

## QUESTIONS TO THE NEUTRINO TOWN MEETING

### Version 1, 3 April 2012

This list of questions will be addressed to the speakers, to the meeting participants and to the community. It is preliminary and may evolve with time as participants or speakers comment on it.

#### **A. Questions on ongoing efforts**

A.1 What is the status of the ongoing CNGS experiments?

A.2 What has been learnt from CNGS operation (beam and experiments)?

A.3 What are the physics perspectives for the CNGS /LNGS facility in the near and longer term?

A.4 What is the precision required from hadro-production measurements and for cross-section measurements e.g. with a muon storage ring?

EUROnu:

A.5 What are the achievements of EUROnu?

A.6 Will EUROnu be able to come up with a \*prioritized\* list of recommended R&Ds?

A.7 Based on technical limitations, what is the estimated time scale (from now to taking data) for various detector and accelerator technologies?

A.8 Ideas in EUROnu concerning a possible continuation?

A.9 Which of the proposed facilities can be housed by CERN, on which timescales, with what available machine time, what are the synergies with LHC?

#### **B Questions on sterile neutrinos**

B.1 What is the parameter space covered by the various proposals?

B.2 What roughly is the time scale and resources required for the various proposals?

#### **Questions on next project**

**C.0 Given the fact that  $\sin^2(2\theta_{13})$  is of the order of 0.1, do we have in Europe, a real chance of discovery (i.e. first and 5 sigma) or just evidence (i.e. 3 sigma) of the neutrino mass hierarchy and/or of the CPV phase?**

1) Question for existing CNGS line:

C.1 What physics reach does the 732 Km baseline permit and what effort that implies?

C.2 Is it necessary/ possible/affordable to equip the line with a near detector site?

C.3 Are the modifications necessary to lower the present very high energy of the beam feasible/affordable?

C.4 How large a detector can be housed either in the existing lab or in possible extension?

C.5 Is there a longer term prospective for this?

C.6 Are there synergies with p decay and nu astrophysics?

C.7 What is the estimated date at which 5 sigma (resp 3 sigma) will be reached for the mass hierarchy determination?

C.7' Same as C.7 for CP violation

2) Questions for CN2PY

C.1' What physics reach does the 2285 Km baseline permit and what effort that implies?

C.7 What is the estimated date at which 5 sigma (resp 3 sigma) will be reached for the mass hierarchy determination?

C.7' Same as C.7 for CP violation

C.8 What could be the incremental steps in detector mass and beam intensity?

C.9 When can a Liquid argon detector be built that would reach the goal?

C.10 Is there an easier technology than Larg that would do it?

C.11 Could we use a more conventional technology (like NOvA) as a first step?

C.12 What is the added value of a large liquid scintillator detector?

C.13 What is the performance of LENA for Mass Hierarchy/CP violation?

C.14 What are the near detector proposals for the various superbeam/betabeam and neutrino factory proposals?

C.15 Can the CN2PY baseline be used for a neutrino factory?

C.16 Can the detectors foreseen for CN2PY be used for a neutrino Factory?

C.17 Is there physics to be done at CN2PY Phase I with a large MIND?

3) questions on 'neutrino test area at CERN'

C.18 Can we see more concrete details on this (size, space)

C.19 Do we need this area and what would we do in it?

C.20 When can it be ready?

C.21 Is there physics one can do in the area?

[C. 22 Is a North Area short baseline neutrino experiment in synergy with \(or in the way of\) a long baseline program?](#)

### **Questions on physics**

D.1 What is  $\sin^2 2\theta_{13} \approx 0.1$  telling us?

D.2 What is the ultimate accuracy expected from ongoing experiments?

D.3 What is the likelihood of there being no interesting physics beyond measuring CP violation and mass hierarchy?

D.4 What is the relevance of neutrino masses for the cosmological and astrophysical observations  
(BAU, dark matter,  $N_{\nu}$ )

D.5 What is the precision at which the neutrino mixing parameters should be measured?

D.6 Can experiments reach those precisions?

D.7 Are there fundamental limitations that would prevent those measurements?

D.8 What is the theoretical interest in the mass hierarchy determination?

D.9 (How many theoretical papers would go in the bin if the hierarchy is inverted?)

D.10 What are the systematic limitations of the next generations of experiments?

D.11 In which way would near detectors and precise flux determinations reduce these systematics?

D.12 What is the concrete, prioritized program to this effect?

D.13 How important is it to measure the (anti)electron neutrino cross-sections and

D.14 with what precision?