

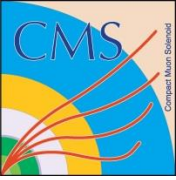
# LPC Programs and Activities

Cecilia Gerber (UIC) and Boaz Klima (Fermilab)

Abid's Visit @LPC

July 27, 2017

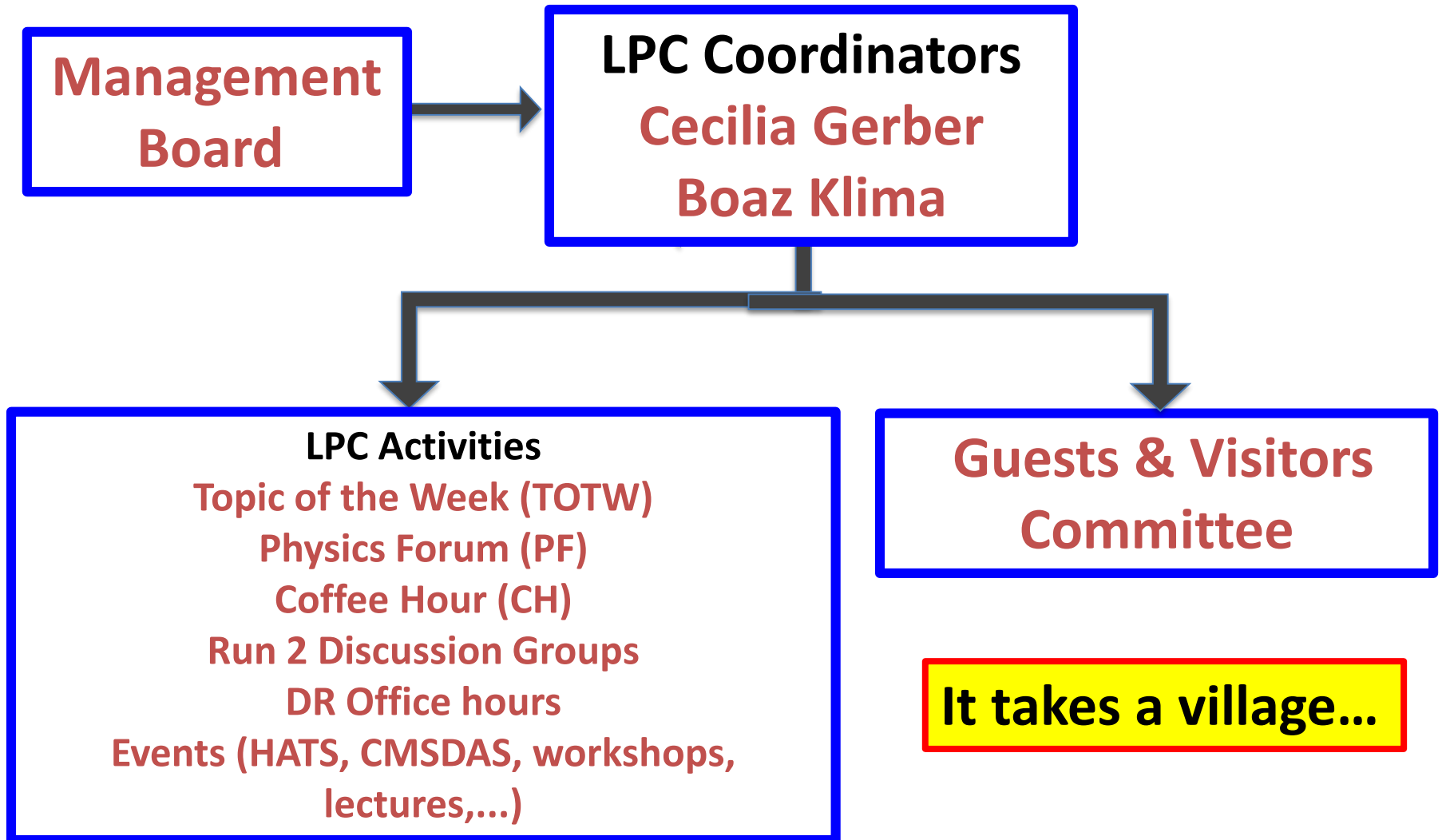




# FNAL CMS LPC

- The LPC continues to be an outstanding regional center of excellence for CMS
  - Promotes education, training, and career development
  - Serves as critical link for remote physicists to participate directly in the CMS experiment, in an economical and transparent manner.
  - Allows members to be simultaneously involved in multiple CMS-related activities (analysis, hardware, software, computing, operations)
- LPC as a Resource is being utilized for
  - “help-desk” for analysis:
  - Training: CMSDAS, HATS
  - Intellectual Exchanges & Community building: TOTW, PF, CH, DROH, CDG
  - Support for hardware/software & computing/detector operations:
    - Tracker and HCAL operations; Jet/MET, tagging, lepton ID; MC production
    - Upgrade Phase 1: FPIX, HE, HF; Upgrade Phase 2: HGCAL, Outer Tracker, Pixel
  - Support for Workshops (within CMS and with ATLAS/Theorists)
  - LPC Computing Analysis Facility (LPC-CAF)

# LPC Organization



# LPC Distinguished Researchers

- Extremely successful program, very competitive
  - Duplicated by ATLAS, Belle, and Intensity Frontier
  - Senior: Leaders in the field resident at LPC for 1 year
  - Juniors: distinguish themselves by establishing an independent research program
  - DRs selected by the MB and funded by DOE & CMS Center
  - ~20/Year, 2:1 ratio junior:senior



2017 DRs

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## Status of applications to the 2018 DR program

- Deadline for applications was June 5, 2017.
- All applications have been reviewed and rated by the entire membership of the LPC management board
