July 20, 2014
@UBC

Steering Committee and IBR reports

T. Nakaya (Kyoto)

Outline

- Hyper-K status in Japan (reminder)
- Steering report

- IBR report

- Message at FNAL neutrino summit

Japan HEP community Future Plan

- http://www.jahep.org/office/doc/201202_hecsubc_report.pdf

Recommendations

The committee makes the following recommendations concerning large-scale projects, which comprise the core of future high energy physics research in Japan.

- **Should a new particle such as a Higgs boson with a mass below approximately 1 TeV be confirmed at LHC, Japan should take the leadership role in an early realization of an e^+e^- linear collider.** In particular, if the particle is light, experiments at low collision energy should be started at the earliest possible time. In parallel, continuous studies on new physics should be pursued for both LHC and the upgraded LHC version. Should the energy scale of new particles/physics be higher, accelerator R&D should be strengthened in order to realize the necessary collision energy.

- **Should the neutrino mixing angle θ_{13} be confirmed as large, Japan should aim to realize a large-scale neutrino detector through international cooperation, accompanied by the necessary reinforcement of accelerator intensity, so allowing studies on CP symmetry through neutrino oscillations.** This new large-scale neutrino detector should have sufficient sensitivity to allow the search for proton decays, which would be direct evidence of Grand Unified Theories.

Science Council of Japan (SCJ)

- SCJ selects Hyper-K as a top priority project in the "Japanese Master Plan of Large Research Projects" (27 chosen out of 192).
  - http://www.scj.go.jp/ja/info/kohyo/pdf/kohyo-22-t188-1.pdf
  - English translation of Hyper-K part

No.	Scien-tific Field No.	Project Name	Project Summary	Scientific Significance	Social Value	Project Duration	Financial Requirement (1billion yen)	Implementing Institution, or Affiliation of Proposer
85	23-2	Nucleon decay and neutrino oscillation experiment with an advanced large detector	The project aims to construct a one million ton-scale water Cherenkov detector, Hyper-Kamiokande, to succeed Super-Kamiokande and to perform world-leading neutrino and nucleon decay research in conjunction with the J-PARC accelerator facility.	The project will explore CP violation (matter-antimatter asymmetry) in neutrinos in order to help understand the evolution of the universe. Additionally, with the world's best nucleon decay searches it also aims to establish the unification of elementary particles and their forces.	Addressing profound questions concerning the elementary structure and evolution of the universe appeals directly to the inherent intellectual curiosity mankind harbors for comprehension of its origins and future. Additionally, dramatic advances in neutrino research with a world-leading project in Japan represent society's dreams for a rich program in basic science.	2015 to 2038	Total:1,880 Construction of Hyper-Kamiokande 800, Operating cost of Hyper-Kamiokande 450, Operating cost of J-PARC 600, Neutrino monitor 30	Lead by the Institute for Cosmic Ray Research, University of Tokyo and the High Energy Accelerator Research Organization. Participation from domestic and foreign universities and research institutions is anticipated.

- ILC was not discussed here because it was separately reviewed. The ILC report is found in http://www.scj.go.jp/ja/info/kohyo/pdf/Report%20on%20ILC_Exective%20Summary.pdf

Steering Reports

- We frequently had the meeting to discuss actions to
  - the MEXT roadmap result
  - Hyper-K situation in the global neutrino projects (P5 report, CERN statement, funding agency meeting).
- Sometimes with
  - KEK DG (Atsuto-san), ICRR director (Kajita-san) and KEK/IPNS director (Yamauchi-san).

MEXT Roadmap and Hyper-K

- **Advantages**
  - Expect world-leading scientific results by using upgraded J-PARC facility.
  - Expect steady progresses based on the past achievements in the neutrino field. Support by Japanese society is foreseen.
- **Comments**
  - Although the plan of Super-K's successor should be made, appropriate organizations and international cooperation, cost-sharing should be well defined for such a large project.
  - Because the required budget is large, necessity and scientific merit of the project should be fully explained and recognized.

Public comments are asked.

- URL:
  - http://search.e-gov.go.jp/servlet/Public?CLASSNAME=PCMMSTDETAIL&id=185000701&Mode=0
- **Deadline**: July 25 (Fri) JST
- Where we send: MEXT
  - by e-mail: gakkikan@mext.go.jp
  - by fax: ０３－６７３４－４０８６
  - by postal mail: （Japanese）
- The subjects: “Comments about the roadmap 2014”
- The contents:
  - Name, title, contact address (including phone number),

Strategy toward the approval of the Hyper-K projects in Japan by addressing issues described in the roadmap

1. Make a proposal with the realistic design, reliable budgets, solid organization and visible international contributions.
2. More negotiation with MEXT. It will be accelerated with the proposal.
3. More discussions with KEK and ICRR managements.
4. Have a campaign of Hyper-K physics seminars in the major Japanese universities and institutes.
    1. In each country, the similar campaign is also nice.
5. Continuous endorsements of Hyper-K in the Japanese communities (HE and CRC) with moderate supports from Nuclear Physics, Astro, J-PARC community, etc..
6. Endorsements of Hyper-K in the world-wide neutrino community.
7. Submit the budget request in 201X (X=5,6,7?)

IBR reports

- Presentations from each country are available only for HK members in
  - http://www-sk.icrr.u-tokyo.ac.jp/indico/conferenceDisplay.py?confId=1948
- Many discussions on
  - MEXT roadmap result
  - R&D subjects
  - The budget request with which subjects members are interested in
  - International situation

• An Example (Swiss view by A. Blondel)

Complementarity

-1- HyperK is the natural continuation to T2K

We have invested in NA61, and in the near detectors of T2K

It is the most sensitive proposal for the observation of CP violation in neutrino oscillations

and for a large part of underground physics

(proton decay, atmospheric, solar and supernovae neutrinos)

.... and the most straight-forward technology

-2- it is not complete however and there is a physics case for a complementary experiment that would determine unambiguously the value of δ_{CP} and the mass hierarchy, complete the observations of oscillations involving tau leptons and matter effects ➔ {LBNO; LBNE} .

This requires a more sensitive technology (Liq. Argon) , in need of R&D and experience (and probably a longer time scale)

The path is not unique and includes focused R&D **(WA105)** and application + experience on running experiments **(microboone)**

Messages to FNAL Neutrino Summit

- Clear explanation about the MEXT roadmap result.
- Physics Sensitivity of Hyper-K
- Consider the international strategy with Hyper-K (and LBNF).
  - Complementarity of physics
  - Common R&D subjects
    - accelerator, beam and detector technologies
- Any others?