Report from the Future Planning Committee of ICRR

M. Nakahata
Secretary of the 2017 Future Planning Committee

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What is Future Planning Committee?

- ICRR has occasionally coordinated Future Plan Committees (FPC) under the supervision of the ICRR Advisory Committee.
- FPC discuss and nominate next generation projects which could be the flagship projects of ICRR.
- Recommendations of previous FPCs have been realized:
  - The first FPC in 1987 recommended Super-Kamiokande project.
  - The second FPC in 1993 recommended TA project.
  - The second FPC in 1993 and the third in 2007 recommended KAGRA project.
- FPC was coordinated twice during the period of this External Review.
  - 2013 FPC --- report dated September 26, 2013
  - 2017 FPC --- report dated October 26, 2017

I extracted key sentences from the committee reports and show in the following pages. For the complete description, please look at the full reports (English translation from the original Japanese reports) attached in the appendix of the External Review Report. Original Japanese reports were uploaded to the Indico.

2013 Future Planning Committee(FPC)

- Background
  - KAGRA was moved to construction stage.
  - ICRR had restructured its organization by terminating CANGAROO and SDSS, and establishing new research groups such as the Cherenkov Cosmic Gamma-ray Group, the Observational Cosmology Group, and the High Energy Astrophysics Group.
- Committee Members

  K. Sato (Chairperson), National Institutes of Natural Sciences
  H. Aihara, the University of Tokyo
  Y. Itow, Nagoya University
  K. Inoue, Tohoku University
  N. Kanda, Osaka City University
  T. Kishimoto, Osaka University
  N. Sugiyama, Nagoya University
  Y. Mizumoto, National Astronomical Observatory of Japan
  T. Terasawa, (Secretary), ICRR
  K. Okumura, (Vice secretary, clerk) , ICRR
  T. Kajita, (Observer, Director) , ICRR

2013 FPC – Evaluation of each project

- Cherenkov Telescope Array (CTA)
  - It was evaluated highly by the Committee. It could be a candidate for the next large-scale project in ICRR.
  - At the same time, the shortage of manpower is a concern. Building the workforce structure in ICRR is believed to be an urgent task.
- Future project of Telescope Array (TA) --- TA2, TAx4
  - TA's research achievements were highly commended within the Committee.
  - However, in terms of the discrepancies with the data from PAO, it is not clear whether these are ascribed to systematic, and the Committee recognized it was important to identify the cause and resolve the issue before proceeding to the next plan.
  - The Committee appreciates that TAx4 is a realistic plan that saves resources.
- The Next Term Tibet Experiment
  - The Tibet experiment has a wide field-of-view and requires a small-scale budget, and a quick implementation of the plan is expected to achieve reasonable scientific results.
  - Although the observation altitude is different between Tibet and TA, having both the Tibet and the TA(TALE) experiments will enable a wide and continuous measurement. So, the mutual collaboration between Tibet and TA would strengthen research.

2013 FPC – Evaluation of each project

- Hyper-Kamiokande (Hyper-K)
  - Its technology and analytical methods have been well demonstrated and confirmed. Other than the scale of the budget, there are no other significant concerns.
  - There is still a 25% error in the 80 billion construction cost estimate at present. The Committee urges the group to improve the accuracy of the budget estimate.
- XMASS Experiment
  - The Committee urges to resolve the surface background of XMASS-I by upgrading the detector as soon as possible, and to seek various possibilities to acquire a budget for XMASS-1.5, in order to implement the plan.
- Ashra Project
  - The Committee must conclude that Ashra is drastically behind its initial plan.
  - The Committee cannot endorse implementing the NTA plan because the manpower within the ICRR is insufficient to fulfil the proposed plan.

2013 FPC – Evaluation of each project

- Gadzooks! (currently called SK-Gd)
  - It is recognized as a research plan that is a natural extension in the realm of Super-Kamiokande research activities.
- Other research groups
  - It is noteworthy that two members of the theoretical group comprehensively share and cover a broad field of research, from particle physics to cosmology.
  - It is recommended that the three groups (Theoretical Group, Observational Cosmology Group, and the High-Energy Astronomy Group) investigate new collaborative research possibilities.

