

The LHC Physics Center at FNAL



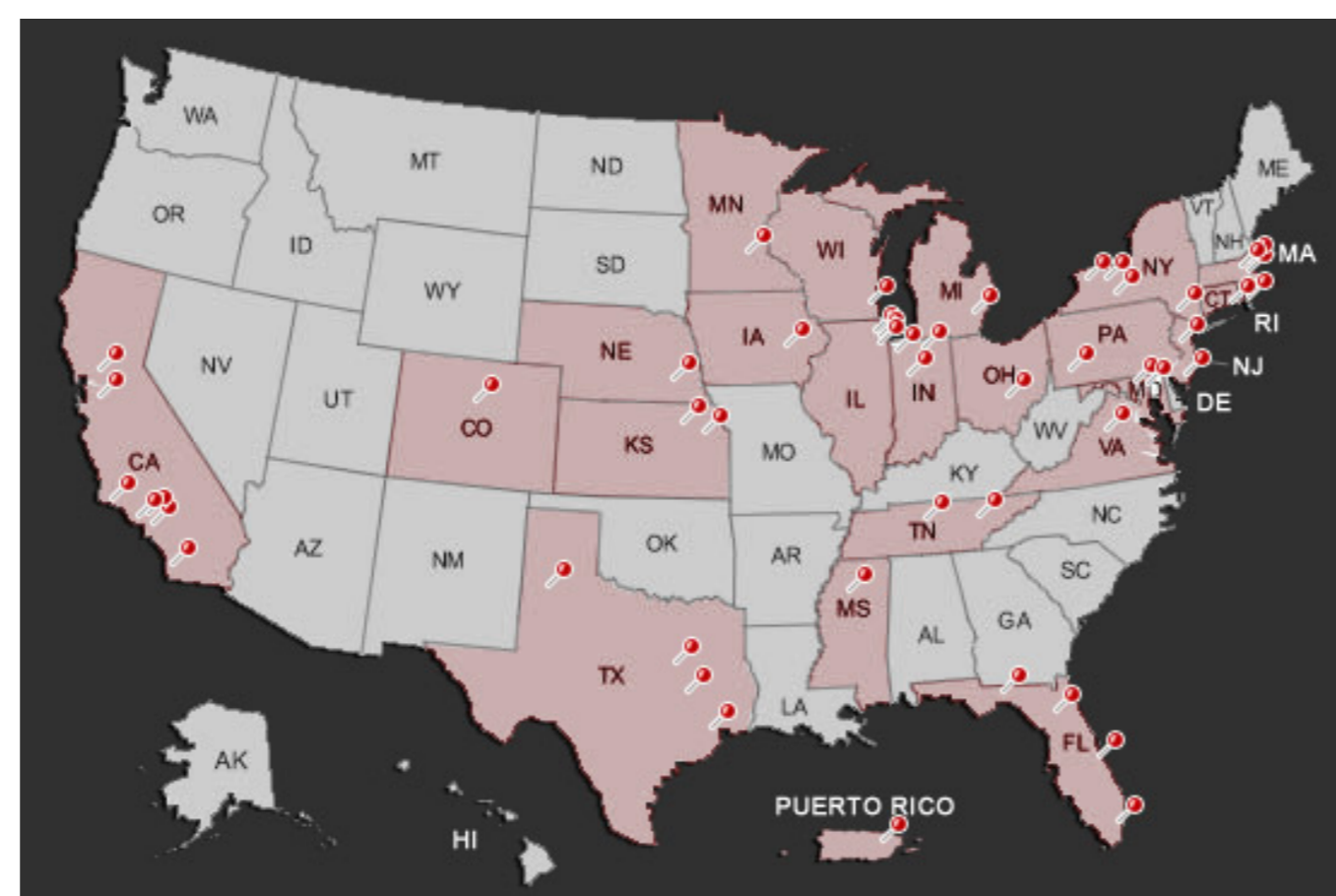
The LPC is the local (US) center of excellence for CMS physics

The LPC serves as a critical link for remote physicists to participate directly in the CMS experiment effectively, economically and transparently.

