
Virtual Meetings: IRIS-HEP Blueprint Workshop Summary

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International Union of Pure & Applied Physics

C11 (Particles & Fields) Meeting

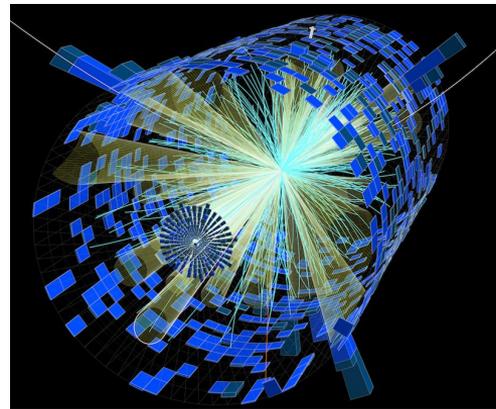
August 19, 2021



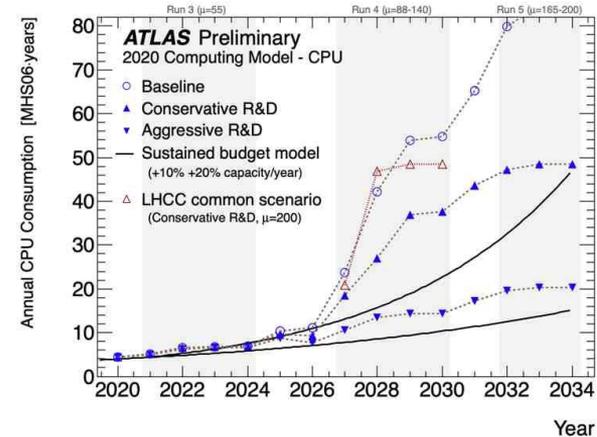
Institute for Research and Innovation in Software for High Energy Physics (IRIS-HEP)



Computational and Data Science Challenges of the High Luminosity Large Hadron Collider (HL-LHC) & other HEP experiments in the 2020s



- The HL-LHC will produce **exabytes of science data** per year, with **increased complexity** — 200 overlapping proton-proton collisions on average per event — as compared to the LHC
- During the HL-LHC era, the ATLAS and CMS experiments will record **~10 times as much data** from **~100 times as many collisions** (and at twice the pp collision energy) as was used to discover the Higgs boson.



IRIS-HEP resulted from a 2-year community-wide effort involving 18 workshops and 8 position papers, most notably a [Community White Paper](#) and [Strategic Plan](#). IRIS-HEP started in Sept 2018.

Blueprint Activity and Process



- The **Blueprint activity** is used to
 - inform development and evolution of the IRIS-HEP **strategic vision**
 - build (or strengthen) **partnerships among communities** driven by innovation in software and computing
- A **series of workshops** that bring together IRIS-HEP team members, key stakeholders and domain experts from disciplines of importance to the Institute's mission
 - *Topical presentations and discussion sessions*
- Discussions are captured and inform **key outcomes** which are summarized in a **short report** made publicly available

Recent Blueprint Workshops

- Analysis Systems R&D on Scalable Platforms
- Fast Machine Learning & Inference
- A Coordinated Ecosystem for HL-LHC Computing R&D
- Software Training
- Sustainable Software in HEP
- Future Analysis Systems and Facilities
- Portable Inference
- Virtual Meetings



Topic of this talk!

The Current Situation

- The COVID-19 pandemic has by-and-large prevented in-person meetings since March 2020 → **“Virtual” Meetings**
- We are all getting Zoom-fatigued!



- While the increasing deployment of effective vaccines around the world is a positive development, the timeline and pathway to “normality” is uncertain (especially given variants) and the “new normal” we will settle into is anyone’s guess at this point

Why a (Virtual) Meeting on Virtual Meetings?