- Proposal for the DR2018 program is being constructed these days by the LPC Coordinators, in consultation with Kevin and Lothar, to account for the budget uncertainty

# LPC Guests & Visitors

- Facilitate CMS collaborators to spend time at the LPC working on projects that advance, enrich, and impact the interests of the CMS experiment.
- Open to senior and junior, domestic and international, for stays ranging from weeks to months.
- G&Vs selected by the LPC G&V committee and funded by US CMS Operations Program
  - G&V contribute to physics analysis and technical aspects of CMS operations
- Call for applications twice a year, typically in February and August.
- Very successful program – highly praised by all beneficiaries; in great demand!
  - Fall 2017 applications, 19/26 junior and 3/5 senior funded

# LPC Graduate Scholars

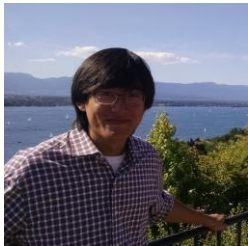
- New program, first call in 2015.
- Aimed to support exceptional Graduate Students from USCMS institutions, by allowing them to spend a year at Fermilab to pursue thesis research opportunities at the LPC
- Selected by a sub-panel of the MB
- Funded 4 GS in 2016 and 1 in 2017
- Call for applications once a year, in October

David Sheffield  
Rutgers

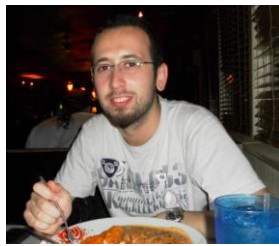


7/27/2017

Sean-Jiun  
Wang Florida



Ali Celik  
TAMU



Abid's Visit @LPC (July 2017)

Rizki Syarif  
Brown



Ryan Mueller  
TAMU



# LPC Activities

- CMS Data Analysis School (CMSDAS)
  - >100 attendees, student:facilitator 1:1
- Hands-on Advanced Tutorials (HATS)
  - ~15 events, 10-50 participants
- Topic Of The Week (TOTW)
  - Every 2 weeks, ~50 attendees
- Physics Forum (PF)
  - Every 2 weeks, ~50 attendees
- Coffee Hour (CH)
  - 1<sup>st</sup> Wed of the month, ~50 attendees
- Distinguished Researcher Office Hours (DROH) **\*NEW**
  - Every Monday, ~30 attendees
- Run 2 Discussion groups
  - 4 topics, 2/week, alternating
  - 5-20 attendees
  - LPC Computing **\*NEW**