More than 350 users and 100 residents

LPC users directly contributed to 50% of ~200 CMS publications

The LPC is a way to attain critical mass for 50 U.S. university groups



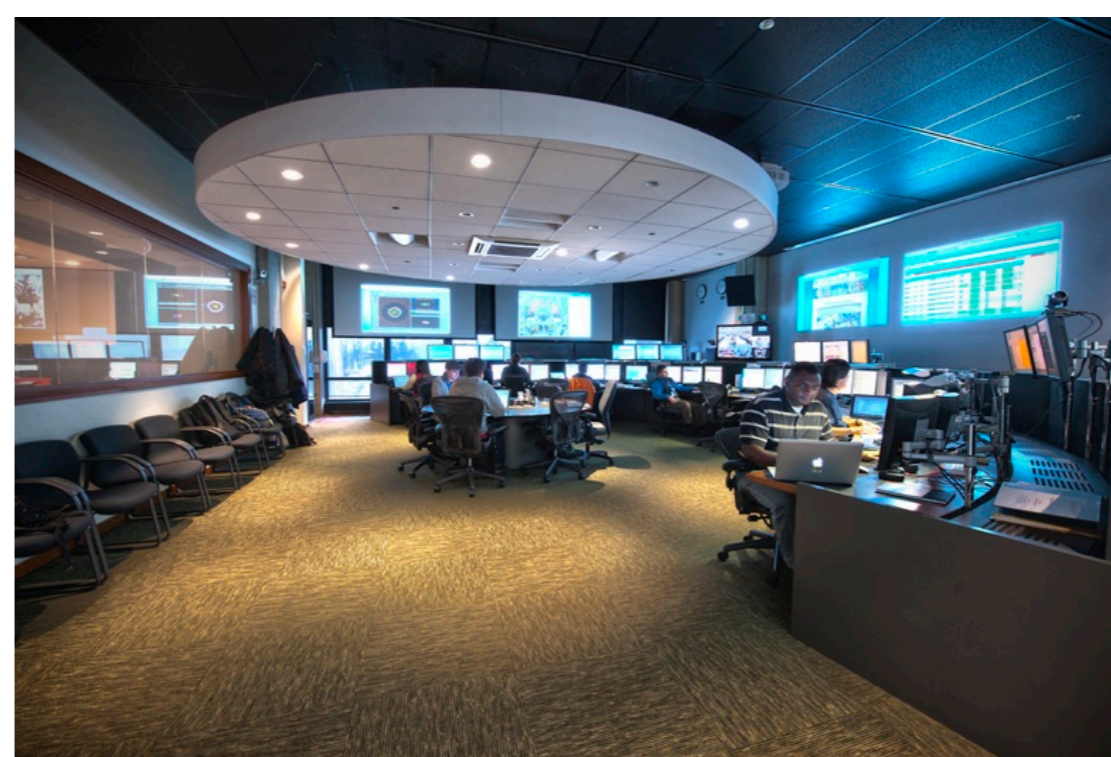
Nearly 700 CMS collaborators use the Fermilab LPC computing cluster with 22 Pb of storage and 3300 local and 6400 global nodes for data processing and analysis

User facilities and activities at the LPC



The LPC is a nexus for diverse synergistic contributions across a broad range of R&D areas

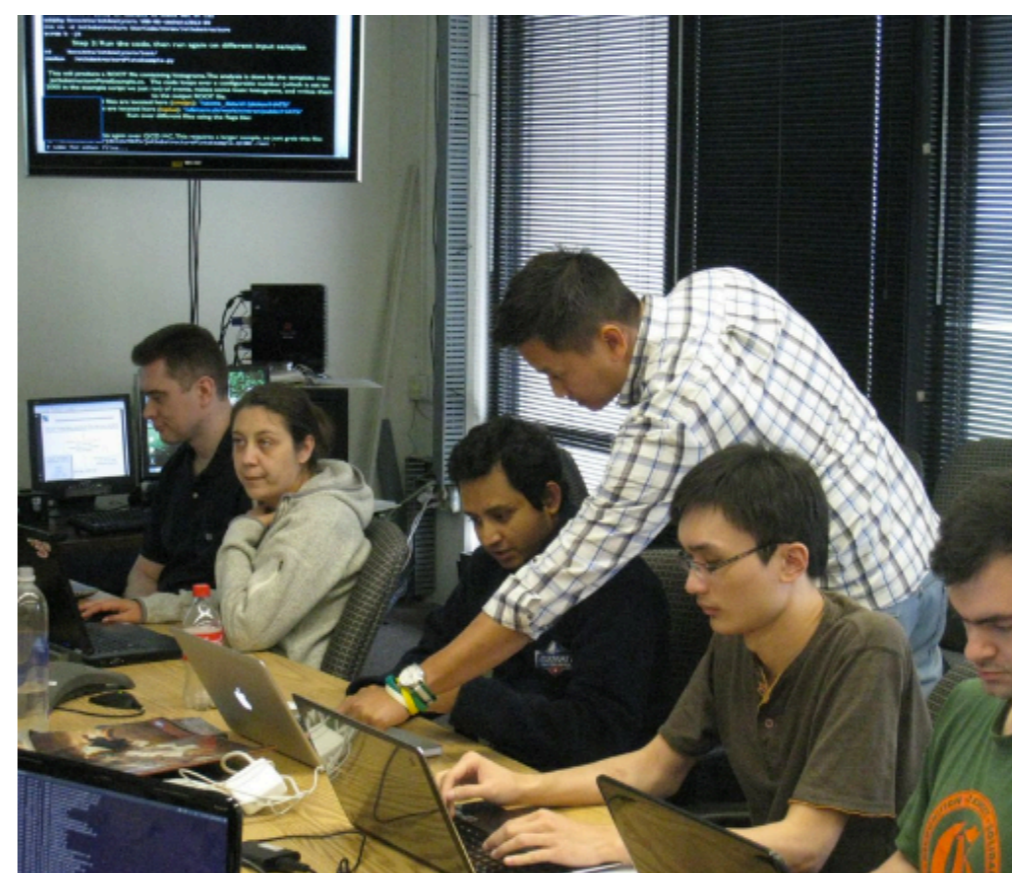
Includes facilities on-site for detector design and fabrication, software development and physics data analysis