- Scientific fields, like particle physics, have a year of experience in holding virtual meetings, workshops and conferences
- A great deal of experimentation and innovation to explore how to execute these meetings effectively had occurred
→ an appropriate time to take stock of what our community has learned and to discuss strategies for the future
- Continuing to develop effective strategies for meetings with a virtual component will be important for making the most of our limited time (and funding), work/life balance, reducing the carbon footprint of our research activities, etc ..., while enabling greater diversity and inclusion for participation

The Virtual Meetings Workshop



Goal: to bring together people (~80 attended) to (1) share their experiences with attending and organizing virtual events, (2) current technologies, effective techniques and best practices and (3) to develop strategies for effective future meetings

Day 1 (via [Zoom](#))

08:30 Welcome, Blueprint Activity and Workshop Overview
08:50 A Virtual Hitchhiker's Guide to Virtual Conferencing
09:20 HSF/WLCG Virtual Workshop Experience
09:40 LHCP 2020
10:00 ICHEP 2020
10:20 Moriond 2021
10:40 Connecting the Dots 2020
11:00 LLVM Developers Meeting
11:35 Snowmass Community Planning Meeting
11:55 OSG Virtual Meetings
12:15 PyHEP 2020 Experience and 2021 Plans
12:35 SciPy 2020 Experience and 2021 Plans
12:55 US ATLAS / Canada ATLAS Computing Bootcamp
13:15 Neutrino 2020
13:35 Discussion Session

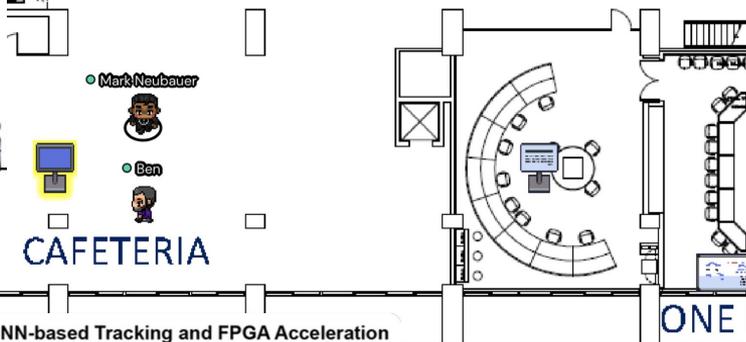
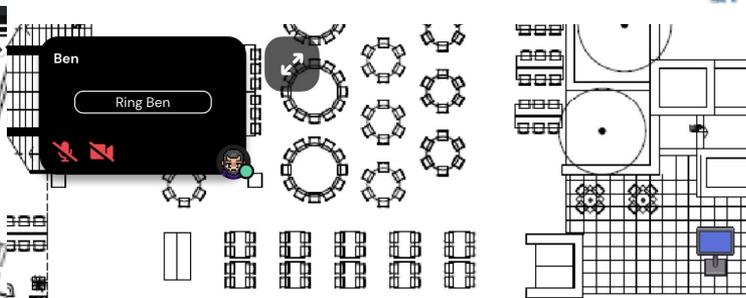
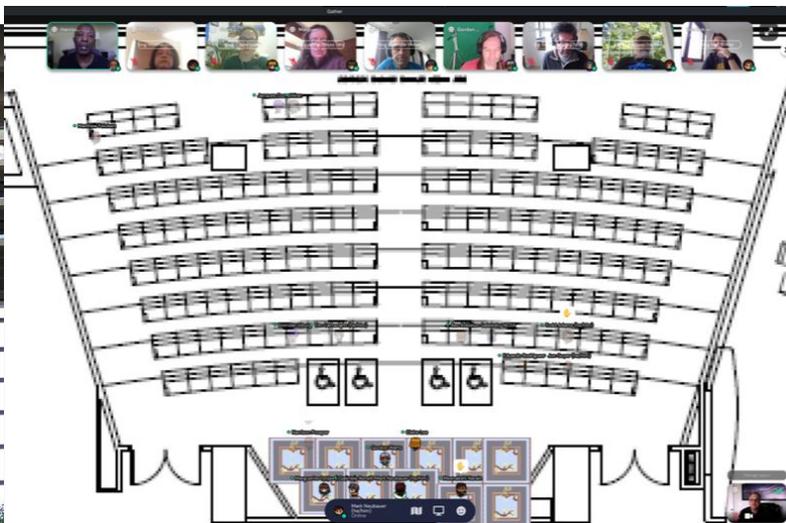
M. Neubauer
B. Krikler
G. Stewart
G. Marchiori, R. Salerno
T. Davidek
V. Varanda
D. Lange
V. Vassilev
B. Jayatilaka
T. Cartwright
E. Rodrigues
J. Guyer
M. Feickert
S. Zeller

