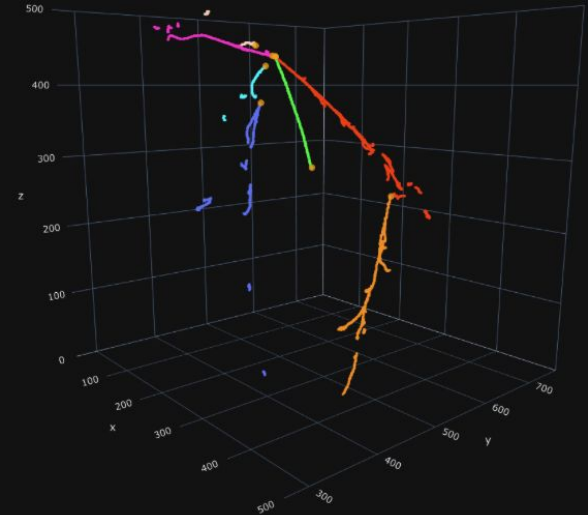
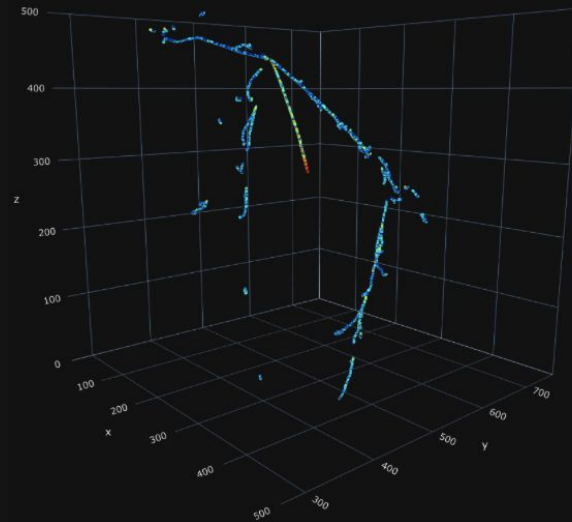


Neutrino Physics and Machine Learning Workshop (NPML)



C. Adams (ANL), A. Aurisano (Cincinnati), J. Bian (UC Irvine),
P. de Perio (TRIUMF), N. Prouse (TRIUMF), K. Terao (SLAC),
M. Del Tutto (FNAL), T. Wongjirad (Tufts)

NPML Workshop

Welcome

Thanks for joining! We would like to see more opportunities to gather around Machine Learning (ML) and related topics for the neutrino physics community. This is an attempt to initiate a workshop.

NPML Lightning Talks / Nu2020 Satellite ([indico link](#))

Goal: promote young researchers to give a technical talk on their ML related research projects = important inputs to the main workshop.

Main workshop ([indico link](#))

Goal: survey the current + form the future vision of the ML techniques R&D for maximizing the impact on the science output.

Neutrino-2020 Satellite Workshop

Checkout the Lightning Talks!

10 minutes presentation by young researchers on their ML research

Trevor Towstego

([slide](#) and [movie](#))

Peibo An

([slide](#) and [movie](#))

Ran Itay

([slide](#) and [movie](#))

Zhenghao Fu

([slide](#) and [movie](#))

Nicholas Kamp

([slide](#) and [movie](#))

Andrea Delgado

([slide](#) and [movie](#))

Jacob Daughhete

([slide](#) and [movie](#))

Jessie Micallef

([slide](#) and [movie](#))

Laura Domine

([slide](#) and [movie](#))

Dae Heun Koh

([slide](#) and [movie](#))

Graczyk Krzysztof

([slide](#) and [movie](#))

Joshua Mills

([slide](#) and [movie](#))

Katie Mason

([slide](#) and [movie](#))

Aobo Li

([slide](#) and [movie](#))

Rui An

([slide](#) and [movie](#))

Ralitsa Sharankova

([slide](#) and [movie](#))

Nitish Nayak

([slide](#) and [movie](#))

Francois Drielsma

([slide](#) and [movie](#))

Qing Lin

([slide](#) and [movie](#))

Carlos Sarasty

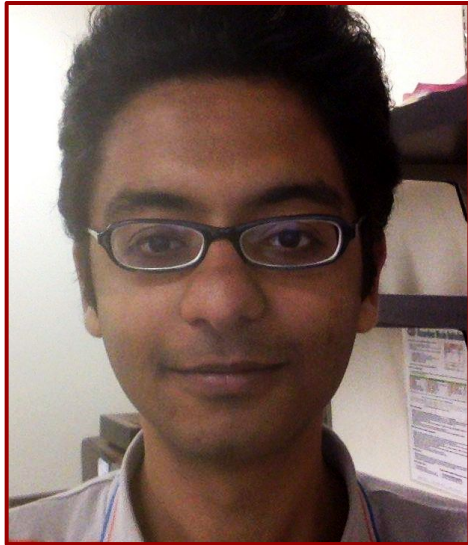
([slide](#) and [movie](#))

... or find all in the satellite workshop [indico](#)!

