US-Japan cooperative program for neutrino physics

Masashi Yokoyama (Tokyo)

1. US-Japan cooperative program
2. US-Japan neutrino program
   1. Development in JFY13
   2. What's ongoing in JFY14
3. Future planning

* Japanese Fiscal Year(JFY): April-March

Today's agenda

10:00	Introduction	Masashi/Steve
10:15	Acc. proposal I (Kicker)	Fang
10:35	Radiation damage	Patrick
10:55	PNNL introduction	D. Asner
11:15	Horn R&D	T.Sekiguchi
11:35	Acc. proposal I (Monitor)	Toyama
11:55	Beamline monitor	M.Hartz
13:00	Monitor discussion	
14:00	Radiation damage discussion	
15:00	Remote handling discussion	
16:00	Accelerator discussion	
17:00	Wrap up	

Background: Japan-US cooperative program in high energy physics

- Long and successful program for 35 years
  - Example: CDF, KTeV, PDG, SciBooNE, …
  - Recently: Belle II, KOTO, …
- Budget entirely comes from Japan (MEXT → KEK).

- In the Japan-US committee meeting in April 2013, it was agreed to make a scheme to facilitate 'pillar fields'.
  - Neutrino was one of such fields.
    - Clearly high priority in both Japan and US.
  - A task force was formed to work out possible topics and to develop coordinated proposals.

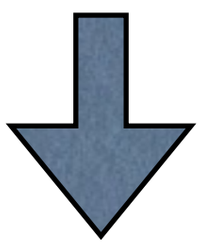
US-Japan Neutrino Task Force

- In 2013, the US-Japan Neutrino task force was set up.
  - To consider the cooperative and common research subjects to advance accelerator neutrino experiments: T2K, T2HK, Lq. Ar R&D, MiniBooNE, MicroBooNE, MINOS, NOvA, LBNE, etc..
  - Meetings: face-to-face at Snowmass (Aug. 2013) and FNAL (Oct. 2013), w/ several phone-meetings.
    - *Accelerator* R&D for the MW beam power
      - T. Koseki, C. Ohmori, B. Zwaska
    - High power *neutrino beam* production R&D
      - T. Kobayashi, T. Nakadaira, M. Bishai, V. Papadimitriou
    - High performance *detector* R&D
      - T. Hasegawa, M. Yokoyama, S. Brice, B. Fleming
    - *Physics* development
      - T. Nakaya, G. Feldman

Outcome from the US-J Neutrino TF

(see ICFA Neutrino panel mini-workshop at FNAL:
https://indico.fnal.gov/conferenceDisplay.py?ovw=True&confId=7865)

- Diverse, multi-pronged and bottom-up R&D subjects are essential in the collaborations of the US and Japan neutrino teams.
  - to improve the *accelerator power*
  - to produce more intense *neutrino beam*
  - to design and to develop gigantic, advance, cost-effective *neutrino detectors*
  - to improve the *analysis techniques* with better understanding of systematic errors.



- We propose a joint research program for *development of advanced technology for neutrino experiments with high power beams*.

Members

- Japanese side: 40 members from KEK, ICRR, universities
  - PI: **Masashi Yokoyama** (Tokyo)
- US side: 35 members from FNAL, BNL, universities
  - PI: **Steve Brice** (Fermilab)
- Leading scientists for each area:

Area covered in this meeting

- Accelerator: **T.Koseki**(KEK/J-PARC), **B.Zwaska**(FNAL)
- ν beam: **T.Nakadaira**(KEK), **V.Papadimitriou**(FNAL)
- Detectors: **T.Hasegawa**(KEK), **M.Yokoyama**(Tokyo), **B.Rebel**(FNAL), **D.Harris**(FNAL)
- Physics: **T.Nakaya**(Kyoto), **Y.Hayato**(ICRR), **S.Brice**(FNAL), **S.Zeller**(FNAL)

Ongoing topics in JFY2013

Covers very broad topics!

Main US activity is at FNAL

- Accelerator
  - Kicker R&D
  - (Beam monitor R&D, common with beamline)
- Beamline
  - Horn improvement (Colorado U)
  - Radiation damage study
  - Beam monitor R&D
- Detector R&D
  - Thin plastic scintillator development
  - Electronics development for water Cherenkov detectors
  - Water based scintillator R&D (BNL)
  - LAr R&D in Japan
- Physics analysis (Just discussing for now)
  - Neutrino interaction
  - Combined analysis of T2K & NOvA in future?

Ongoing detector R&D: status

- Thin plastic scintillator development
  - To be used in a test ν experiment at J-PARC.
  - Ordered a die for extrusion, expect production in ~Nov.
- Electronics development for water Cherenkov detectors
  - Engineer working to develop a test board with FNAL-developed FPGA-based high resolution TDC
- Water based scintillator R&D (BNL)
  - Material compatibility test ongoing at BNL
- LAr R&D (Japan)
  - Supporting some equipments (elec.,)

Budget in JFY 2013

- 30MJPY (~275kUSD) allocated to neutrino program.
  - + travel budget (only for Japanese side members' travel to US)
- 23MJPY (~210kUSD) to be spent in US
  - Account must be closed each year.
  - Material must be delivered within this calendar year.
    - Delivery → Invoice → Payment takes ≥1month.
  - Please re-evaluate how much you will spend this year. I need the information by the end of Sep.

Preparing for the next year

- We need to submit proposal *every year*.
  - Deadline of proposal is beginning of February.
    - Proposal itself is just a few pages.
    - Need to start preparation.
      I expect the first input from this meeting.
  - Hearing is in Feb/Mar (in Japan) (+ Apr, if asked).
    - Important to show the progress in this year.
- Once budget allocation is determined,
  we need to adjust our program quickly.
- I need to know a prioritized list of items with cost.