LPC Report

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LPC CAF

- LPC-CMS Analysis Facility (CAF) is the main USCMS analysis computing infrastructure
  - Used by ~70% of U.S. CMS and many in CMS.
  - ~ 150 active users
  - 750 people with user accounts
  - Most users are not stationed at Fermilab
- Funded by the US CMS Operations Program
- Operated by the Fermilab Scientific Computing Division (SCD)
- Support of the computing resources and the user community is shared between SCD and LPC support staff

LPC CAF

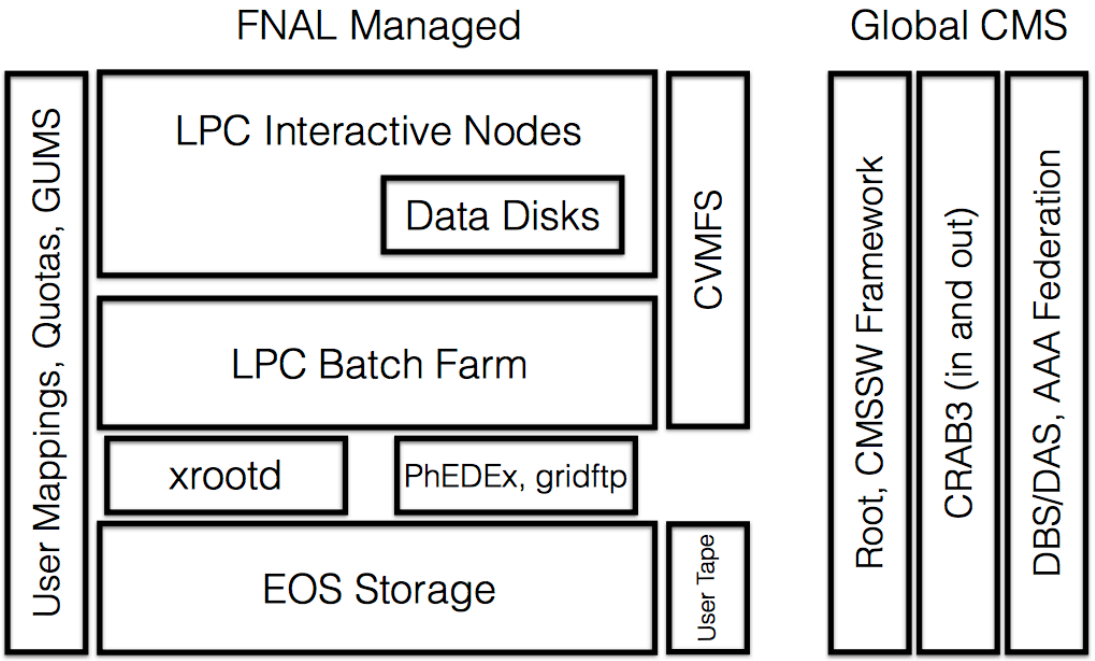
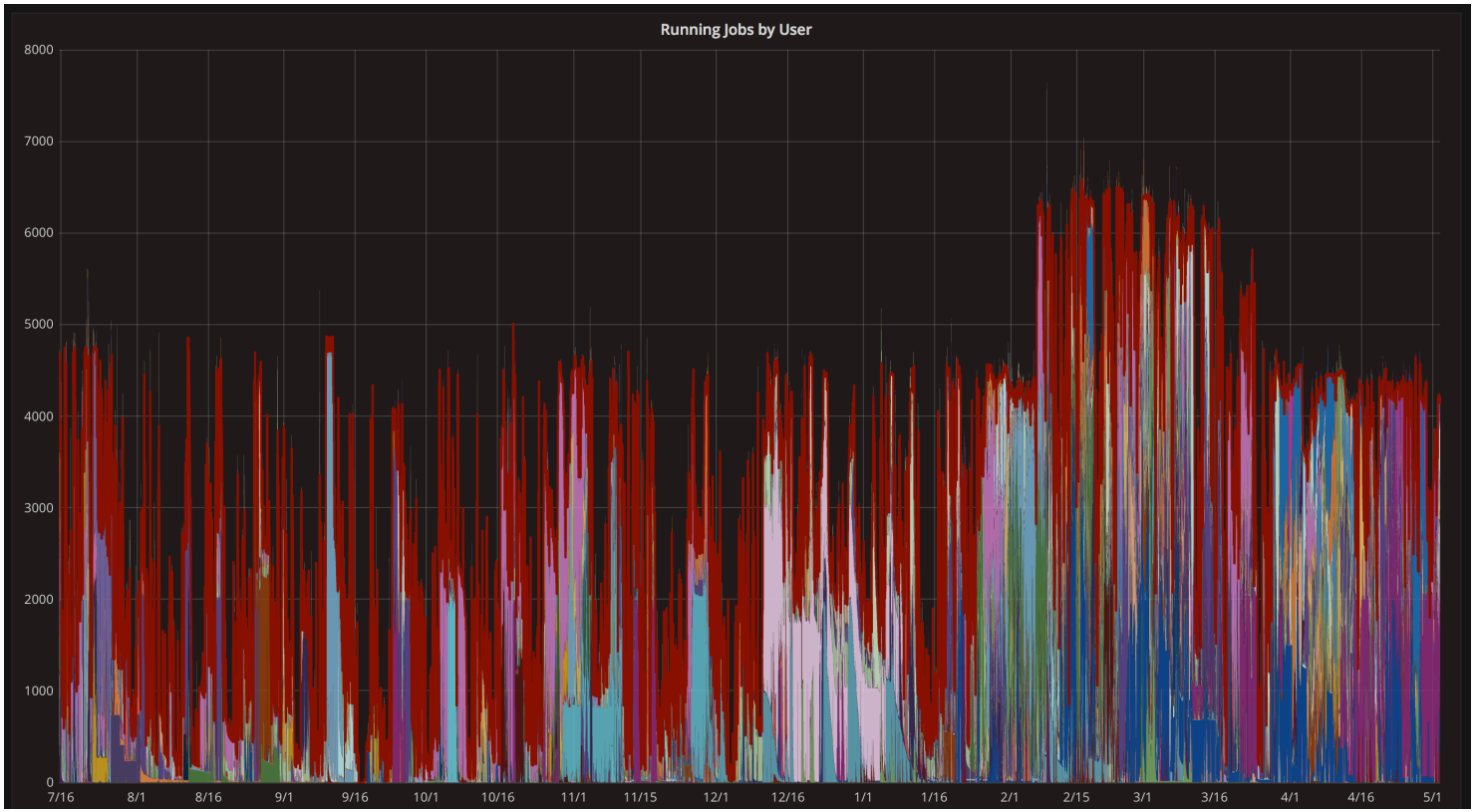