The Remote Operations Center enables US-based physicists to participate in real-time as members of the detector operations shift crew.

The LPC has transformed the way the CMS collaboration educates young students and post-docs

CMS Data Analysis School established at the LPC for new collaborators

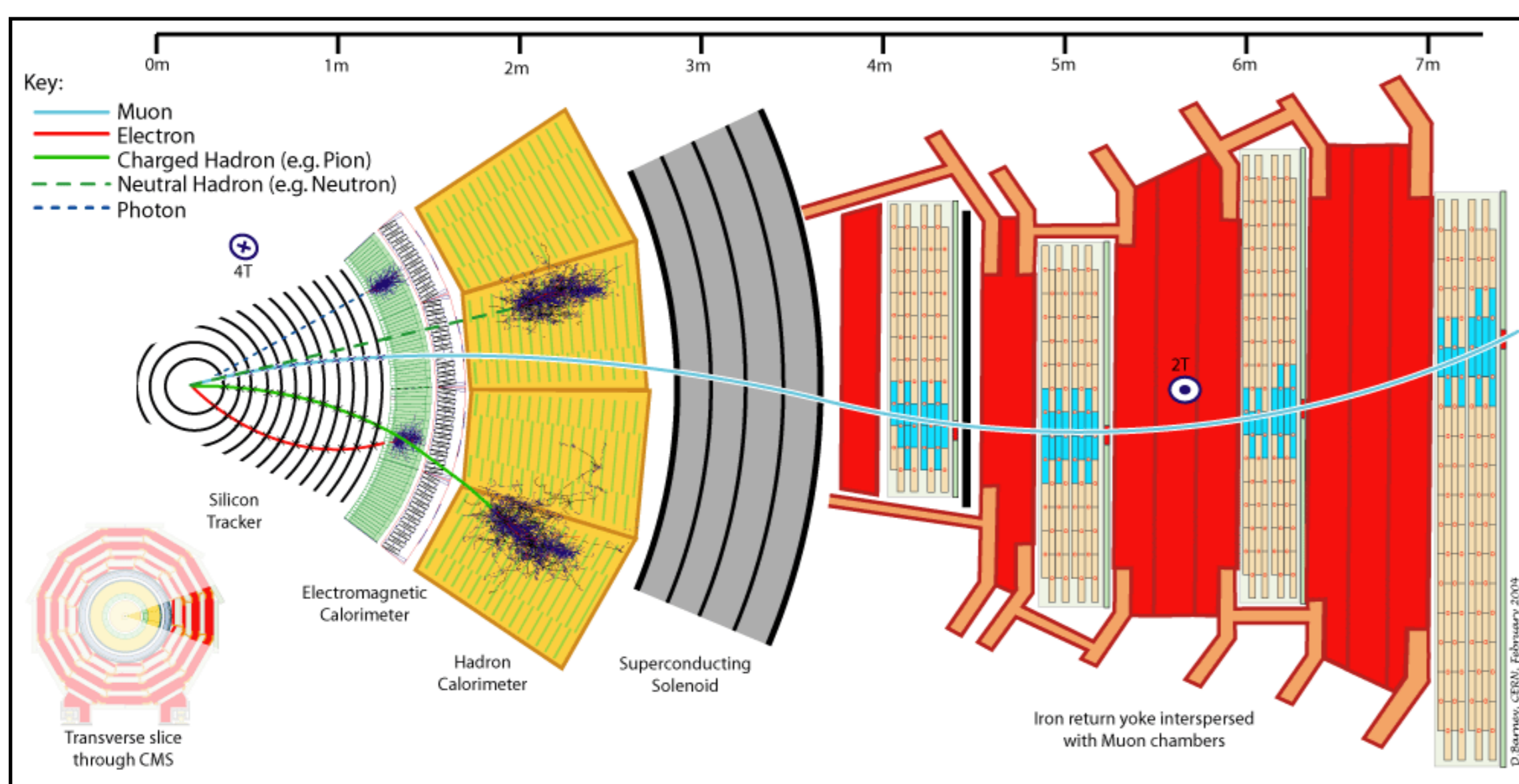


The LPC hosts distinguished visiting scientists and fosters interactions with off-site collaborators and theorists through seminars, workshops, and hands-on tutorials.



