

Welcome to Fast Machine Learning for Science

World Changers
Shaped Here



SMU

Organizing Committee:

Allison Deiana (Southern Methodist University)

Rohin Narayan (Southern Methodist University)

Thomas Coan (Southern Methodist University)

Elizabeth Fielding (Southern Methodist University)

Scientific Committee:

Javier Duarte (UCSD)

Phil Harris (MIT)

Burt Holzman (Fermilab)

Scott Hauck (U. Washington)

Shih-Chieh Hsu (U. Washington)

Sergo Jindariani (Fermilab)

Mia Liu (Purdue University)

Allison McCarn Deiana (Southern Methodist University)

Mark Neubauer (U. Illinois Urbana-Champaign)

Maurizio Pierini (CERN)

Nhan Tran (Fermilab)



Getting Into the Workshop!

Welcome to the Fast Machine Learning for Science Workshop!

Program: <https://indico.cern.ch/event/924283/timetable>

All sessions will be held in Zoom – see your email for the Zoom link!

Please connect to the workshop Slack for out-of-session conversations!

• https://join.slack.com/t/fastml2020/shared_invite/zt-jg08pzwh-F_DcPvHISZi2APIKN_p2Jw



What to Expect this Week...

Talks

Monday—Wednesday 10 AM - 4 PM CDT: talks on a variety of topics!

- ✓ Each talk will have designated discussion time afterward, so keep track of your questions to ask at the end.
- ✓ Audience members will be muted by default during the talks – please “raise your hand” virtually if you have a question, and you will be asked (in order of raised hands) to unmute during the discussion period.
- ✓ **Discussion is important, but so is the agenda** – the Slack workspace is the place to continue long side conversations and ask questions that run over time.
- ✓ Each morning and afternoon will include a 15 minute “coffee break”, and an hour break for lunch.
- ✓ Remember to be courteous to your colleagues, and adhere to the [Code of Conduct!](#)



What to Expect this Week...

hls4ml Tutorial

Two identical tutorial sessions on Dec. 3rd: 9 AM and 1 PM

You must sign up in advance: <https://forms.gle/fGCSPpfJrQgFDnzU7>, and provide a github handle.

The tutorial is intended for those with familiarity with Python and machine learning concepts and/or frameworks. Knowledge of FPGAs is a benefit, but not required.

This tutorial will provide hands-on experience with the workflow of the hls4ml package, including:

- ✓ Demonstration of the easy to use, yet deep customisation options hls4ml provides, including tunable parallelism and quantization.
- ✓ Model pruning, observing the impact on the resource usage of the inference.
- ✓ Quantization-aware training, resulting in low precision weights and activations and enabling very lightweight inference without loss of model accuracy.
- ✓ Synthesizing the FPGA firmware and evaluating the relevant metrics.



After the Workshop...

You're invited to a Mini-Workshop on Portable Inference

Friday 9AM-12PM CDT: <https://indico.cern.ch/event/972791/overview>

- Blueprint meeting of the Institute for Research and Innovation for Software in High-Energy Physics (IRIS-HEP)
- The goal of this workshop is to bring together experts to share their experiences, on-going work and plans in area of **portable inference**.
- The workshop is meant to be an informal technical interchange between experiments and split 50/50 between short presentations and discussions.
- During the discussion block, we would like to develop a short document which identifies common challenges around portable inference for co-processing applications (e.g. High-level Trigger, analysis) and points of future collaboration.