Figure 1: Functional diagram of LPC CAF.

The U.S. CMS Tier-1 manager can request that batch resources be migrated between the Tier-1 facility and the LPC CAF

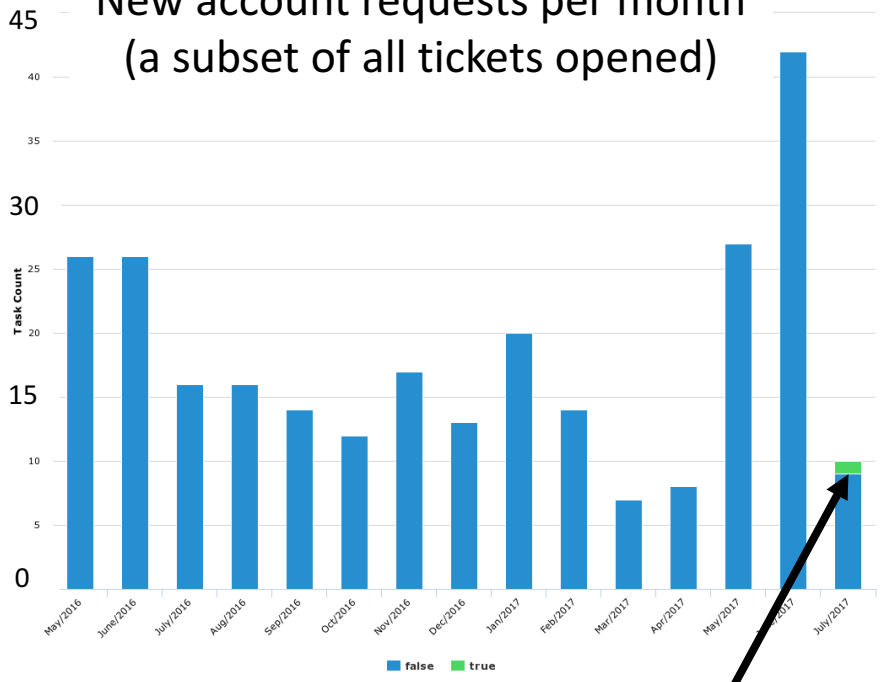
LPC batch system usage



In the run-up to winter conferences, the LPC batch system used resources roughly equivalent to Run1 FNAL T1