Very popular, very well attended

Many initiated by members of the community

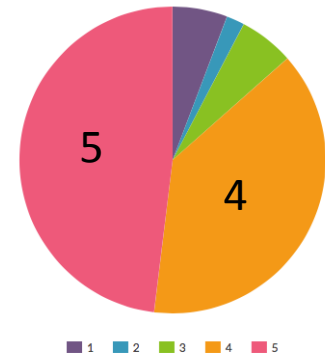
DRs and G&Vs are regularly contributing to the organization of the LPC events



# 2017 LPC CMS DAS



>100 participants  
50 students  
85% GS, 15% UG  
77% from the US  
80% new to analysis  
98% would recommend CMSDAS to others



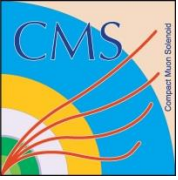
Ratings  
90% 4 or 5  
in a 1-5  
scale



7/27/2017



Abid's Visit @LPC (July 2017)



# Summer 2017 HATS (Hands-on Advanced Tutorials)

An LPC Signature Initiative Training Program, very popular and well attended

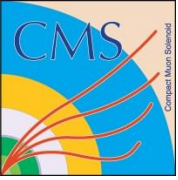
**APRIL - MAY HATS** on pyroot, histogrammar, HEP analysis in python & Machine Learning

## **JUNE HATS**

- Mon Jun 12 (1pm CDT; Sunrise) Git/GitHub HATS <https://indico.cern.ch/event/636599/>
- Tue Jun 13 (1pm CDT; Sunrise) Muon HATS <https://indico.cern.ch/event/636600/>
- Wed Jun 14 (1pm CDT; Sunrise) Jets Algorithms and Substructure (Jets I) HATS <https://indico.cern.ch/event/636602/>
- Thu Jun 15 (1pm CDT; Sunrise) MET HATS <https://indico.cern.ch/event/636603/>
- Fri Jun 16 (**12pm** CDT; Sunrise) Tau HATS <https://indico.cern.ch/event/636608/>
- Mon Jun 19 (1pm CDT; Sunrise) JEC and Pile-Up Mitigation (Jets II) HATS <https://indico.cern.ch/event/636605/>
- Tue Jun 20 (1pm CDT; Sunrise) Electron/Photon (Session I) HATS <https://indico.cern.ch/event/636606/>
- Wed Jun 21 (1pm CDT; Sunrise) Electron/Photon (Session II) HATS <https://indico.cern.ch/event/636607/>
- Fri Jun 23 (**12pm** CDT; Sunrise) Trigger HATS <https://indico.cern.ch/event/636604/>
- Mon Jun 26 (1pm CDT; Sunrise) CRAB3 HATS <https://indico.cern.ch/event/636609/>
- Tue Jun 27 (1pm CDT; Sunrise) Generators HATS <https://indico.cern.ch/event/636611/>
- Wed Jun 28 (1pm CDT; Sunrise) Visualization HATS <https://indico.cern.ch/event/636612/>

## **JULY HATS**

- Mon Jul 24 (1pm CDT; Sunrise) Multivariate Analysis Techniques HATS <https://indico.cern.ch/event/636614/>
- Tue Jul 25 (1pm CDT; Sunrise) Tracking and Vertexing HATS <https://indico.cern.ch/event/636615/>
- Wed Jul 26 (1pm CDT; Sunrise) B-tagging HATS <https://indico.cern.ch/event/636616/>



# Summer 2017 HATS (Hands-on Advanced Tutorials)

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**APRIL - MAY HATS** on pyroot, histogrammar, HEP analysis in python & Machine Learning

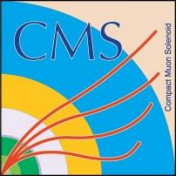
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- Fri Jun 16 (**12pm** CDT; Sunrise) Tau HATS <https://indico.cern.ch/event/636604/>
- Mon Jun 19 (1pm CDT; Sunrise) JEC and Pile-Up Mitigation (JEC) HATS <https://indico.cern.ch/event/636605/>
- Tue Jun 20 (1pm CDT; Sunrise) Electron/Photon (Session 1) HATS <https://indico.cern.ch/event/636606/>
- Wed Jun 21 (1pm CDT; Sunrise) Electron/Photon (Session 2) HATS <https://indico.cern.ch/event/636607/>
- Fri Jun 23 (**12pm** CDT; Sunrise) Trigger HATS <https://indico.cern.ch/event/636604/>
- Mon Jun 26 (1pm CDT; Sunrise) Calorimeter HATS <https://indico.cern.ch/event/636609/>
- Tue Jun 27 (1pm CDT; Sunrise) Missing Energy HATS <https://indico.cern.ch/event/636611/>
- Wed Jun 28 (1pm CDT; Sunrise) Data Visualization HATS <https://indico.cern.ch/event/636612/>

Done! Very popular; very successful!