Day 2 (via [gather.town](#))

08:30 Day 2 Topics and Goals
08:50 Summary of Community Input from DPF Townhall
09:20 Tools and Techniques for Virtual Workshops Session
11:00 Taking Stock of Experiences and Discussion on Future Events
12:00 Summary Report Discussion and Writing

M. Neubauer
M. Narain
B. Galewsky

Gathering in Wilson Hall (Day 2)



 **GNN-based Tracking and FPGA Acceleration**
Team: M. Atkinson¹, G. DeZoort¹, P. Elmer¹, B. Galewsky¹, M.S. Neubauer¹, I.R. Ojabe², S. Thak²
Institutions: ¹University of Illinois at Urbana-Champaign, ²Princeton University

Press x to interact

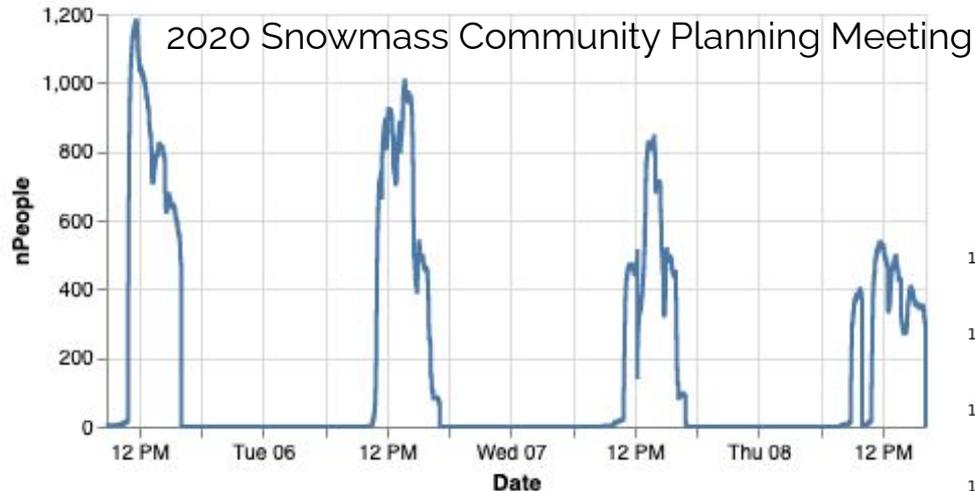
 Mark Neubauer
Online



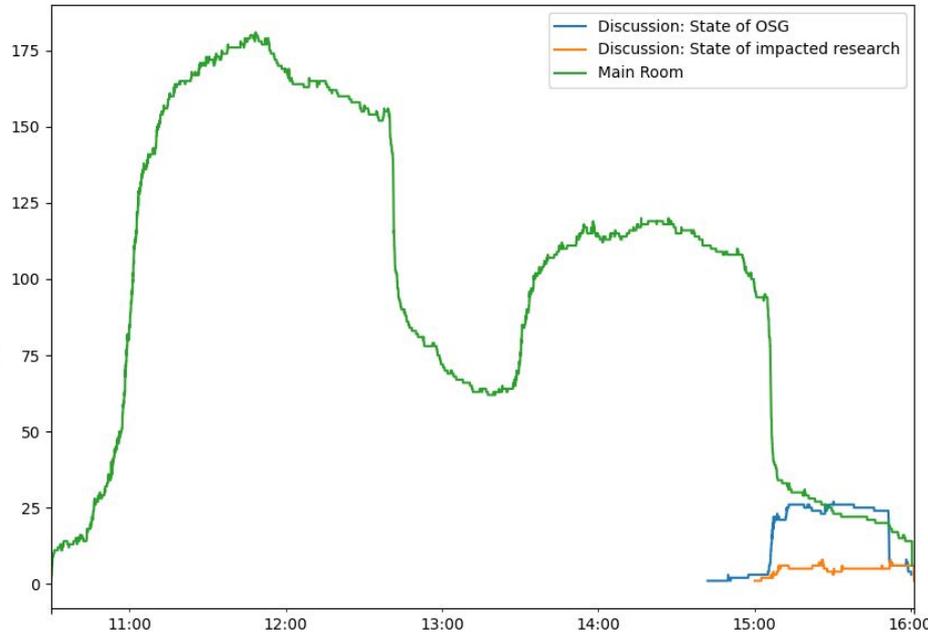
Common Themes and Key Findings



- Virtual meetings come with several benefits such as increased participation by early-career scientists and international collaborators, smaller overall budgets required to run an event, decreased cost of attendance and reduced carbon footprint associated with the event (due to a lack of required travel)
- Roughly 25%-50% of registered participants are connected at a given time and this decreases over the course of the event, while the vast majority of registrants attend the event at some point over its duration



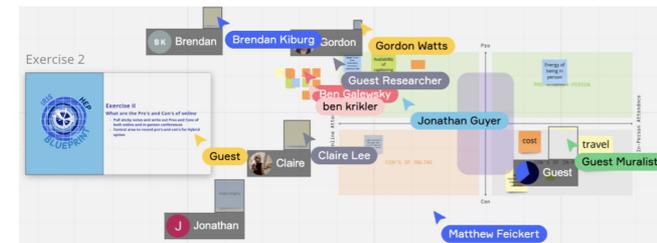
2021 Open Science Grid All-Hands Meeting



Common Themes and Key Findings (cont)



- Challenges include a lack of personal interaction opportunities and diminished quality of those interactions, “Zoom fatigue”, attention capture and retention, and synchronous participation over wide range of time zones.
- Zoom is an adequate tool for “traditional” presentation-style, but other tools are needed to be able to approach in-person style interactivity (many great ideas shown at the workshop!)
 - Virtual whiteboards (e.g. [Miro](#) board)
 - “Guided networking” (e.g. [RemotelyGreen](#))
 - Virtual reality (e.g. poster session at v2020)





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You are muted. Click or press M to un-mute.

Share

NEUTRINO 2020
Poster 1

MIT
Light Oscillating Effect, Neutrino Oscillation

Abstract