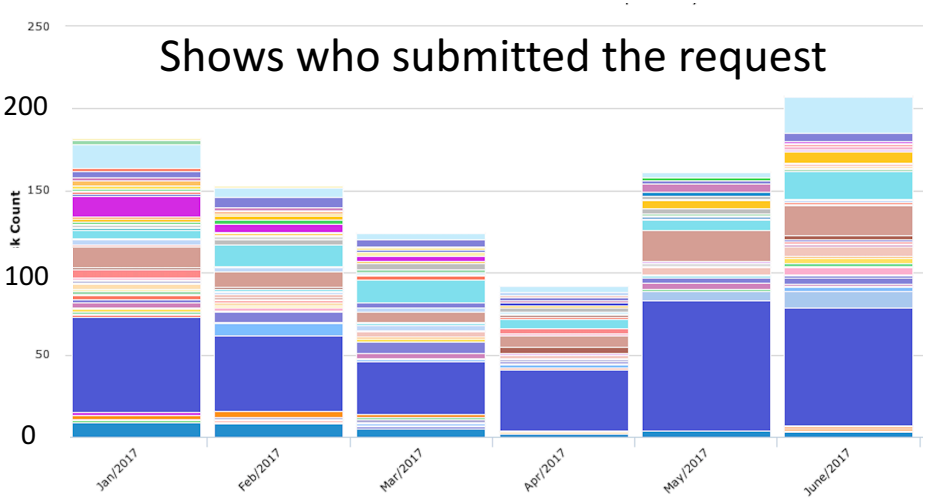
Tickets per month

New account requests per month
(a subset of all tickets opened)

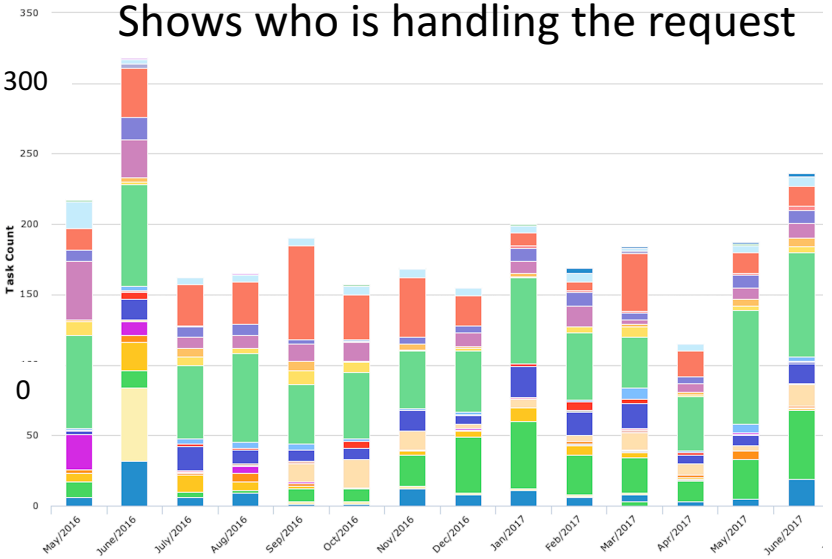


Requests in green are waiting for user to go (in person) to the User's office at Fermilab.

