additional data at 2.9 T and 1.15 T. Understanding the magnetic field profile would be a key for the measurement, and the team is developing several magnetic probes.

The MAC congratulates the first observation of the HFS spectra with both important transitions in a high field using the low-intensity muon beam from only 100kW of proton beam power. The quality allows extrapolating expectations to a longer, full-power running with an excellent perspective for a world-leading result. The MAC looks forward to this important measurement and the progress in the next year.

Report from DeeMe Progress Review

A report on the findings of the progress review committee of the DeeMe experiment was presented by Prof. Iinuma.

The focused topics were (1) delayed proton contaminations out of the regular accelerator bunch, (2) ghost tracks which should not physically exist, and (3) the timeline with the competing experiment COMET.

The amount of delayed protons was well below the physical requirements. This indicates the cleanliness of the proton beam.

The ghost tracks, which appear in an unphysical region of high electron energies, could not be eliminated. The possible origins of the ghost tracks were discussed, and the most likely scenario was that negative pions, from the production target, were stopped in beamline components, producing decay muons and electrons with unexpected timing. As there was no way of eliminating these events, the DeeMe team decided not to run for the physics.

The discontinuation critically affects a Ph.D. thesis on the project. The DeeMe team is planning a series of engineering runs in JFY2025 to investigate performance and systematics, which will allow the completion of this thesis. The MAC supports this plan.

The contribution of the DeeMe collaboration on the H line and H1 experimental area is the serious measurement and the estimate of the backgrounds which will be inevitable in the high momentum setting of the beamline. The MAC acknowledges this effort and the project's contributions to the future high-precision measurements to be carried out in the H line.

Status of g-2/EDM

Dr. Kamioka presented the current status of the Muon g-2/EDM experiment. The development of the experimental apparatus including the installation of the last focusing magnet in the H-line, the clean room construction, the installation of an optical bench for the laser system, the new slow muon transport line for the H2 area, the design of muon polarization monitor, the design of the laser chamber between the Mu chamber and the laser room were finished.

The MAC congratulates the success of the world's first demonstration of cooling and RFQ acceleration of the muon beam to 100 keV. However, the MAC is seriously concerned about the cancellation of the budget request, for this fiscal year, for the H-line experimental building to MEXT. The MAC awaits the reconsideration of the plan by all the stakeholders, while keeping the expected physics outcome. The H-line extension building is essential for next-generation uses of re-accelerated muons, in particular for g-2/EDM (and TμM).

IV General Comments and Summary of Recommendations

The MAC acknowledges the outstanding work of the MUSE team in the development of the facility, running the experimental program, and the scientific results. The human resource development programs are impressive: from the general public, high schools, undergraduates and graduates' programs.

MUSE Facility personnel: It is important to hire and promote people with broad skills who can further develop the instrumentation and methodology of research. Only in this way, the future of the facility can be guaranteed. While the MAC applauds the further increase of temporary staff by two due to the excellent success with external funding, it remains very concerned concerning the permanent staff situation and, in particular, concerning the urgent need for senior laser specialists.

Summary of Recommendations

- While the MAC welcomes the important short-term provision of substantial resources for 'aging counter-measures', it recommends sufficient resources be made reliably and sustainably available for mid- and long-term maintenance and consolidation works.
- The MAC supports the repair of the D-line refrigerator at the highest priority.
- The MAC strongly supports activities to exploit the synergies with the neutron sample environment team for magnets and dilution refrigerators. The MAC encourages closer cooperation also for high-pressure sample environments.
- The MAC recommends the continuation of the outstanding efforts on graduate student education, the wide range of outreach and educational programs, internship programs, schools, and symposia for national and international audiences.
- The MAC recommends an immediate search for and hire of at least one additional laser specialist to enforce the mission-critical muonium ionization systems for the U- and H-lines. The present situation presents a high-risk situation with no mitigation plan.
- The MAC recommends hiring of a staff scientist with expertise to initiate a high-pressure program and support the comprehensive portfolio of the versatile D1 measurement program.
- The MAC recommends publishing intermediate results of the muonium 1S-2S spectroscopy as soon as possible.