## JULY HATS

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- Wed Jul 26 (1pm CDT; Sunrise) B-tagging HATS <https://indico.cern.ch/event/636616/>



# Summary of LPC Activities (1 Year\*: May 2016-May 2017)

- CMSDAS – 1
- Workshops – 6
- Hands-on Advanced Tutorial Sessions (HATS) – 19
- Topic of the week – 21
- Physics Forum – 12
- Coffee Hour – 9
- Special Lecture Series – 6
- Other - 1
- Bi-weekly discussion groups on:
  - b/t/H/W/Z tagging
  - Jets (including substructure), Missing Et, pileup, and
  - Triggers, lepton ID (e/mu/tau)
  - LPC Computing

\* Does not include events during June/July 2017, e.g. 20 HATS

# LPC Support – behind the scenes



Gabriele Benelli  
Analysis &  
Events Support



Marguerite Tonjes  
Computing Support  
& Documentation

## LPC admin staff



Carrie Farver



Terry Grozis



Terry Read



Sonya Wright

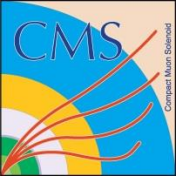
# Near Future Activities

- Announced regularly
- Available from (the bottom of) our main web page at <http://lpc.fnal.gov/>

## Upcoming Events at the LPC

- See latest Bulletin at <http://lpc.fnal.gov/bulletin/LPCbulletin.shtml>





# Backup

# Events from May 2016

Event Name	Event Type	Date	Facilitators	Participants
<i>ATLAS Higgs physics prospects and the FTK system</i>	TOTW	5/3/2016	Lauren Tompkins (Stanford University)	50
<i>The Physics of Detectors (Part 1)</i>	Special Lecture Series	5/4/2016	Roger Rusack (University of Minnesota)	100+
<i>Pixels in Space</i>	Coffee Hour	5/4/2016	Marcelle Soares-Santos (Fermilab) and Brenna Flaughter (Fermilab)	40
<i>The Physics of Detectors (Part 2)</i>	Special Lecture Series	5/5/2016	Roger Rusack (University of Minnesota)	80+
<i>Jet Substructure</i>	PF	6/5/2016	Jesse Thaler (MIT)	50
<i>The Physics of Detectors (Part 3)</i>	Special Lecture Series	5/11/2016	Roger Rusack (University of Minnesota)	60+
<i>The Physics of Detectors (Part 4)</i>	Special Lecture Series	5/12/2016	Roger Rusack (University of Minnesota)	60+
<i>Configure, Start, Running... physics! The run-time operation of the Compact Muon Solenoid detector</i>	Other	5/25/2016	Gregory Rakness (Fermilab)	58
HCAL	HATS	5/25/2016	Keti Kaadze (Kansas State University), Jim Hirschauer (Fermilab), Jim Freeman (Fermilab), Joe Pastika (Baylor University), Andrew Whitbeck (Fermilab), Danny Noonan (Florida Institute of Technology)	40
<i>Dissecting Jets and Missing Energy Searches</i>	TOTW	5/31/2016	Nhan Tran (Fermilab)	
<i>Git/GitHub</i>	HATS	6/6/2016	Kevin Pedro (Fermilab), Lindsey Gray (Fermilab), Christopher Jones (Fermilab)	45
<i>The LHC</i>	Special Lecture Series	6/7/2016	Roger Rusack (University of Minnesota)	30
<i>Trigger</i>	HATS	6/7/2016	Dominick Olivito (UC San Diego), Leonard Apanasevich (UI Chicago), Jingyu Zhang (UI Chicago), Zhenbin Wu (UI Chicago)	30
<i>CMS 101</i>	Special Lecture Series	6/8/2016	Roger Rusack (University of Minnesota)	35
<i>Electron/Photon (Session 1)</i>	HATS	6/8/2016	Lindsey Gray (Fermilab), Lovedeep Kaur Saini (Kansas State University), Marc Gabriel Weinberg (Florida State University), Varun Sharma (University of Delhi)	28
<i>Multivariate Analysis Techniques</i>	HATS	6/9/2016	Caterina Vernieri (Fermilab), Harry Prosper (Florida State University), Matthew Walker (Rutgers)	42
<i>Electron/Photon (Session 2)</i>	HATS	6/10/2016	Lindsey Gray (Fermilab), Lovedeep Kaur Saini (Kansas State University), Marc Gabriel Weinberg (Florida State University), Varun Sharma (University of Delhi)	25
<i>CMS Connect</i>	Tutorial	6/17/2016	Kenyi Paolo Hurtado Anampa (University of Notre Dame)	16
<i>BSM Higgs discovery via exotic decay</i>	TOTW	06/21/2016	Shufang Su (University of Arizona)	40
<i>Tau</i>	HATS	06/27/2016	Abdollah Mohammadi (Kansas State University), Edward Laird (Brown University), Zaixing Mao (Brown University)	14
<i>Muon</i>	HATS	06/28/2016	Nicola De Filippis (Politecnico and INFN Bari), Shawn Gregory Zaleski (Wayne State University)	14