Shows who submitted the request

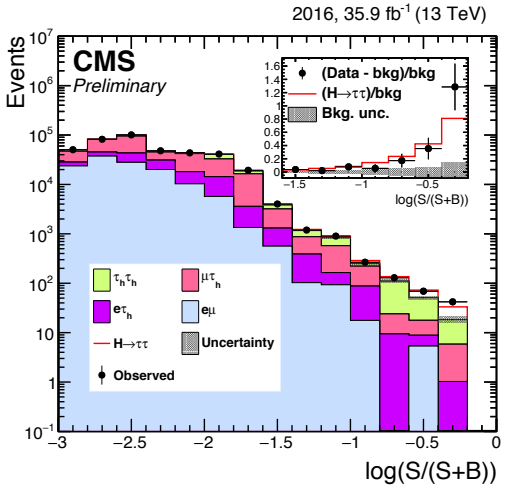


Shows who is handling the request

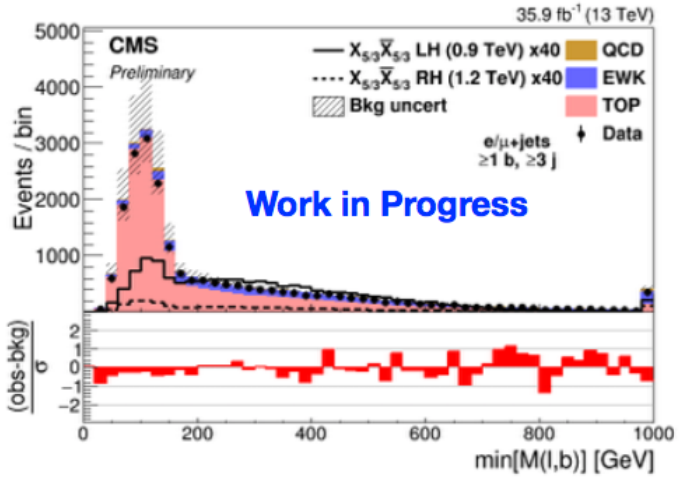


Selected Physics Results by LPC authors

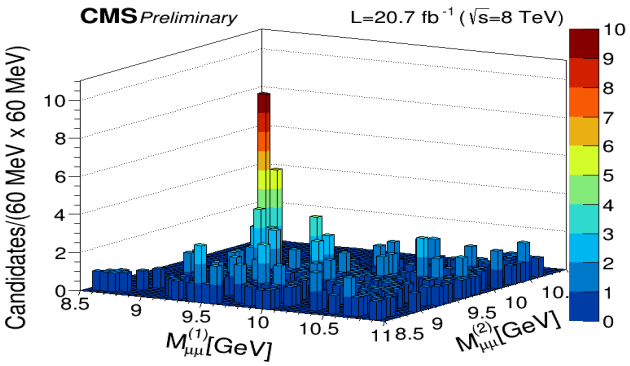
SM H→ $\tau\tau$, 4.9σ



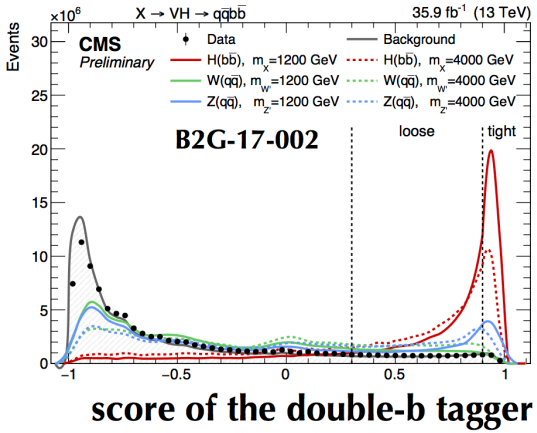
Exotic tops with q=5/3



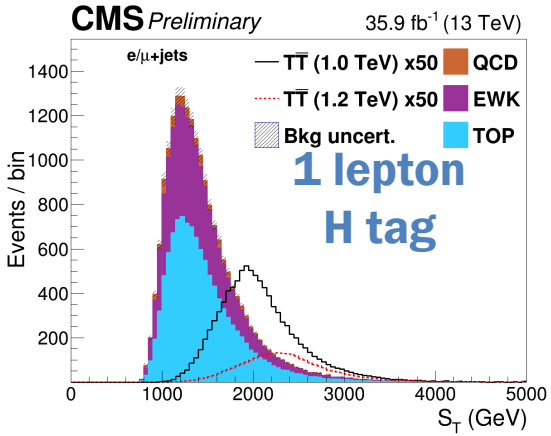
Observation of double Upsilon production