- The MAC recommends investigating the option to install the CYCLOPS spectrometer permanently in S4 and to work towards attracting respective project funding that would leverage this installation.

- The MAC recommends that a first science strategy be prepared for USM operation.

- The MAC recommends reconsidering all options to realize the H-line extension building as quickly as possible. The building is essential for next-generation uses of re-accelerated muons, first for g-2/EDM and TμM, and later also beyond, and a unique opportunity for the facility.

V Charges given to MAC

The following charges were given to MAC.

- Evaluate the progress made in FY2024 in terms of (1) sciences promoted by MUSE including S1 type programs, the research on the integration of arts and science, etc.; (2) instruments such as the target system, the beamlines, the experimental apparatus, and the sample environments.
- Evaluate the scenario of the upgrade/replacement of the deterioration of aging equipment.
- Evaluate the scenario for extending the H line to promote the g-2/EDM experiment and transmission muon microscope project promptly.
- Evaluate the various attempts to nurture/promote the next generation of in-house staff and science society

APPENDIX I

Members of MAC:

Nori Aoi (Research Center for Nuclear Physics, Osaka)

Makoto Fujiwara (TRIUMF)

Adrian Hillier (ISIS Neutron and Muon Facility)

Klaus Kirch (ETH Zurich and Paul Scherrer Institute), Chair

Kenji Kojima (TRIUMF)

Kenya Kubo (International Christian University)

Martin Mansson (KTH Royal Institute of Technology)

Yoko Sugawara (Kitasato Universtiy)

Koji Yoshimura (Okayama University)

APPENDIX II

Agenda for the MAC-2024 meeting of KEK/J-PARC in 2025

February 20, 2025:

- 09:50 – 10:20 Executive Session
- 10:20 – 10:40 J-PARC overview T. Kobayashi
- 10:45 – 11:05 MLF overview/Charge to MAC T. Otomo
- 11:10 – 11:15 Group Photo
- 11:15 – 11:30 Status Muon Science Laboratory K. Shimomura
- 11:35 – 11:50 Facility (MUSE) overview N. Kawamura
- 11:55 – 12:25 Muon Source (Target/Proton beam) S. Matoba/H. Sunagawa/T. Yuasa

- 12:35 – 13:35 Lunch Break
- 13:35 – 14:05 D-line and instruments S. Takeshita/I. Umegaki/T. Yuasa

- 14:15 – 14:30 Research on Integration of Arts&Sciences M. Tampo

- 14:35 – 15:05 S-line and muSR instruments A. Koda/J. Nakamura/W. Higemoto
- 15:15 – 15:30 S2 Instruments S. Uetake

- 15:35 – 15:55 Coffee Break
- 15:55 – 16:25 U-line and instruments (USM/TmuM) S. Kanda/Y. Nagatani/Y. Ikedo
- 16:35 – 16:50 U-line (LASER) Y. Oishi

- 16:55 – 17:10 Acquisition of external funds K. Shimomura
- 17:15 – 17:35 Coffee Break
- 17:35 – 18:05 Executive Session
- 18:05 – 18:20 Break

  18:20 – 20:20 Reception

February 21, 2025:

- 09:00 – 09:15 H-Line T. Yamazaki
- 09:20 – 09:35 Status of MuSEUM P. Strasser/S. Nishimura
- 09:40 – 09:50 Report from DeeMe Progress Review H. Iinuma
- 09:55 – 10:15 Status of g-2/EDM S. Kamioka
- 10:20 – 10:50 Coffee Break
- 10:50 – 11:05 Human resource development A. Koda
- 11:10 – 11:25 Report from LASER Review Committee M. Katsuragawa

- 11:30 – 12:20 Lunch Break
- 12:20 – 14:10 Executive Session
- 14:10 – 16:10 Facility Tour
- 16:10 – 16:40 Concluding Remarks K. Kirch