NEW DIRECTIONS IN NEUTRINO-NUCLEUS SCATTERING

NuSTEC Workshop Kickoff
Kirsty Duffy and Camillo Mariani, for the organizing committee

WELCOME!

- We hope this will be a productive workshop for everyone, with many interesting dicsussions that may continue over the coming months!
- The aim of this workshop is to talk about **new directions** in neutrino-nucleus interactions: to discuss where the field is going and new ideas for **experiment, theory, and generators**

Organizing Committee

Andrew Furmanski (University of Minnesota)

Daniel Cherdack (University of Houston)

Kirsty Duffy (Fermilab) [Co-chair]

Jonathan Paley (Fermilab)

Camillo Mariani (Virginia Tech) [Co-chair]

Jorge Morfin (Fermilab)

Luis Alvarez Ruso (IFIC, Valencia)

Natalie Jachowicz (Ghent University)

Steven Dytman (University of Pittsburgh)

Vishvas Pandey (University of Florida)

Yang Un-ki (Seoul National University)

Yoshinari Hayato (ICRR, University of Tokyo)

LOGISTICS

- The workshop will start around 7.30am U.S. Central Time every day
- Exact finish time varies, but roughly 1pm U.S. Central Time every day
- The agenda consists of **longer "plenary" talks** and **shorter (7 minute) "flash" talks**
- There will be a short amount of time for **questions after each talk**
- At the end of each session is a **longer discussion session**

MONDAY

07:00

Introduction - Welcome — *Camillo Mariani et al.* — 07:20 - 07:30

T2K Experiment — *Dr Andrew Cudd* — 07:30 - 08:00

08:00

NOva Experiment — *Leonidas Aliaga Soplin* — 08:00 - 08:30

SBND/ICARUS — *Mateus Carneiro* — 08:30 - 08:45

MicroBooNE — *Dr Adi Ashkenazi* — 08:45 - 09:15

09:00

DUNE — *Dr Rafique Aleena* — 09:15 - 09:45

An improved muon neutrino charged-current single positive pion cross section on water using michel electron reconstruction in the T2K near detector — *Sam Jenkins*

10:00

Extraction of the Inclusive Muon Neutrino Charged Current Cross Section at MicroBooNE using Wiener SVD Unfolding — *Mr London Cooper-Troendle*

Measurement of the Electron-Neutrino Charged-Current Inclusive Cross-Section on Argon in MicroBooNE — *Krishan Mistry* — 10:05 - 10:15

Monday: First Discussion - Chair: Dr. Andy Furmanski, Panelists: Dr. Linda Cremonesi, Dr. Alessandro Lovato — 10:15 - 10:45

Break — 10:45 - 11:00

11:00

Generator Tools Workshop Overview — *Dr Laura Fields* — 11:00 - 11:10

Plans for Theory Interfaces — *Dr Minerba Betacourt* — 11:10 - 11:20

Plans for Common Flux and Geometry Driver, Event Format, and FSI Separation (plus Q&A for two previous talks) — *Dr Luke Pickering*

GENIE Tuning Effort — *Dr Marco Roda* — 11:45 - 12:00

12:00

New Physics Model Developments in GENIE — *Dr Steven Gardiner* — 12:00 - 12:15

Exploring GENIE and Real-World Data through Simulation Tuning — *Richie Diurba et al.* — 12:15 - 12:45

The GENIE Event Library Generator Interface — *Chris Backhouse* — 12:45 - 12:55

13:00

Dark Neutrino Simulations with GENIE on SBND — *Iker de Icaza* — 12:55 - 13:05

Angular distributions in Monte Carlo event generation of weak single-pion production — *Kajetan Niewczas* — 13:05 - 13:15

Monday: Second Discussion - Chair: Prof. Steve Dytman, Panelists: Dr. Steven Dolan, Prof. Jan Sobczyk — 13:15 - 13:45

TUESDAY

07:00

Short Time Approximation — *Prof. Saori Pastore* — 07:30 - 08:00

08:00

Radiative Corrections — *Oleksandr Tomalak* — 08:00 - 08:30

Polarization Effects in neutrino-nucleon interactions — *Beata Kowal* — 08:30 - 09:00

09:00

Neutrino-Nucleon Form Factors from Lattice QCD — *Aaron Meyer* — 09:00 - 09:30

Compatibility of Neutrino Deep Inelastic Scattering Data in a Global Nuclear Parton Density Determination. — *Mr Khoirul Faiq Muzakka*

Extracting the nucleon axial form factor from LQCD using chiral perturbation theory — *Fernando Alvarado* — 09:40 - 09:50

Q2 dependence at large x and impact on EMC studies — *Narbe Kalantarians* — 09:50 - 10:00

10:00

Tuesday: First Discussion - Chair: Prof. Luis Alvarez-Ruso, Panelists: Dr. Jorge Morfin, Dr. Michael Wagman — 10:00 - 10:30