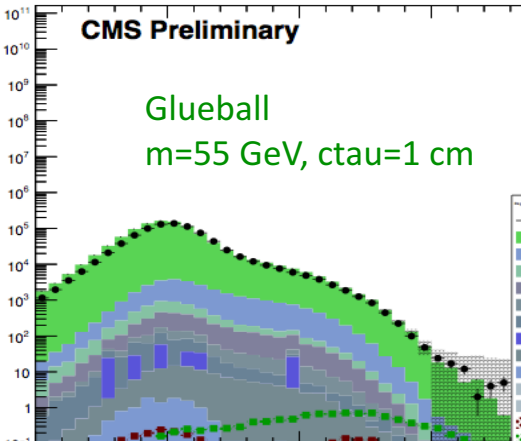
Double-b subjet tagging



TT inclusive search



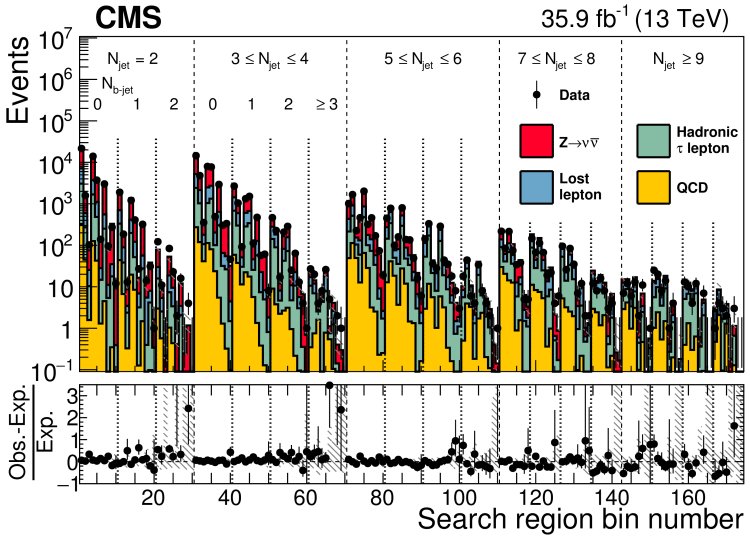
H to long lived particles



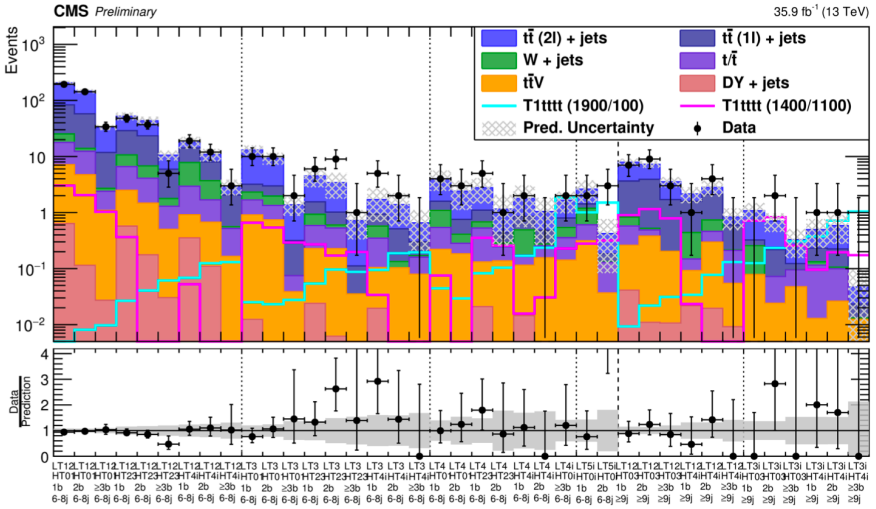
Displaced jet tagging significance

Selected Physics Results by LPC authors

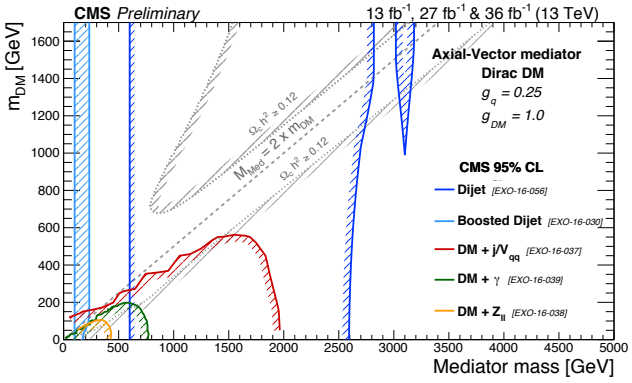
RA2/b: Hadronic SUSY Search



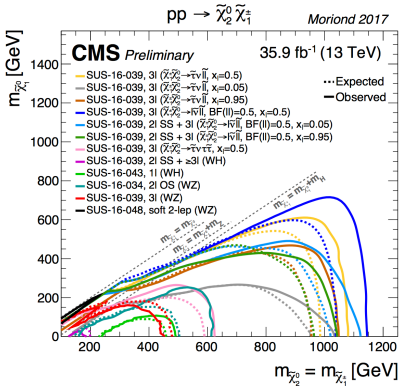
Single Lepton Gluino Search



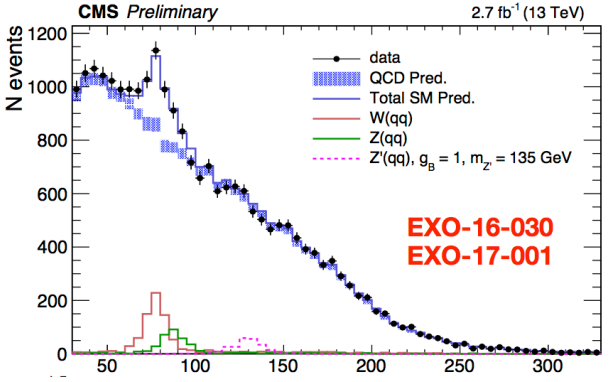
Dijet and MET + X, DM Mediator



EW prod. charginos & neutralinos



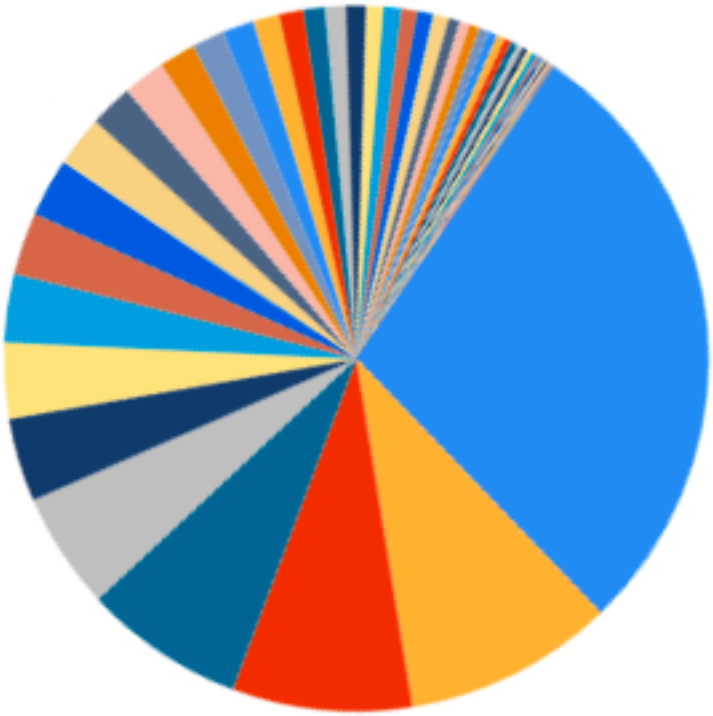
Light hidden resonances



LPC Metrics