LPC contributions to LHC physics

The LPC is significantly involved in all major areas of physics at the LHC

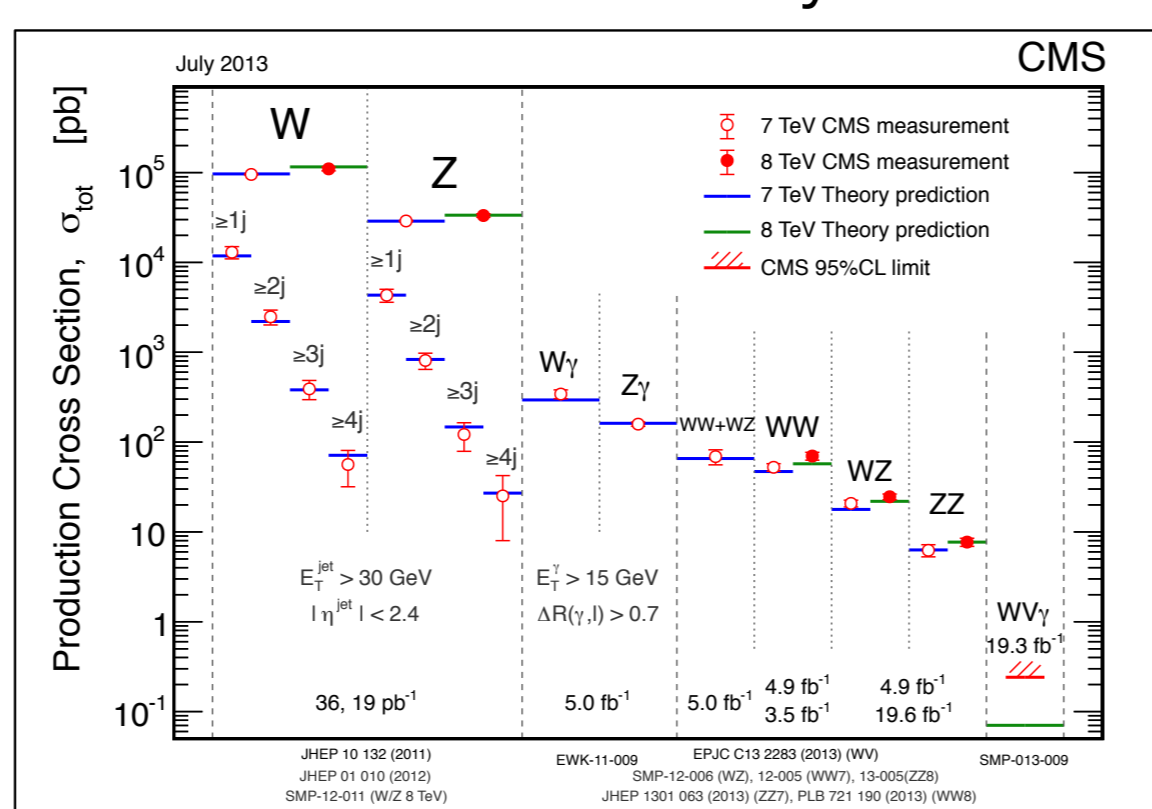


LPC experts contributed to the performance of key physics ingredients such as tracking and vertexing, triggering, jets, b-tagging, muons, electrons, taus, photons, and missing energy