Neutrino oscillation is a quantum mechanical phenomenon where neutrinos, which are elementary particles, change their flavor as they propagate. This is due to the fact that the flavor eigenstates are not the same as the mass eigenstates. The oscillation probability depends on the mass differences between the mass eigenstates and the mixing between them.

Introduction
Neutrinos are produced in a wide variety of processes, from the Sun to supernovae. They are unique particles because they interact only via the weak force and gravity. This makes them difficult to detect, but also allows them to travel long distances without being deflected or absorbed.

Neutrino Oscillation
Neutrino oscillation is a quantum mechanical phenomenon where neutrinos, which are elementary particles, change their flavor as they propagate. This is due to the fact that the flavor eigenstates are not the same as the mass eigenstates. The oscillation probability depends on the mass differences between the mass eigenstates and the mixing between them.

Neutrino Masses
The neutrino masses are unknown, but they are known to be non-zero. This is because neutrino oscillation has been observed. The mass differences between the mass eigenstates are also unknown, but they are known to be on the order of eV.

Neutrino Mixing
Neutrino mixing is the process by which neutrinos change their flavor. This is due to the fact that the flavor eigenstates are not the same as the mass eigenstates. The mixing is described by the Pontecorvo-Maki-Nakagami-Sakata (PMNS) matrix.

Neutrino Oscillation Probability
The neutrino oscillation probability is the probability that a neutrino will change its flavor as it propagates. This probability depends on the mass differences between the mass eigenstates and the mixing between them. The probability is given by the following equation:

$$P(\nu_\alpha \rightarrow \nu_\beta) = \delta_{\alpha\beta} - 4 \sum_{i < j} \text{Re}(U_{\alpha i} U_{\beta i}^* U_{\alpha j}^* U_{\beta j}) \sin^2 \Delta m_{ij}^2 L / 4E^2 + 2 \sum_{i < j} \text{Im}(U_{\alpha i} U_{\beta i}^* U_{\alpha j}^* U_{\beta j}) \sin \Delta m_{ij}^2 L / 4E^2$$

Neutrino Oscillation Experiments
Neutrino oscillation has been observed in a number of experiments, including Super-Kamiokande, KamLAND, and MINOS. These experiments have shown that neutrinos oscillate between different flavors as they propagate.