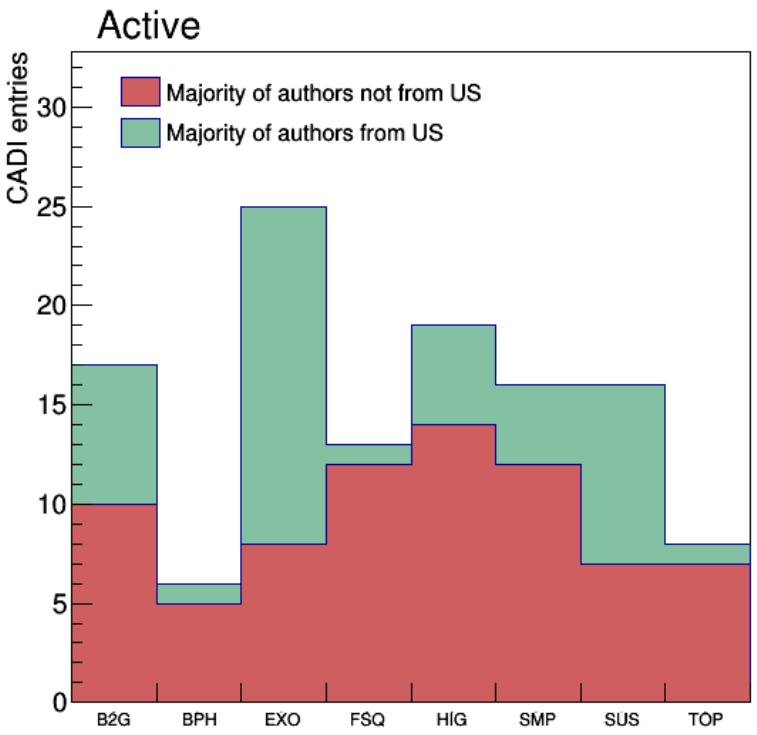
- Updated May 2017
- Information extracted from CMS analysis CADI lines with year 2015 and later
- 4 categories for people counted
  - non US, US = (US-LPC + US-nonLPC)
  - Association with LPC taken from 2016 LPC survey and cross-checked/complemented by DRs, G&Vs, and office occupants from US institutions only
  - Majority means $\geq$ 50%

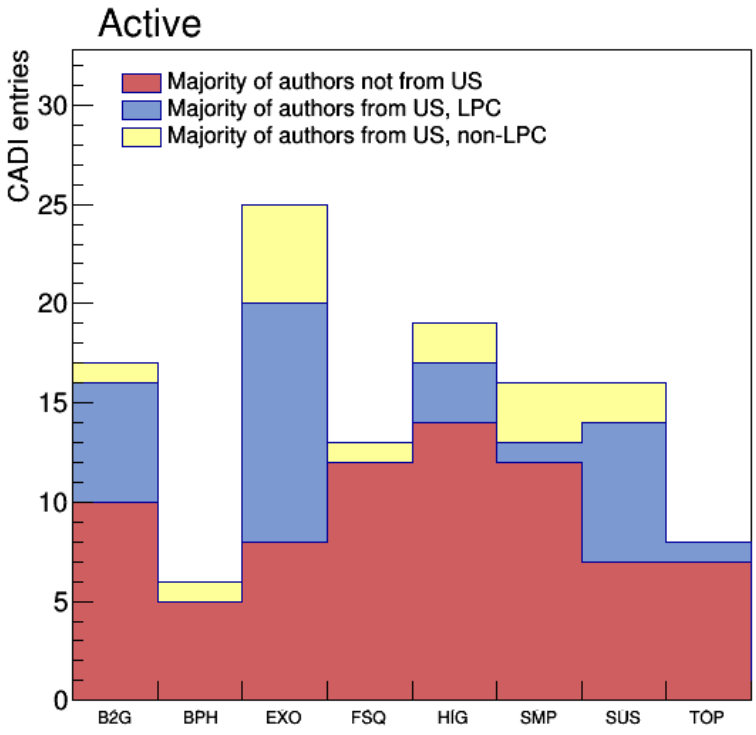
CMS Participation per Country



- United States – 30%
- Italy - 10%
- Germany – 8%
- CERN – 7%
- Russian Federation – 5%
- France – 4%
- India – 3.5%
- United Kingdom – 3%
- Belgium – 3%