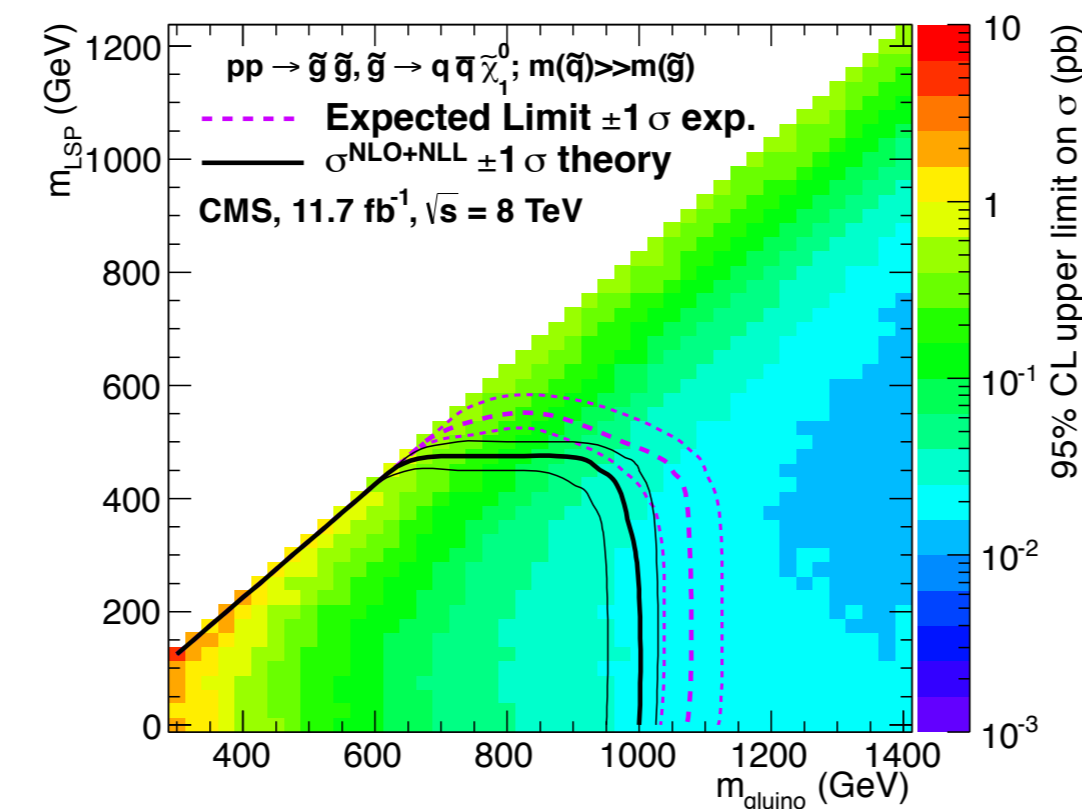
Across all major areas of physics:

- Precision electroweak measurements
- QCD measurements
- Searches for new physics phenomena
- Searches for supersymmetric particles
- Top quark physics
- Measurements related to heavy quark physics
- Heavy ion physics
- Studies of future collider reach and capability

Standard model benchmark measurements by CMS

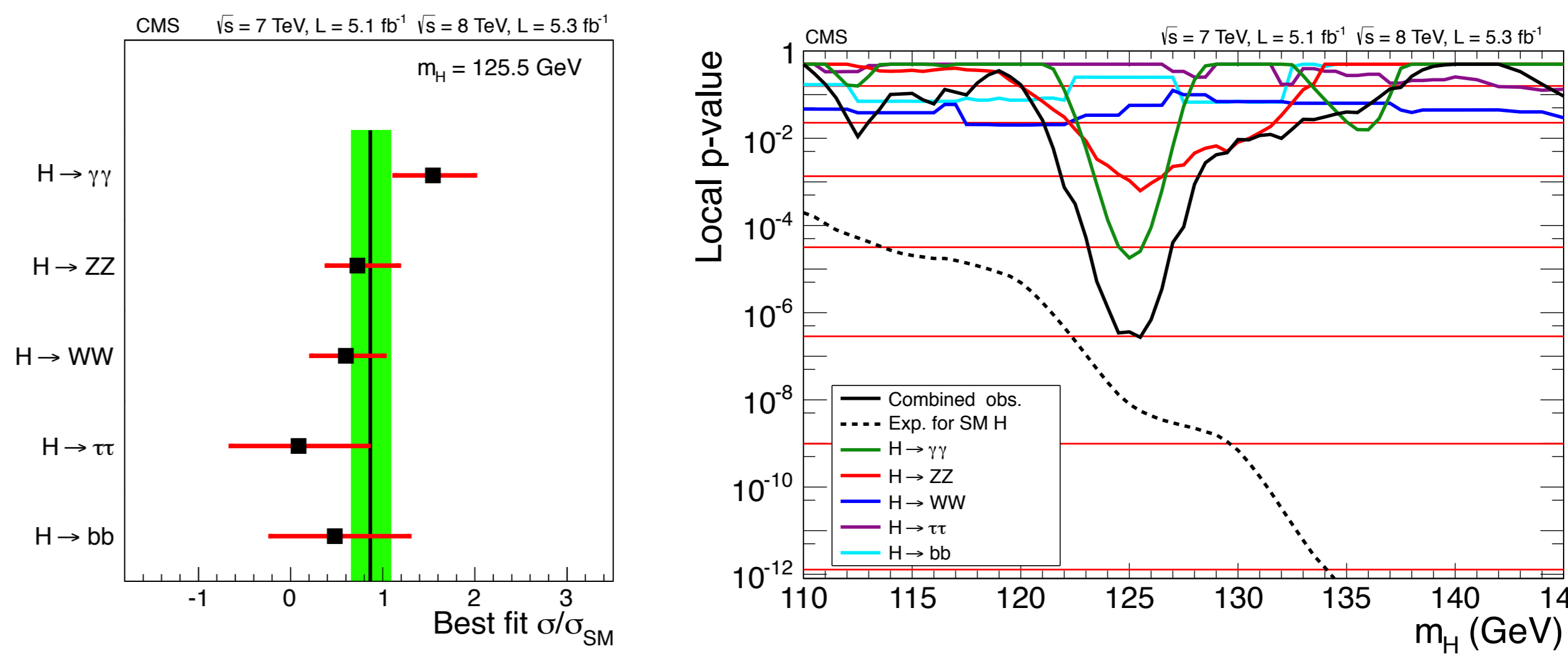


supersymmetry search result



LPC contributions to the Higgs discovery

Members from the LPC played an important role in the data analysis for the main Higgs search channels