Everyone in both workshop is invited for writing the white paper :)

Neutrino-2020 Satellite Workshop

Best Machine Learning Poster (BMLP)



Nitish Nayak (Graduate Student, UC Irvine)

Efficient neutrino oscillation parameter inference using Gaussian processes

A rather unique ML application in neutrino physics and inspiring. The subject is recognized as a major research challenge for long baseline oscillation programs

*Nitish was highlighted in the closing talk of Neutrino 2020 as a winner of the Best Machine Learning Poster award. **Congratulations Nitish!***

Neutrino-2020 Satellite Workshop

Best Lightning Talks (BLTs)



Jessie Micallef (Graduate Student, Michigan State University)

Reconstructing 10 GeV-Scale Neutrino Events in IceCube using CNNs

Laura Domine (Graduate Student, SLAC/Stanford University)

Reconstructing Michel Electrons in ICARUS with Deep Neural Networks

*Many found Jessie and Laura gave a crystal clear talk on promising ML applications + excellent handling of questions. **Congratulations Jessie and Laura!***



NPML Main Workshop

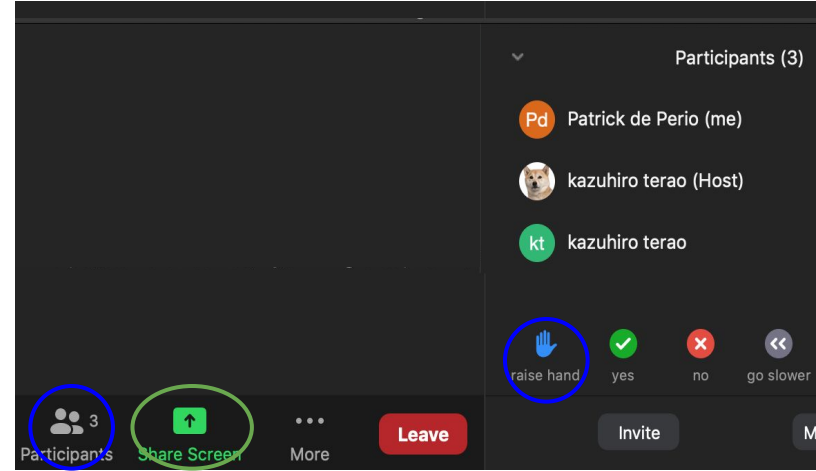
Agenda ([timetable](#))

- Zoom meeting ([link](#), password 550998)
 - Want a topical breakout room during a break? Let us know!
- July 10, 14, 21, 22, 24 (5 days) to cover 40 talks.
 - 10:00 - 15:30 CT for morning + afternoon sessions / day
 - Two conveners moderate each session
- Talks
 - Welcome talk by Michael Cooke ... after this!
 - White paper discussion by Adam Aurisano ... first + last day!
 - Long (25+15) and short (15+10) research talks ... the bulk :)

NPML Main Workshop

Question/Talk policy

- Speakers:
 - Please introduce yourself first
 - If possible w/ video-on!
 - Be ready to **share screen!**
- Audience:
 - One mic - **raise hand** for questions!
 - Unmute after you are called upon by a convener
 - Question only accepted after a speaker finishes his/her talk
 - Alternatively ask questions on the Slack channel **#workshop-questions**. Upvote a good question (:thumbsup:)!



NPML Main Workshop

White paper

- **How ML can maximize neutrino physics output?**
 - Survey of methods currently explored
 - Future vision: what ML techniques? What applications to maximize impact? What is needed to make that happen?
- **Ultimate goal:** community-wide vetting to form a coherent view on the future research directions.
- **Adam Aurisano** leads this discussion in the first and final day
 - Would like **ALL OF YOU** to contribute in writing/reviewing
 - See Adam's talk later this morning.

Have fun!

Advertisement

Our sibling workshops/conferences in near future

- **Inter-experimental groups:** [WatChMaL](#), [DeepLearnPhysics](#), [Exa.Trk.](#)
- **Workshops**
 - **Reconstruction & ML for Neutrino Experiment**
 - [Last one](#) inspired this workshop, next one in 2021!
 - **DANCE ML Workshop**
 - Happening virtual in this August ([indico](#))!
 - ... and more in other HEP frontiers
 - IML, ACAT, summer schools (CoDaS-HEP, HEP-ML, etc.)
 - Want more?
 - HEP Cross-frontier workshops? Beyond HEP? Lectures/tutorials?