Break — 10:30 - 10:45

11:00

Minerva Experiment — *Manuel Alejandro Ramirez Delgado* — 10:45 - 11:15

High Statistics Inclusive Cross Section Measurements from MINERvA — *Amy Filkins* — 11:15 - 11:25

Overview of MINERvA's Binding Energy Study with the STKI Variables — *Tejin Cai* — 11:25 - 11:35

Constraints on neutrino electromagnetic properties from COHERENT elastic neutrino-nucleus scattering — *Yiyu Zhang* — 11:35 - 11:45

Studying neutrino charged-current interactions in the COHERENT liquid argon detectors — *Erin Conley* — 11:45 - 11:55

12:00

Coherent elastic neutrino-nucleus scattering with the NuMI beamline and the νBDX-DRIFT detector — *Diego Aristizabal* — 11:55 - 12:05

Status of the ENUBET monitored neutrino beam — *Michelangelo Pari* — 12:05 - 12:15

Tuesday: Second Discussion - Chair: Dr. Jorge Morfin, Panelists: TBA — 12:15 - 12:45

WEDNESDAY

07:00

Measurement of charged-current interactions on water using a nuclear emulsion detector in the NINJA experiment *Ms Ayami Hiramoto*

Towards the measurement of neutrino cross section on water in the 1 GeV region using the WAGASCI detector of the T2K experiment *Giorgio Pintaudi*

Inelastic neutrino-nucleus scattering in the superscaling model *Mr Jesus Gonzalez Rosa*
07:50 - 08:00

08:00

Tau polarization in (anti-)neutrino-nucleon interactions. *Dr M. Rafi Alam*
08:00 - 08:10

Break
08:10 - 08:25

Electron scattering for neutrino physics at MAMI *Dr Luca Doria*
08:25 - 08:35

Coulomb corrections for charged current events *Ryan Plestid*
08:35 - 08:45

Quasielastic interactions of monoenergetic kaon decay-at-rest neutrinos *Alexis Nikolakopoulos*
08:45 - 08:55

09:00

Electroweak pion production off nucleons near threshold in ChPT *Gustavo H Guerrero Navarro*
08:55 - 09:05

Importance of study of quasielastic hyperon production at DUNE energies *Dr A. FATIMA*
09:05 - 09:15

Wednesday: First Discussion - Chair: Dr. Vishvas Pandey, Panelists: Prof. Andreas Kronfeld, Prof. Kevin McFarland
09:15 - 09:45

Break
09:45 - 10:00

10:00

Comparison of Validation Methods for Final State Interactions in Hadron Production Experiments *Julia Tena Vidal*
10:00 - 10:20

QMC-based approach to inter-nuclear cascades *Alessandro Lovato*
10:20 - 10:45

11:00

Quantum Monte Carlo *Dr Alessandro Baroni*
10:45 - 11:05

Neural Net for Sampling *Dr Federico Sanchez*
11:05 - 11:25

nCTEQ15HIX -- Extending nPDF Analyses into the High-x, Low Q2 Region *Dr Efrain Segarra*
11:25 - 11:50

E4nu *Afroditi Papadopoulou*
11:50 - 12:10

12:00

Wednesday: Second Discussion - Chair: Prof. Steve Dytman, Panelists: Dr. Or Hen, Dr. Noemi Rocco
12:10 - 12:40

THURSDAY

Late start on Thursday: 7.50am U.S. Central Time

Zoom will be open from 7.30am if you want to use it for discussions

07:00

08:00

ANNIE: Roadmap for neutron multiplicity measurement *Dr Michael Nieslony*
07:50 - 08:10

THEIA *Zara Bagdasarian*
08:10 - 08:35

H2/N2 *Prof. Roberto Petti*
08:35 - 09:00

09:00

Thursday: First Discussion - Chair: Dr. Daniel Cherdack, Panelists: Prof. Richard Hill, Prof. Bob Svoboda
09:00 - 09:30

Break
09:30 - 09:45

10:00

COHERENT *Dr Matthew Heath*
09:45 - 10:05

Towards ab initio computations of neutrino scattering on medium-mass nuclei *Joanna Sobczyk*
10:05 - 10:25

Low Energy theory and Generator *Dr Vishvas Pandey*
10:25 - 10:45

11:00

Electron Scattering vs Neutrino Scattering *Artur Ankowski*
10:45 - 11:05

Jefferson Lab eAr experiment results *Libo Jiang*
11:05 - 11:30

Semi-inclusive scattering for nu energy reconstruction *RAUL GONZALEZ JIMENEZ*
11:30 - 11:55

12:00

Weak pion production in BChPT *Dr Astrid Blin*
11:55 - 12:20

Thursday: Second Discussion - Chair: Prof. Camillo Mariani, Panelists: Prof. Arie Bodek, Prof. Omar Benhar
12:20 - 13:00