Authors for “ACTIVE” CADI lines





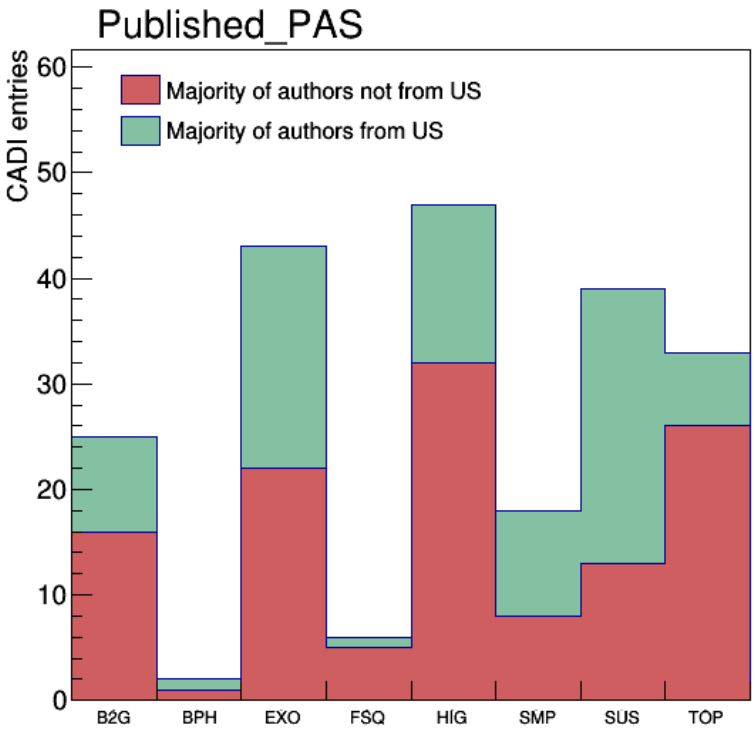
All: 120, USCMS: 45, USCMS/All: 37.5%

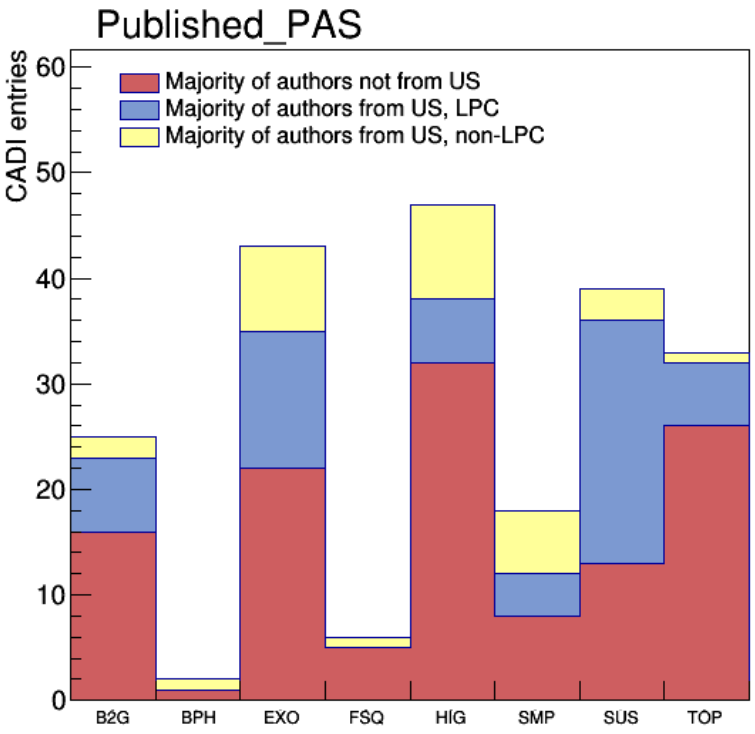
LPC: 30, LPC/USCMS: 67%

non US US US-LPC US-nonLPC

Majority means $\geq$ 50%

Authors for “Published” CADI lines





All: 213, USCMS: 90, USCMS/All: 42%

LPC: 59, LPC/USCMS: 66%

non US US US-LPC US-nonLPC

Majority means $\geq$ 50%

Shifts at the Fermilab ROC

- Starting in 2017, the LPC brought back the opportunity to get central shift credits equivalent to P5 shifts while being stationed at the LPC

- FNAL ROC is running 1 tracker offline shift per day since May
  - Support/training currently handled by Gabriele Benelli

- HCAL offline shifts are also available at the LPC during the summer (June-August)
  - Support by S. Kunori and the TTU group.
  - May continue throughout 2017 depending on the availability of shifters at Fermilab

New Initiative: Statistical Methods Class

- Starting September 2017, the LPC will host a statistical methods class co-taught by Ulrich Heintz (Brown) and Harrison Prosper (FSU)

- The plan is to link concepts to concrete real-world examples that students will be required to work through
  - Students will not be allowed to use canned programs (except for basic things like Minuit)
  - Students will learn to perform their own statistical analyses from scratch
  - However, at the end of the course, experts will teach students how to use tools such as RooFit, theta, etc
- Students will be given homework , and could arrange to get credit in their home institutions
- Registration opened on Tuesday, 18 students registered within 1 hour of the posting of the message

Statistics for Particle Physicists

Fermilab LPC, Fall 2017

Course Description: This course provides an introduction to statistics for graduate students in particle physics. However, for completeness, and given that probability is the foundation of statistics, the course begins with a discussion of probability following a brief introduction that sets the stage.

