WG3 Overview

Accelerator Physics

Conveners:
Mamad Eshraqi (ESS)
Robert Zwaska (FNAL)
Tetsuro Sekiguchi (KEK/J-PARC)
### Topics covered:
- High power proton beams
- Target design and Irradiation
- Neutrino sources
- Muon sources, beams and cooling
- Beam diagnostics for protons and muons

<table>
<thead>
<tr>
<th>Aug 26 (Mon)</th>
<th>Aug 27 (Tue)</th>
<th>Aug 28 (Wed)</th>
<th>Aug 29 (Thu)</th>
<th>Aug 30 (Fri)</th>
<th>Aug 31 (Sat)</th>
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<tr>
<td>09:00-10:30</td>
<td>Opening and Keynote</td>
<td>Plenary: Neutrino scattering</td>
<td>Plenary: Accelerator</td>
<td>Plenary: Muon</td>
<td>Plenary: Beyond PMNS</td>
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<td>10:30-11:00</td>
<td>Break</td>
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<td>11:00-12:30</td>
<td>Plenary: WG overview</td>
<td>Plenary: Non-accelerator experiment</td>
<td>Plenary: Round table discussion</td>
<td>Parallel</td>
<td>Plenary: Detector technology</td>
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<td>12:30-14:00</td>
<td>Lunch</td>
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<td>14:00-15:30</td>
<td>Plenary: Neutrino oscillation</td>
<td>Parallel</td>
<td>Excursion</td>
<td>Parallel</td>
<td>BD</td>
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<td>15:30-16:00</td>
<td>Break</td>
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<td>16:00-17:30</td>
<td>Plenary: Neutrino oscillation</td>
<td>Parallel</td>
<td>Parallel</td>
<td>mu</td>
<td>Parallel</td>
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<td>18:00-20:00</td>
<td>Welcome reception, poster session</td>
<td>SPC meeting</td>
<td>Workshop dinner</td>
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**Note:** The table uses abbreviations for topics, with 'nu' for Neutrino and 'mu' for Muon.
**BEAMS OF NEUTRINOS**

- **Neutrino Factories, pure neutrino beams:**
  - Generating muons from high energy primary beams
  - Cooling the muons
  - Accelerating the muons

- **Neutrino Super Beams**
  - Generating pions from high energy primary beams

**August 27 (14:00-14:30, 15:00-15:30)**
J-PARC Neutrino Beamline and 1.3 MW Upgrade, Yuichi Oyama
Neutrino Source for Sterile Neutrino Searches, Tomoyuki Konno

**August 30 (14:00-14:30, 15:00-15:30)**
NuMI Neutrino Beam Operations and Megawatt Upgrade, Yun He
Design of nuSTORM facility for a potential implementation at CERN, Jaroslaw Pasternak
HORN AND TARGET

- High power target:
  - Thermomechanical
  - Lifetime
  - Radiation damage
- Horn:
  - Efficient focusing and separation of species
  - Thermomechanical
  - Vibrations
  - High current needed

August 27 (16-17:30)
Design Studies of the LBNF/DUNE Target, Chris Densham
Radiation Damage Experiments (RaDIATE), David Senor
HiRadMat and High Power Targetry, Claudio Torregrosa Martin

August 29 (12:00-12:30)
The Design Study of the Target Station for the ESS Neutrino Super Beam Project, Loris D’Alessi

August 29 (16:00-16:25, 17:40-18:05) +WG4
Status and Future Prospect of Muon Target at J-PARC, Shunsuke Makimura
Design and Development of a Tungsten Pion Production Target for the Mu2e Experiment, Chris Densham
MuON Sources; Probably the Best

- On top of above mentioned challenges, they have their own!
  - A different kind of cooling
    - Fast
    - Low loss
    - Efficient
  - Modeling of Muon interaction with matter is not as well documented as that of stable(r) particles

August 29 (16:00-16:25-17:40-18:05) +WG4
Mu2E Muon Beam Optimization, Helenka Casler
MuCool, Ryoto Iwai
MuSIC, Akira Sato

August 30 (14:30-15:00, 16:00-18:00)
Updated Design Studies at 25 kW for EMuS at CSNS, Nikos Vassilopoulos
Progress on Muon Ionization Cooling Demonstration with MICE, Moses Chung
Measurement from MICE of Coulomb Multiple Scattering and Energy Loss, John Nugent
Transverse/Longitudinal Emittance Exchange in MICE, Alan Bross
Accumulators and Linear Accelerators

- Accumulators and synchrotrons:
  - Injection problems
  - Strong space charge, tune shift and losses

- Linear accelerator front end:
  - Efficient acceleration
  - Losses (specific to H⁻)
    ‣ Intra beam stripping
    ‣ Lorentz Stripping
    ‣ Gas and blackbody radiation

August 27 (14:30-15:00)
Novel Approaches to High-Power Proton Beams, Jeffrey Eldred

August 29 (11:00-12:00)
ESSnuSB Linac Design and Beam Dynamics, Ben Folsom
The ESSnuSB Accumulator Beam Dynamics Design, Ye Zou
**Beam Diagnostics**

- **Interceptive devices**
  - Survival in high beam intensities

- **Non-interceptive devices**
  - Accuracy and precision of measurement

- **Lifetime and reliability**

**August 29 (14:00-15:30)**
Development of New Proton Beam Monitors for J-PARC 1.3 MW Upgrade, Megan Friend
Novel RF Hadron Beam Monitor, Rolland Johnson
Development of New Muon Monitors for J-PARC Neutrino Experiment, Kenji Yasutome
Towards NuFact(ORIES)

ESS proton driver

Neutrons to ESS

Protons dump

Accumulator

π decay

νμ or νμ

μ Test Facility

μ Decay channel or ring

νμ or νμ

νe + νμ

νμ + νe

ESSnuSB

短基线探测器

长基线探测器

nuSTORM

短基线探测器

长基线探测器

Neutrino Factory

Muons Collider

Front end

Cooling

RLA acceleration

Storage ring

Long Baseline Detector

Cooler ring

νμ

νμ

νe

ε

νe

νμ

Accumulator

νμ

νμ

ε
ENJOY A LIVELY NuFACT 2019