13:00

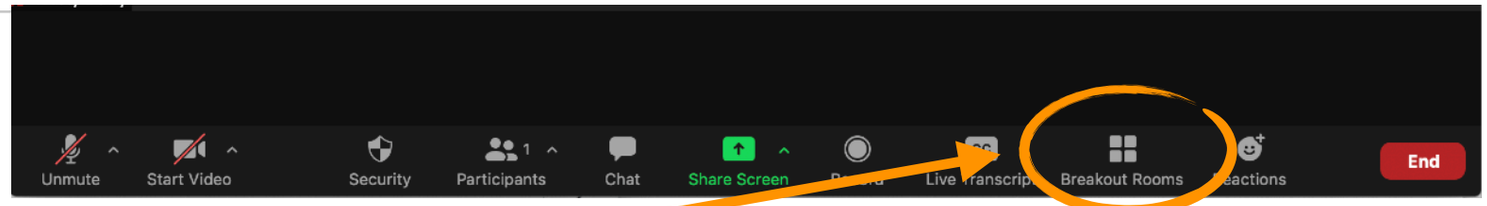
NuSTEC Neutrino Scattering Theory-Experiment Collaboration

DISCUSSION SESSIONS

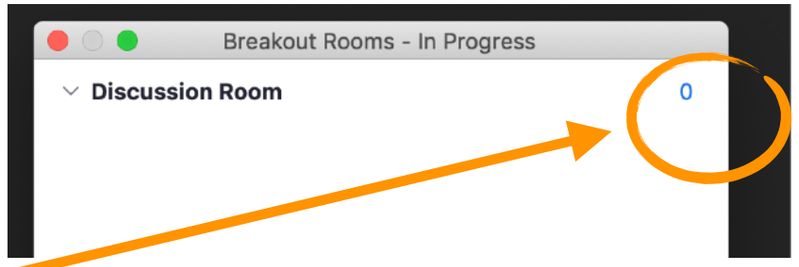
- We are planning **two 30-minute discussion sessions** per day
- Each will be led by discussion leaders and a chair from the organizing committee
- But the discussion is **open to all** and we want to hear your thoughts!
- We have prepared a Google doc where you can **add questions or topics you would like to discuss during the talks**
  - Discussion chairs will use this Google doc to decide what to discuss during these sessions
  - If you add your name, the chair can call on you to ask your question yourself
  - If we don't get to that topic in the discussion, **we encourage speakers to check the Google doc and type answers to unanswered questions there!**

DISCUSSION BREAKOUT ROOM

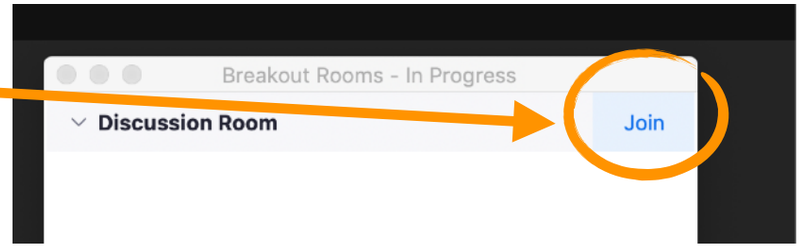
- If you would like to keep discussions going (e.g. during break times), we have a breakout room you can use for that



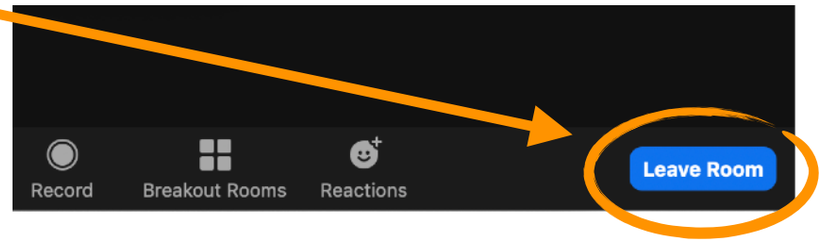
- To access the breakout room:
  - Click **"Breakout rooms"** at the bottom of the screen
  - When the window pops up, you can see who is already in the breakout room



  - Hover over the number of current participants, and it will change to a button that says **"Join"** — **click that button** to enter the breakout room



  - To leave the breakout room and re-enter the main workshop room, click **"Leave Room"** at the bottom-right of the screen



- We will be moving discussion to the breakout rooms at the end of the 30-minute discussion sessions (to keep the "main" zoom room open during breaks for speakers to test their microphones and screen sharing)

GROUND RULES FOR A PRODUCTIVE WORKSHOP

- **Please save your questions for the end of the talk.** Please let speakers get through their entire presentation first. Points of clarification during the talk are ok.
- **Please raise your hand on zoom** if you would like to ask a question
- **Please wait to be called on by the session chair**
- Please keep questions and comments relevant to the physics discussion. As always, be respectful, be courteous
- Didn't get a chance to ask your question during the session? Please add it to the Google doc
- This meeting will follow the Fermilab Statement of Community Standards and the APS Code of Conduct

LET'S HAVE A GREAT WORKSHOP!