Neutrino Oscillation and the Standard Model
Neutrino oscillation is a phenomenon that is not predicted by the Standard Model of particle physics. This is because the Standard Model does not include neutrino masses or neutrino mixing. The discovery of neutrino oscillation has therefore provided strong evidence for physics beyond the Standard Model.

Neutrino Oscillation and the Future
Neutrino oscillation is a fascinating phenomenon that has many unanswered questions. Future experiments, such as DUNE and JUNO, will help to answer these questions and provide a better understanding of neutrinos and the universe.

NEUTRINO 2020



Send to room

Diversity, Inclusion and Accessibility



- The rapid shift to fully-online events exposed areas inequalities in pre-pandemic models of in-person meetings → opportunity!
- Allows for participation by a larger and more diverse set of people around the world, especially from less well-funded groups and early-career researchers
 - However, network reliability is a challenge in many locations
- Careful captioning and content curation should be treated as a 1st class “citizen” - benefits those with hearing-impairment, non-native speakers & those unfamiliar with technical jargon
- Virtual events bring additional challenges with conduct issues
 - A Code of Conduct must exist w/ clear reporting + enforcement

Best Practices - Additional Considerations



- *Synchronous* time - where all attendees are available and able to be attentive, should be considered a precious commodity to be optimized through careful and thorough planning
- Organizers should ask speakers for their preferred pronouns (voluntarily) and to provide audio recordings of them pronouncing their names. Presenter pronouns must be respected and used
- Organizers should consider asking participants to provide (voluntarily) information beyond the usual registration content to facilitate interactions, such as personal and research interests
- Staying on time is crucial; Q&A should have dedicated handlers

Looking Forward



- Online meetings have a number of advantages, and we should work to retain as many of these as possible “post”-pandemic
- In-person interactions, informal chats and networking have been sorely missed over the past year or so
 - This is perhaps the strongest motivator to returning to in-person
- Effective “hybrid” formats could pull in benefits of each format
 - In-person and remote participation options could be provided
 - A “hybrid-with-hubs” approach could utilize nearby host locations
 - Would likely come with additional logistical load on organizers
 - One has to be careful to avoid a “class divide” where the quality of experience favors those with privileged access to in-person

For More Information...

- The full workshop summary report can be found at <https://arxiv.org/abs/2106.15783>
- Thanks for inviting me to talk with you on behalf of the participants of this workshop about this important topic for us all going forward
- Feel free to contact me at msn@illinois.edu if you have any follow-up questions or ideas!

arXiv:2106.15783v1 [physics.soc-ph] 30 Jun 2021

IRIS-HEP Blueprint Workshop Summary

Learning from the Pandemic: the Future of Meetings in HEP and Beyond

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Abstract

The COVID-19 pandemic has by-and-large prevented in-person meetings since March 2020. While the increasing deployment of effective vaccines around the world is a very positive development, the timeline and pathway to “normality” is uncertain and the “new normal” we will settle into is anyone’s guess. Particle physics, like many other scientific fields, has more than a year of experience in holding virtual meetings, workshops, and conferences. A great deal of experimentation and innovation to explore how to execute these meetings effectively has occurred. Therefore, it is an appropriate time to take stock of what we as a community learned from running virtual meetings and discuss possible strategies for the future. Continuing to develop effective strategies for meetings with a virtual component is likely to be important for reducing the carbon footprint of our research activities, while also enabling greater diversity and inclusion for participation.

This report summarizes a virtual two-day workshop on *Virtual Meetings* held May 5–6, 2021 which brought together experts from both inside and outside of high-energy physics to share their experiences and practices with organizing and executing virtual workshops, and to develop possible strategies for future meetings as we begin to emerge from the COVID-19 pandemic. This report outlines some of the practices and tools that have worked well which we hope will serve as a valuable resource for future virtual meeting organizers in all scientific fields.