**ROUND TABLE DISCUSSION ON NEUTRINO FACILITIES IN THE GLOBAL CONTEXT 1 AUGUST 2011 AT CERN**

**Questions from the panel to the NUFACT11 participants**

**ANSWERS FROM WG3 (ACCELERATORS)**

**Compiled by**

**Alex Bogacz (JLab)**

**Elena Wildner (CERN)**

**Makoto Yoshida (KEK)**

**Sergio Bertolucci**: *I hear that international collaboration on coordinated R&D is lacking. Could the community propose a realistic plan for common and staged neutrino R&D****?***

WG3 considers we have well working, active international collaboration

*A few examples:*

Design Studies: IDS and EUROnu, LAGUNA

R&D: EMMA, MICE, MERIT for neutrino factories and Muon Colliders, 60GHz ion source (LPSC, Grenoble, and IAP, Nizhny Novgorod), isotope production (ANL, INFN Legnaro) for Beta Beams.

More R&D needed and a much larger CERN coordinated contribution is necessary

Staged R&D/Projects in an overall staging process:

1. Japan:

T2K upgrade-> T2HK/Okinoshima (one beam only, possibly multiple detectors)

2. CERN:

* High energy options: C2Py and/or Nufact to Pyhäsalmi
* Low Energy option: Superbeam to Fréjus->Beta Beam to Fréjus

Availability of detectors will be decisive

3. US: LBNE-> ProjectX-> Neutrino Factory->Muon Collider

Physics/price relation is expected from EUROnu/IDS

We wait for more information on sin2213

Comments:

Regional needs must be considered

The number and choice of Superbeams the world needs will be defined by physics needs and opportunities; some steps in the regional schemes may be a redundant duplication

**Sachio Komamiya:**

*Physics question: 13 & are similar to Vub and CP phase in the quark sector. In heavy flavors, angles are not really the interesting thing – CP violation there is found to be insufficient to generate Baryogenesis. How about neutrinos? We know about lepto-genesis, is there further fundamental physics in neutrinos beyond the numerical values of the angle and phase?*

N. A. to WG3

**Steve Myers:**

*As an accelerator physicist, there are too many options – we need to kill some to make progress. Need to make a choice, define the next steps, define critical R&D and move on. What is it that the community really wants to build?*

We are not ready for down-selection yet: down-selection of options should mainly be made from physics hints and needs, we expect new results complementing T2K & Minos and from the reactor experiments as well as the outcome of comparative studies in EUROnu/IDS.

The community is doing good progress with already allocated resources, in spite limited. However there is a serious lack of resources in the domain of engineering for feasibility and costing and for critical research topics.

The facility the community wishes will depend on physics and on results of R&D. A clear picture can only come if the needed R&D resources are allocated.

**Tatsuya Nakada;**

*In the incremental approach, where does a Betabeam fit? This question is in regard both to the physics case and the R&D needs.*

The staging process for Beta Beams (at CERN) would be

1. Beta Beam injection into the TSR for testing and physics (letter of intent ISOLDE, <http://cdsweb.cern.ch/record/1319286/files/INTC-I-133.pdf>)

2. Superbeam (SPL) to Fréjus

3. Beta Beam to Fréjus

A Superbeam with SPL to Frejus can do physics as a first stage contrary to the SPL version needed for a Neutrino Factory to Pyhäsalmi (would only be used for pion production).

The powerful facilities Beta Beam and Neutrino Factory need a non stagable quantum of funding to be efficient, the prices are awaited from EUROnu

Imminent R&D would be: isotope production, instability and impedance estimation, end to end simulations and optimization. The R&D for the Beta Beam is staged and cross fertilized with other sciences in addition to accelerator physics like nuclear physics, nuclear power etc.

**Koichiro Nishikawa:**

*In the near term, the international framework should be bottom up and not top down? At what point should an international framework be forced from the top?*

Forcing from top is yet to early. WG3 expects results from EUROnu/IDS.

**Jim Strait:**

*If you didn’t have a neutrino factory, how precise a measurement of parameters can be done with superbeams before reaching their limitations? What “external” measurements, e.g. particle production, neutrino cross sections, etc., can be done to improve the current systematic error limits on superbeam experiments, and what are the ultimately limiting systematic errors?*

N.A. for WG3

**John Womersley:**

 *Do I need to worry whether neutrino and antineutrino oscillation parameters are the same, or worry about the LSND anomaly?* N.A. for WP3

 *Do neutrinos play a role in dark matter, especially if there is no light neutralino?*

N.A. for WG3

 *Since STFC and funding agencies from other countries in Europe, the US, and Japan are investing substantially in MICE, please consider, given the new indications that 13 may be large, the importance of continuing to support R&D for the Neutrino Factory (and ionization cooling in particular).*

Precision measurements are nevertheless necessary. Unless we do R&D today a Neutrino Factory, and a Muon Collider will not be possible tomorrow.