H → ZZ → 4l

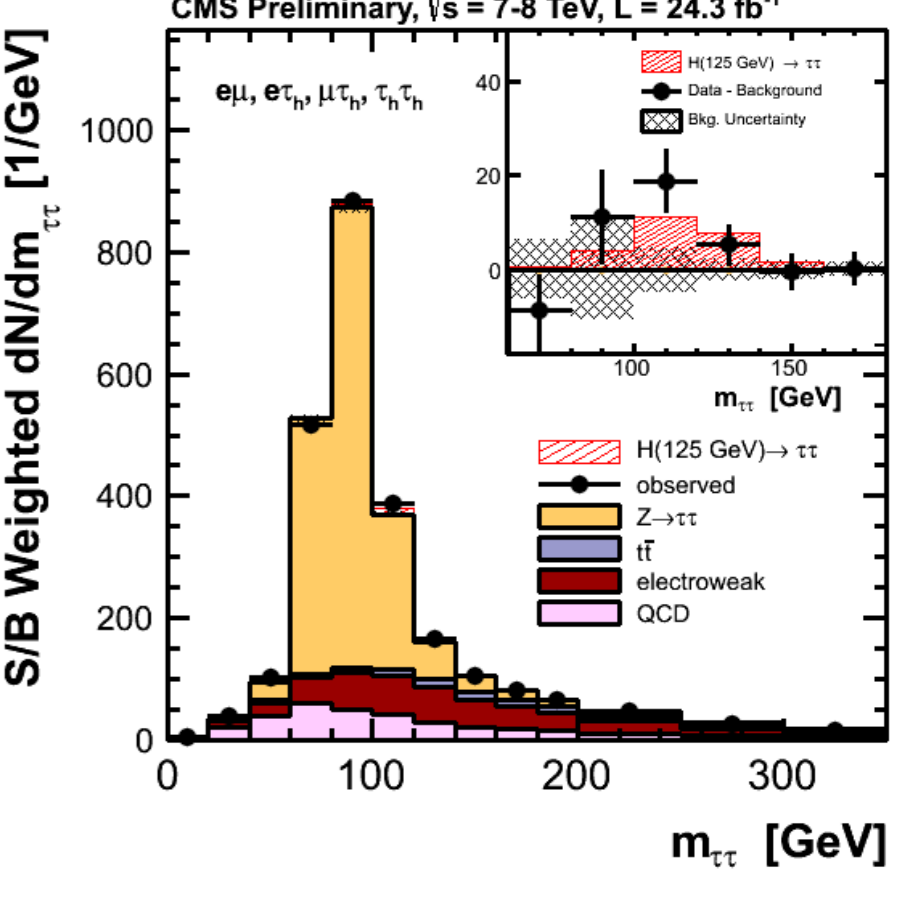