# Events from May 2016

Event Name	Event Type	Date	Facilitators	Participants
<i>Jets Algorithms and Substructure</i>	HATS	06/29/2016	<i>James Dolen (State University of New York), Ben Kreis (Fermilab), Alexx Perloff (Texas A&amp;M University), Justin Pilot (UC Davis)</i>	28
<i>Jet Energy Corrections and Pile-Up Mitigation</i>	HATS	06/30/2016	<i>James Dolen (State University of New York), Ben Kreis (Fermilab), Alexx Perloff (Texas A&amp;M University), Justin Pilot (UC Davis)</i>	28
<i>An Introduction to the Mu2e Experiment The Mu2e Tracker</i>	PF	07/07/2016	<i>Andrei Gaponenko (Fermilab) Marjorie Corcoran (Rice)</i>	25
<i>Precision Timing for Collider Experiments</i>	TOTW	07/26/2016	<i>Si Xie (CalTech)</i>	42
<i>Tracking and Vertexing</i>	HATS	07/27/2016	<i>Gabriele Benelli (Brown University), Caterina Vernieri (Fermilab), Matthew Walker (Rutgers)</i>	16
<i>B-Tagging</i>	HATS	08/02/2016	<i>Ivan Marchesini (University of Hamburg), Caterina Vernieri (Fermilab), Matthew Walker (Rutgers)</i>	25
<i>Why it should be called The Compact Photon Solenoid</i>	TOTW	08/04/2016	<i>Andrew Askew (Florida State University)</i>	11
<i>Collider dark matter: Where we stand after ICHEP</i>	Coffee Hour	08/15/2016	<i>Phil Harris (CERN)</i>	40
<i>Signatures of Flavorful Higgs Bosons</i>	TOTW	08/16/2016	<i>Stefania Gori (University of Cincinnati)</i>	40
<i>UK vs US science - similarities and differences</i>	Coffee Hour	08/17/2016	<i>Ian Shipsey (Oxford University)</i>	42
<i>Vector-Like Quarks (VLQs): Past, Present, Future Computing for Data Analysis</i>	PF	08/18/2016	<i>Sadia Khalil (Kansas State University) Jim Pivarski (Princeton)</i>	35
<i>Understanding Hadronisation at Proton-Proton Colliders</i>	TOTW	08/23/2016	<i>Peter Skands (Monash University)</i>	35
<i>Looking Forward from ICHEP2016</i>	TOTW	08/31/2016	<i>Chris Quigg (Fermilab)</i>	50
<i>Searching for new physics using muons - the Fermilab Muon g-2 and Mu2e experiments</i>	TOTW	09/13/2016	<i>Doug Glenzinski (Fermilab)</i>	30
<i>Beyond Leading Order Calculations on HPCs</i>	Special Workshop	09/22/2016 09/23/2016	<i>Taylor Childers (Argonne National Laboratory) Elizabeth Sexton-Kennedy (Fermilab)</i>	31
<i>SUSY (including pMSSM)</i>	TOTW	09/27/2016	<i>Carlos Wagner (University of Chicago)</i>	60