We shall assume no familiarity with statistical concepts. Therefore, we shall be careful to define every concept we introduce, careful to use terms correctly (unless doing so impairs clarity), and we shall develop the concepts and arguments in detail, but erring always on the side of clarity. If, by the end of the course, you have diligently worked through all of the examples on your own—or in good faith collaboration with your fellow students, you should be able to perform your own statistical calculations essentially from scratch. Of course, we would not expect you to write your own version of `Minuit` (a program created by CERN scientist Fred James for minimizing functions)! But, we would expect you to be able to replicate results of the standard statistics packages using your own program, at least for a few of the standard problems in particle physics. If you are able to do this by the end of this course, we shall have succeeded.

Prerequisites: College-level algebra, calculus, a modicum of residue theory, and basic programming skills. (If you do not know how to code, learning `Python` is easy and highly recommended. Also, a knowing a bit of the CERN package `Root` would be extremely handy.)

Course Twiki: This syllabus and other information about this course as well as course materials can be found at .....

Grading: The only way to master something is to do it yourself. Consequently, homework is a vital component of this course. Your course grade is determined solely by the quality of your graded homework. Some may entail filling in details omitted in class or working through problems, while others will require writing and executing your own program to solve a statistical analysis problem. Wherever possible, we shall use real readily available data. There are no exams.

Instructors: Professor Ulrich Heintz (Brown) and Professor Harrison Prosper (FSU).

Topics:

Statistics is a huge subject, which, like physics, requires a great many years to wrap your head around. Since we have a matter of weeks, we have to make choices. The topics we have chosen are intended to provide a good balance between giving you a firm conceptual foundation and a working knowledge of standard statistical results and methods. Throughout, we use real-world examples from particle physics (and one from cosmology) to illustrate the concepts and methods.

DRAFT

Future

- If ain't broke, don't fix it…
- Nevertheless,
  - we will continue to entertain new ideas
  - monitor the interest and participation in all activities and programs
  - foster collaboration with instrumentation initiatives (Phase 1 and Phase 2), software and computing initiatives, and detector operations to ensure proper participation in all aspects of the experiment

- A strong LPC empowers its members to improve their productivity, which in turn benefits CMS as a whole
- We will continue to work in close coordination with the management of CMS, USCMS, and Fermilab to maximize the opportunities for our colleagues

Thank you!

Backup

LPC Management Board

- Juan Alcaraz Maestre (CIEMAT, Madrid, CMS Physics Coord)
- Guenther Dissertori (ETH, Zurich)
- Sarah Eno (Maryland)
- Robin Erbacher (UC-Davis)
- Cecilia E. Gerber (UIC, Chair)
- Eva Halkiadakis (Rutgers)
- Sergo R Jindariani (FNAL)
- Boaz Klima (FNAL, Chair)
- Harrison Prosper (Florida State)
- Greg Snow (Nebraska, USCMS)
- Lenny Spiegel (FNAL)

LPC Guests & Visitors Committee

- Andrew Askew (Florida)
- Sridhara Dasu (Wisconsin)
- Avto Kharchilava (SUNY-Buffalo, Chair)
- Yurii Maravin (Kansas State)
- Jane Nachtman (Iowa)
- Marco Verzocchi (FNAL)

LPC Events Committee

- Gabriele Benelli (Brown, Chair)
- Jim Dolen (SUNY Buffalo)
- Ben Kreis (FNAL, Chair)
- Andreas Jung (Purdue)
- Abdollah Mohammadi (Kansas State)
- Justin Pilot (UC Davis)
- Marco Trovato (Northwestern)
- Hannsjorg Weber (FNAL)

LPC Topic of the Week Committee

- Jamie Antonelli (OSU, Chair)
- Anadi Canepa (FNAL)
- Paddy Fox (FNAL, Theorist)
- Ulrich Heintz (Brown, Chair)
- Zhen Liu (FNAL, Theorist)
- Bjoern Penning (University of Bristol)
- Alexander Schmidt (University of Hamburg)
- Caterina Vernieri (FNAL)

LPC Physics Forum

- Matteo Cremonesi (FNAL)
- Julie Hogan (Brown)
- Ketino Kaadze (KSU)
- Sudhir Malik (Puerto Rico)

LPC Coffee Hour

- Sergo Jindariani (FNAL)
- Kaori Maeshima (FNAL)
- Giovanni Zevi Della Porta (UCSD)