

*For the discussion
and
Final remarks*

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Goal:

Realizing 100kt class Giant Liquid
Argon Charge Imaging Experiment

Physics:

Long baseline neutrino experiment

- Conclude lepton mixing structure (θ_{13}) and investigate lepton sector CP phase (Hierarchy also)
- Spectrum measurement (1st and 2nd Oscillation Max.) with On-Axis beam with ν beam run (possibly anti- ν after looking at ν run results)
 - LBNE in USA
 - CN2PY in Europe
 - T2O in Japan

Note: Event rate (5kt T2O = $0.5 \times$ T2K)

Nucleon decay

- High quality tracking information, high energy resolution, low particle energy detection energy threshold
 - Background free measurement for several decay modes
- Possible to explore 10^{34} - 10^{35} years life time within 10 years for several decay mode

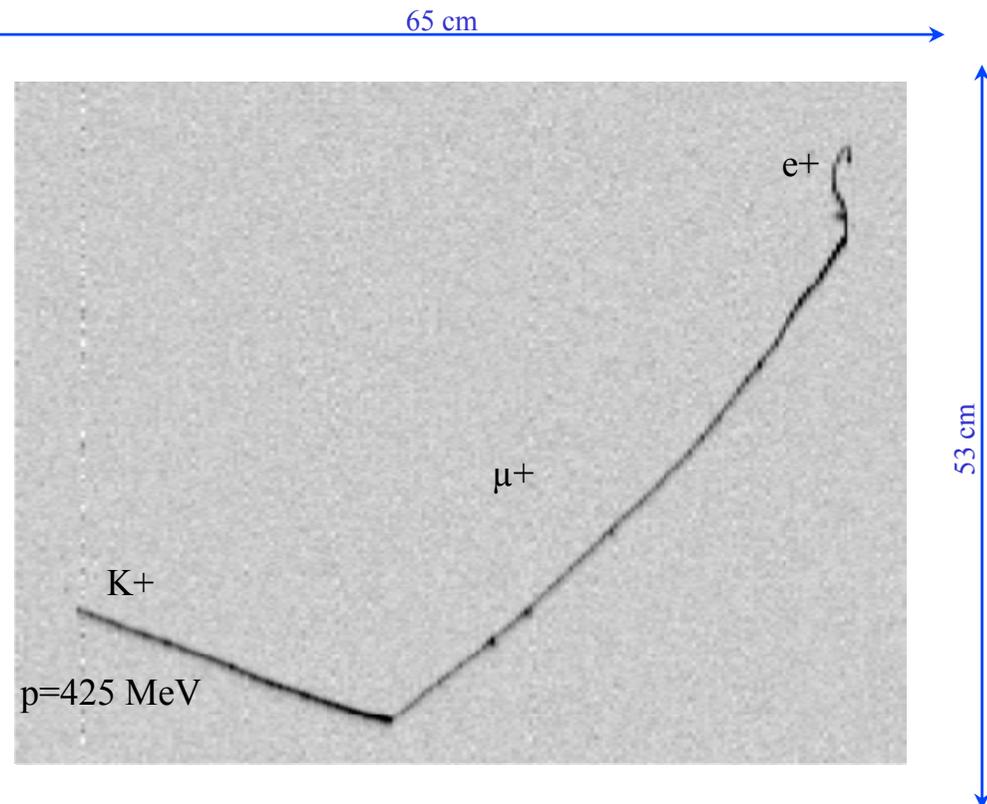
- Shallow depth(>600 m.w.e.) is enough to suppress cosmogenic background

- Main background is atmospheric neutrino

- Never miss
 $p \rightarrow \nu K^+$, $p \rightarrow e^+ K^0$, $n \rightarrow e^+ K^-$, ...etc.

(Exceed SK limit within 10 years even with 5kt)

- Surely detect high multiplicity final states mode
(e.g. $p \rightarrow \mu \pi K$, ...)



Astrophysical neutrino

- Galactic Supernova neutrinos
- Diffuse Supernova neutrinos
- Atmospheric neutrinos
- Solar neutrinos
- Indirect dark matter searches

Short baseline neutrino experiment

- Very short baseline with decay at rest source
- LSND/miniBooNE anomaly

and

Study of neutrino interaction

- MicroBooNE
- larLAR (\sim kt)
- Double-LAr @ CERN PS
- GLACIER 1kt @ CERN SPS/PS

R&D:

ICARUS T-600 experiences

Charge readout

- Wire (single phase)
- LAr LEM (double phase)
- Micromegas (double phase)

Light readout

- PMT
- Coating
- Light guide

Electronics

- Cold electronics
- Warm electronics
- Feed through

High voltage system

- High voltage (external) + Feed through
- High voltage (Greinacher multiplier inside LAr)

*Purification
and
Recirculation(gas and liquid)*

- LAPD
- 40L LAr @ Liverpool
- 6m³

Test of long drift

- ArgonTube (long drift)

Large cryogenic systems and industrial components

- Underground construction
- Large cryogenic tank
- Cryogenic facility (inside/outside of cavern)
- LHC/ATLAS/CMS experience

R&D with Dark Matter search

- WARP
- ArDM
- XENON-100,ton
- XMASS

Software

- LArSoft
- QSCAN

Beam test with well defined beam

- T32
- 6m³

Large scale prototyping

- An underground kton-scale pilot project
- LBNE LAr

Site study

- Pyhäsalmi
- DUSEL
- Okinoshima

*Let's put together all our knowledge
into
White paper*

“The next-generation
Giant Liquid Argon Charge Imaging Experiment“

The next-generation Giant Liquid Argon Charge Imaging Experiment“

We propose Giant Liquid Argon Charge Imaging Experiment (GLACIER) as a next-generation underground neutrino observatory on the scale of 100 kton. The physics objectives comprise the investigation of neutrino oscillations and CP violation in the leptonic sector with long-baseline neutrinos, the search for proton decay, as well as the observation of known and potentially unknown astrophysical neutrino sources. The outstanding successes of R&D and prototyping on smaller scale setups demonstrate the large potential of liquid-argon detectors. Based on the considerable expertise present in European and international research groups, the technology is sufficiently mature to allow for an early start of detector realization of a pilot facility of the scale of 5 kton, which could then evolve towards the ultimate mass by additional units of increasingly larger mass.

1. Introduction
2. Physics motivation
3. Detector design
4. Conclusion

Let's form editor team and start writing.
Welcome for every related contributions !

Proceedings

- GLA2010 Proceedings
 - Editors apology for slow processing
 - Almost finalized and appear in “Journal of Physics, Conference Series” soon
- GLA2011 Proceedings
 - Proceedings will be published in Journal of Physics, Conference Series (Editors: T. Hasegawa, A. Rubbia and W. H. Trzaska)
 - No page limitation. (~4page/contribution as a standard)
 - The deadline for paper submission is August 31, 2011.
 - Detailed instruction is found at <https://www.jyu.fi/fysiikka/en/gla2011/Proceedings>

3rd International Workshop
towards
the Giant Liquid Argon Charge Imaging
Experiment
(GLA2012)

2012, BNL(USA)

contact:

Prof.Milind Diwan and Prof. Veljko Radeka

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Thank you !!

and

Keep in touch with each other !!