# Events from May 2016

Event Name	Event Type	Date	Facilitators	Participants
<i>Studies related to gender and geographic diversity in the ATLAS Collaboration</i>	<i>Coffee Hour</i>	09/28/2016	<i>Beate Heinemann (DESY and University of Freiburg)</i>	40
<i>HCAL DPG at the LPC</i>	<i>Special Workshop</i>	09/29/2016 09/30/2016	<i>Kenichi Hatakeyama (Baylor University) and John Paul Chou (Rutgers University)</i>	38
<i>B physics in CMS, 4-lepton low mass excess B hadron lifetime measurement</i>	<i>PF</i>	10/06/2016	<i>Kai Yi (University of Iowa) Jhovanny Mejia (CINVESTAV)</i>	26
<i>EWK SUSY from ATLAS</i>	<i>TOTW</i>	10/12/2016	<i>Ben Hooberman</i>	32
<i>INFIERI 8th workshop</i>	<i>Special Workshop</i>	10/17/2016 10/21/2016	<i>Petra Merkel (Fermilab) Aurore Savoy-Navarro (LPNHE, U. P. et M. Curie, CNRS-IN2P3)</i>	63
<i>Higgs Exotic, displaced</i>	<i>TOTW</i>	10/18/2016	<i>Jessie Shelton (University of Illinois at Urbana-Champaign)</i>	35
<i>Light dark matter and LDMX</i>	<i>PF</i>	10/20/2016	<i>Phillip Schuster (SLAC)</i>	35
<i>Maximizing di-Higgs</i>	<i>TOTW</i>	10/25/2016	<i>Felix Yu (University of Mainz)</i>	40
<i>CRAB3</i>	<i>HATS</i>	10/26/2016	<i>Marco Mascheroni (Fermilab), Alexx Perloff (Texas A&amp;M), Eric Vaandering (Fermilab)</i>	26
<i>Phase 2 Readiness for Physics with Full Simulation at the LPC</i>	<i>Special Workshop</i>	10/27/2016 10/28/2016	<i>Patrizia Azzi (INFN Padova), Meenakshi Narain (Brown University)</i>	50
<i>Probing New Physics with Higgs</i>	<i>Coffee Hour</i>	10/31/2016	<i>Zhen Liu (Fermilab)</i>	33
<i>Dimuon 29 GeV excess: models &amp; techniques</i>	<i>PF</i>	11/03/2016	<i>Nathaniel Odell (Northwestern University)</i>	33
<i>Soft objects for new physics</i>	<i>TOTW</i>	11/22/2016	<i>Markus Stoye (CERN)</i>	22
<i>LHC as a Photon Collider, Results from Atlas (and CMS)</i>	<i>TOTW</i>	11/29/2016	<i>Larry Nodulman (Argonne National Laboratory)</i>	30
<i>Jet parton showering modeling and substructure</i>	<i>PF</i>	11/30/2016	<i>Stefan Prestel (Fermilab)</i>	50
<i>Jet Substructure 'Planning for the future'</i>	<i>Special Workshop</i>	11/30/2016 11/31/2016	<i>Robin Erbacher (UC Davis), Justin Pilot (UC Davis)</i>	52
<i>Data plumbing: managing large datasets</i>	<i>Coffee Hour</i>	12/14/2016	<i>Jim Pivarski (Princeton)</i>	35