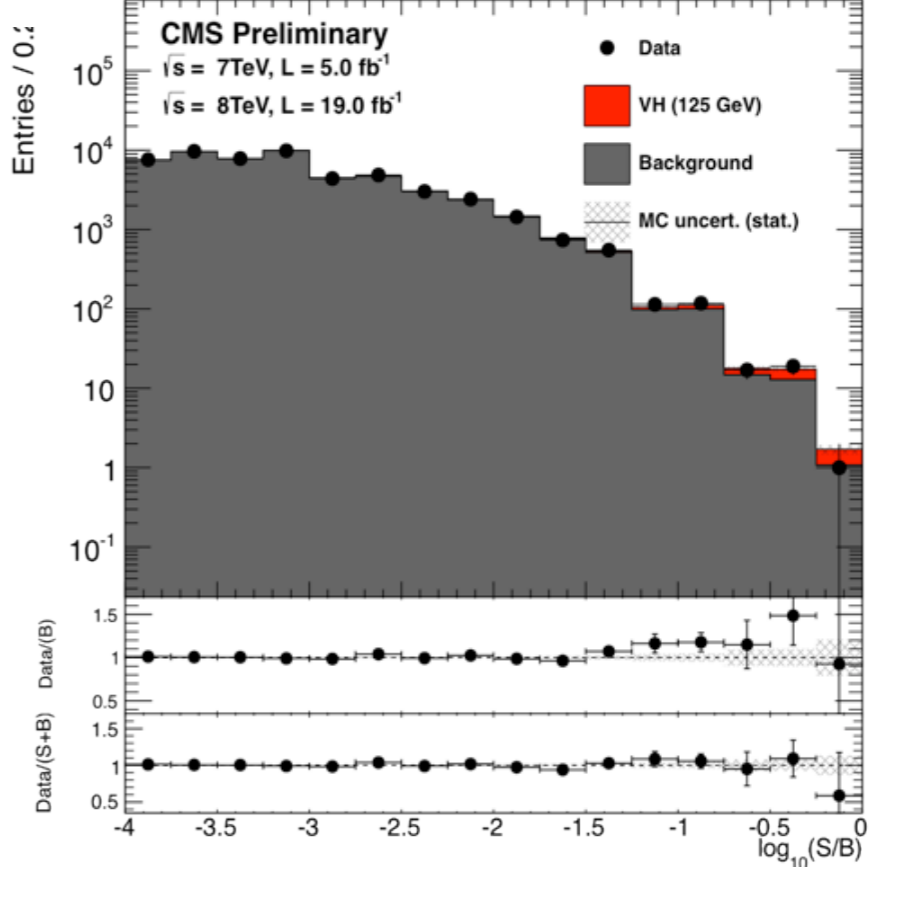
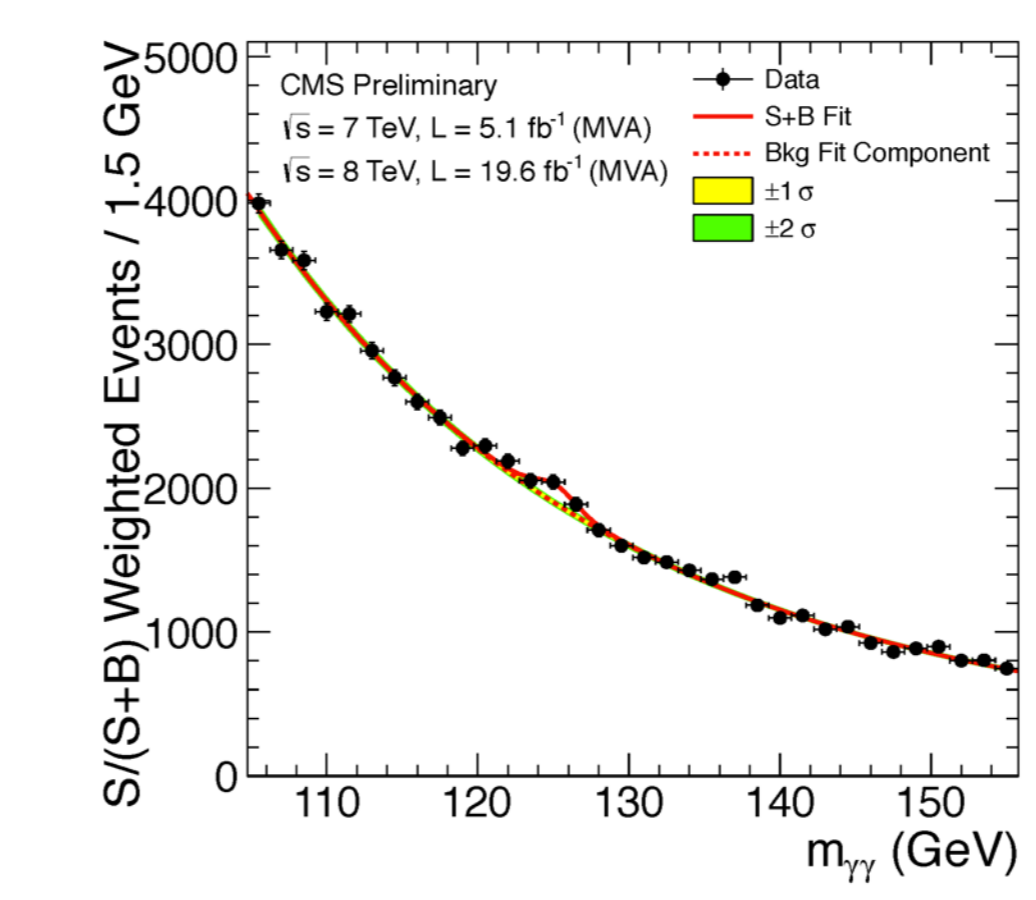
