

The Future of Neutrino Mass Measurements: Terrestrial, Astrophysical, and Cosmological Measurements in the Next Decade

Welcome!

<http://www.int.washington.edu/PROGRAMS/10-44w.html>

Workshop Goals

- Review the status and future of **direct and indirect neutrino mass measurements** in the laboratory as well as from **astrophysical and cosmological** observations.
- Plan to critically assess what low-energy neutrino physics and astrophysics/cosmology can contribute to the **measurement of the neutrino mass and the mass hierarchy** in the next decade.
- Discussions will be summarized in a **white paper**.

Workshop Format

- **Plenary talks**
 - 30 min for review talks
 - 20 min for specialized contributions
 - *no need to repeat introductory material*
 - time includes questions+discussions
- **Working groups + discussions**
 - time to show additional slides
 - in-depth discussions
 - working groups will prepare summary slides = basis for white paper
- **White paper**
 - contribution from each working group
 - other discussions not covered by working groups?

Science Questions & Working Groups

direct kinematic measurements
double beta decay
astrophysics/cosmology

Day 1-2

- **Q1.** What are the reach and experimental limitations of current and future direct neutrino mass experiments?
- **Q2.** What can we learn about neutrino mass and mass hierarchy from double beta decay experiments, and what is their future reach?
- **Q3.** What can we learn from astrophysical or cosmological observations about neutrino mass and the mass hierarchy?

Q1-3 will discuss the status and future opportunities in various subfields.

Science Questions & Working Groups

model-dependencies and uncertainties
extracting unified information on mass and hierarchy

Day 3-4

- **Q4.** What are the model-dependencies and uncertainties in laboratory measurements and astrophysical/cosmological observations, and how are these uncertainties established?
- **Q5.** How do we analyze future neutrino mass experiments and astrophysical observations to extract unified information on neutrino masses and the mass hierarchy?

Q4-5 will bring together the discussion of low-energy neutrino and astrophysics/cosmology.

Workshop Logistics and Tools

- Program administrator
 - Laura Lee <lee@phys.washington.edu>
- Workshop organizers
 - Baha, Eric, Steen, KMH
 - email list: numass2010@physics.wisc.edu
- Workshop website
 - INT website: <http://www.int.washington.edu/PROGRAMS/10-44w.html>
 - upload talks: <http://agenda.hep.wisc.edu/categoryDisplay.py?categId=20>
 - *please upload talks so they are instantly available for working groups*
 - wiki: <https://wiki.hep.wisc.edu/numass2010/>
 - literature references: <https://wiki.hep.wisc.edu/numass2010/LiteratureReferences>
 - CVS for white paper: see wiki for instructions

White Paper

- **Goals/Content**
 - Summary and resource paper
 - Organized around workshop science questions
 - Covers experiment/observation/theoretical aspects
 - Timescale to consider: next 5-10 years
- **Length**
 - ~25 pages, 4-5 pages on each science question
- **Publication**
 - arXive and publication
 - International Journal of Physics G? Other?
- **References**
 - original references
 - user literature page on wiki to collect references

Monday, February 8, 2010

Day 1

8.00 registration in INT office, 4th floor

PLENARY SESSION 1, room C520

9.00 welcome

9.10 *Kinematic measurements*, R.G.H. Robertson

9.40 *Neutrino mass from double beta decay experiments*, J.F. Wilkerson

10.10 *Theory of neutrino mass and of $\beta\beta$ nuclear matrix elements*, P. Vogel

10.40 coffee break

PLENARY SESSION 2, room C520

11.00 *Neutrino masses from oscillation experiments*, C. White

11.30 *Neutrino mass and core collapse supernovae*, G. Fuller

12.00 *Neutrino mass and weak lensing*, S. Dodelson

12.30 lunch

PLENARY SESSION 3, room C520

2.00 *Neutrino masses from CMB and large scale structure*, Y. Wong

2.30 *Lyman alpha forest*, K. Abazajian

3.00 *Neutrino masses and cosmic simulations*, M. Takada

3.30 *Seeing Cosmic Neutrinos through CMB Lenses*, B. Keating

3.50 *Treatment of neutrino masses in the PDG*, R. Miquel

4.10 coffee

4.30 WORKING GROUPS, room C520 + various other rooms

Q1 – direct measurements

Q2 – double beta decay

Q3 – astrophysics/cosmology

PLENARY SESSION 4, room C520

6.00 Reconvene working groups. Questions and discussion.

6.30 end of session

- review talks

kinematic measurements
double beta decay
astrophysics/cosmolgy
nu masses in PDF

- working groups get organized

- do we need to refine the
science questions Q1-5?

- plenary discussion to discuss
goals of Q1-3