# Events from May 2016

Event Name	Event Type	Date	Facilitators	Participants
<b>CMSDAS</b>	<b>School</b>	<b>1/9/2017 - 1/13/2017</b>	<b>62 facilitators, 7 speakers</b>	<b>48+62</b>
<i>Radiation Damage in Plastic Scintillator</i>	<i>TOTW</i>	<i>1/17/2017</i>	<i>Sarah Eno (U. Maryland)</i>	<i>45</i>
<i>Tau Leptons at CMS B Jets at CMS</i>	<i>PF</i>	<i>1/19/2017</i>	<i>Isobel Ojalvo (Princeton) Caterina Vernieri (Fermilab)</i>	<i>30</i>
<i>(3<sup>rd</sup>) Fast Simulation Days</i>	<i>Workshop</i>	<i>2/13/2017 – 2/14/2017</i>	<i>Kevin Pedro (Fermilab) Sezen Sekmen (Kyungpook National University)</i>	<i>28</i>
<i>Looking under the Higgs Lamppost</i>	<i>Coffee Hour</i>	<i>2/22/2017</i>	<i>Marcela Carena (Fermilab) Zhen Liu (Fermilab)</i>	<i>40</i>
<i>Current HEP accelerator landscape and challenges of future machines</i>	<i>Coffee Hour</i>	<i>3/1/2017</i>	<i>Vladimir Shiltsev (Fermilab)</i>	<i>40</i>
<i>New results from AMS</i>	<i>PF</i>	<i>3/9/2017</i>	<i>Dan Hooper (Fermilab)</i>	<i>30</i>
<i>LHC signals for Singlet Neutrinos from a Natural Warped Seesaw</i>	<i>PF</i>	<i>3/23/2017</i>	<i>Kaustubh Agashe (U. Maryland)</i>	<i>35</i>
<i>Cosmology and Particle Physics</i>	<i>Coffee Hour</i>	<i>4/11/2017</i>	<i>Dan Green (Fermilab)</i>	<i>40</i>
<i>Cornering Natural SUSY at Run II of the LHC and Beyond</i>	<i>TOTW</i>	<i>4/14/2017</i>	<i>David Shih (Rutgers)</i>	<i>50</i>
<i>Higgs Measurements in LHC Run 2</i>	<i>TOTW</i>	<i>4/18/2017</i>	<i>Andrei Gritsan (Johns Hopkins University)</i>	<i>40</i>
<i>PyROOT and rootpy</i>	<i>HATS</i>	<i>4/19/2017</i>	<i>Ashley Parker (SUNY Buffalo), Jim Pivarski (Princeton), John Hakala (Brown U.), Mauro Verzetti (Rochester)</i>	<i>49</i>
<i>HEPcloud</i>	<i>PF</i>	<i>4/20/2017</i>	<i>Burt Holzman (Fermilab)</i>	<i>40</i>
<i>ttH and Single Top + Higgs</i>	<i>TOTW</i>	<i>4/25/2017</i>	<i>Chris Neu (U. Virginia)</i>	<i>35</i>
<i>Histogrammar</i>	<i>HATS</i>	<i>4/26/2017</i>	<i>Jim Pivarski (Princeton)</i>	<i>27</i>
<i>HEP Analysis in the Python Ecosystem</i>	<i>HATS</i>	<i>4/27/2017</i>	<i>Jim Pivarski (Princeton)</i>	<i>28</i>
<i>HEP.TrkX Project: deep learning for CMS tracking</i>	<i>PF</i>	<i>5/4/2017</i>	<i>Dustin Anderson (CalTech)</i>	<i>20</i>
<i>New Physics from Standard Model Measurements</i>	<i>TOTW</i>	<i>5/9/2017</i>	<i>Josh Ruderman (New York U.)</i>	
<i>Machine Learning I</i>	<i>HATS</i>	<i>5/15/2017</i>	<i>Josh Bendavid (CalTech), Javier Duarte (Fermilab), Julie Hogan (Brown U.), Andrew Melo (Vanderbilt U.), Maurizio Pierini (CERN), Jim Pivarski (Princeton), Caterina Vernieri (Fermilab), Jean-Roch Vlimant (CalTech)</i>	<i>40+</i>
<i>Machine Learning II</i>	<i>HATS</i>	<i>5/16/2017</i>	<i>Josh Bendavid (CalTech), Javier Duarte (Fermilab), Julie Hogan (Brown U.), Andrew Melo (Vanderbilt U.), Maurizio Pierini (CERN), Jim Pivarski (Princeton), Caterina Vernieri (Fermilab), Jean-Roch Vlimant (CalTech)</i>	<i>40+</i>
<i>NOvA and DUNE</i>	<i>TOTW</i>	<i>5/17/2017</i>	<i>Ryan Patterson (CalTech)</i>	