2013 FPC – Overall Conclusion

- For the next plan of ICRR, the Committee recommends a focus on CTA experiment that aim at dramatic advancements of gamma-ray astronomy. In order for the Japanese community to make a significant contribution and to actively implement the research, it is important to further reinforce Japan's research team organization comprised of ICRR and other research groups in Japan.
- Hyper-Kamiokande is a vital project that will continue advancement of neutrino physics. The Committee encourages to promote its R&D to prepare for its swift implementation when the opportunity arises. Since the budget is estimated to be around 80 billion yen, it is recommended that outstanding details are finalized so that the budget request can be moved forward.
- For XMASS-1.5, the next Tibet plan, Gadzooks!, and TA×4, ICRR should support these plans and advocate for their speedy implementation taking into account funding possibilities including competitive funds.

2017 Future Planning Committee(FPC)

- Background
  - CTA project was moved to construction stage.
  - The 2013 FPC encouraged to promote Hyper-K R&D and recommended that budget details are finalized. (see previous page) So, the main purpose of the 2017 FPC was to discuss details of their outcomes.
  - In addition, 2017 FPC discussed about new/revised proposals.
- Committee Members

  Y. Okada (Chairperson), KEK
  H. Aihara,The University of Tokyo
  Y. Itow, Nagoya University
  K. Inoue, Tohoku University
  S. Ogio, Osaka City University
  T. Kishimoto, Osaka University
  J. Hisano, Nagoya University
  M. Mori, Ritsumeikan University
  M. Nakahata (Secretary), ICRR
  M. Ibe (Vice secretary, clerk), ICRR
  T. Kajita (Observer, director), ICRR

2017 FPC – Evaluation of Hyper-K

- The Committee highly commends Hyper-K, the multipurpose detector, as it is able to contribute to the developments of diverse fields of science, including the precision measurements of neutrino oscillation parameters, the contribution to the neutrino astronomy, and the direct verification of the Grand Unified Theory.
- The Committee recognizes significant improvements in the budget estimation accuracy that was an issue identified at the last meeting, in the international collaboration formation, and in defining the role-sharing between ICRR and KEK. Based on the points made above and its scientific significance, the Committee recognizes Hyper-K as an appropriate plan for ICRR's next major project, and concludes that its prompt realization is desirable.
- The Committee urges that ICRR and the international collaboration team cooperate to develop a management system appropriate for the construction and the execution. The Committee views that it is also important to seek advices, as deemed necessary, from a third-party committee of experts who have experience in executing large-scale projects.

2017 FPC – for new/revised proposals

- The ALPACA Project
  - This project has high feasibility in both technology and budget, and hence the Committee evaluates it as a research that should be promoted.
  - Tibet ASγ's technology and the already-established international cooperation system with BASJE can be leveraged.
  - ALPACA employs wide field-of-view and long-term continuous observation, which is complementary to CTA.
  - There is a concern that human resources may be insufficient to execute ALPACA and Tibet ASγ simultaneously.
- Future Plans of Observations of Ultra-High Energy Cosmic Rays on the ground (TA2)
  - Observation of the high-energy cosmic rays is an important research subject with respect to the elucidation of cosmic ray acceleration mechanism over 10^{20} eV.
  - The optimization of TA2 strongly depends on the results of ongoing TAx4 and Auger Prime experiments.
  - International cooperation is indispensable to advance a large-scale future plan of this level. The Committee commends that a cooperative framework is being established between the TA and Auger experiments.

2017 FPC – for new/revised proposals

- Composite Imaging Observation of Cosmic Elementary Particles (NTA)
  - 2013 FPC could not endorse the NTA plan in such a way that ICRR is positioned as the main body.
  - The Committee has not been able to acknowledge any significant progress being made that would overturn the last Committee's decision.
- New Development of Direct Dark Matter Search Experiment with Liquid Xenon
  - It is an appropriate decision to terminate the current XMASS experiment and withdraw XMASS1.5, considering the competition with the ongoing researches overseas.
  - It is appropriate that the research group has proposed to change the research plan. Also, taking part in the ongoing G2 experiment overseas, particularly in the XENONnT project, is a promising plan.
  - Committee requests the group to continue having dialogue within the community and to finalize a plan which can lead to the G3 experiment in the future.