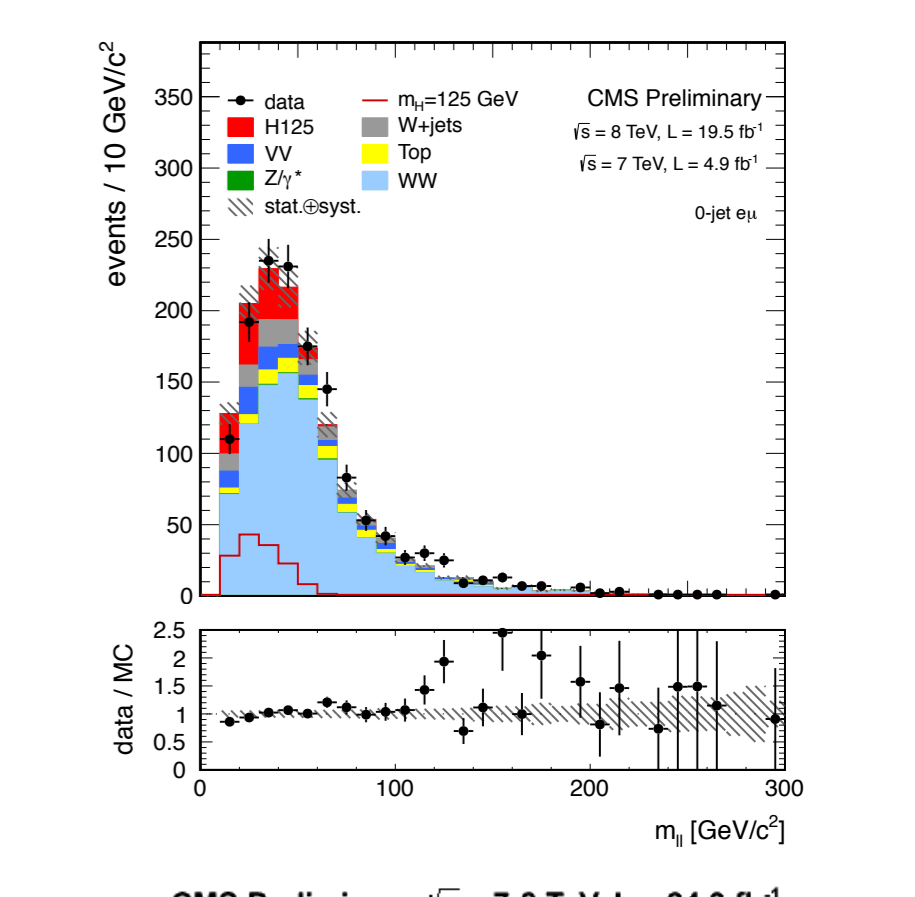
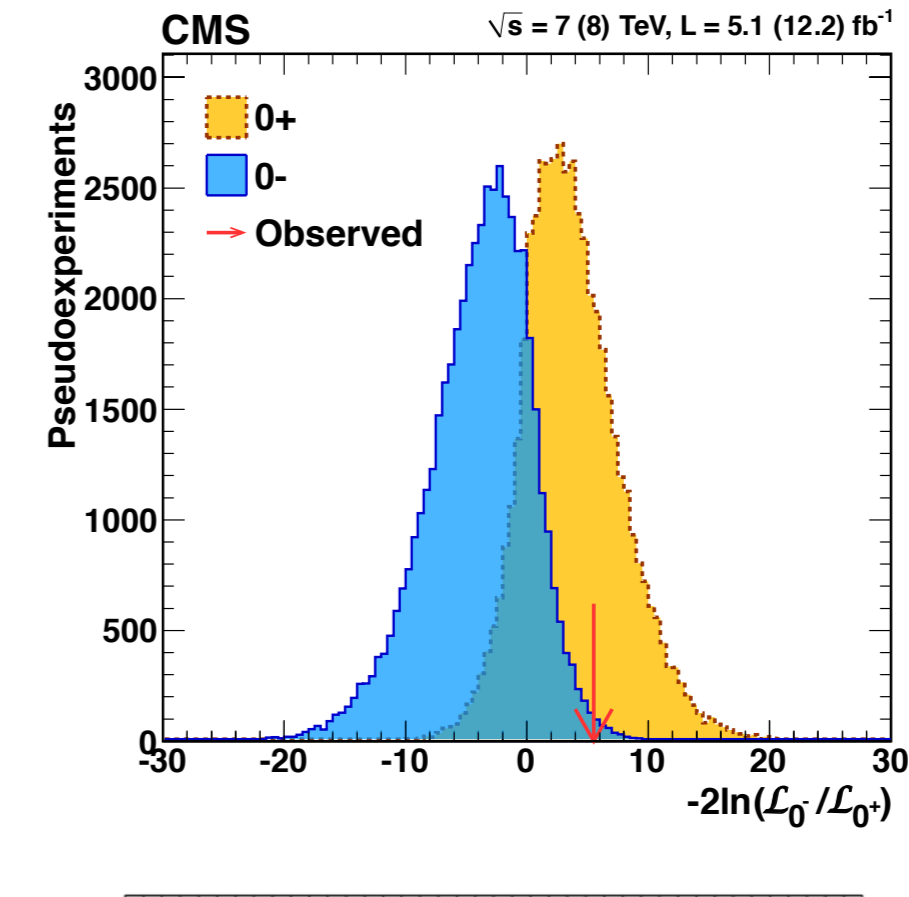
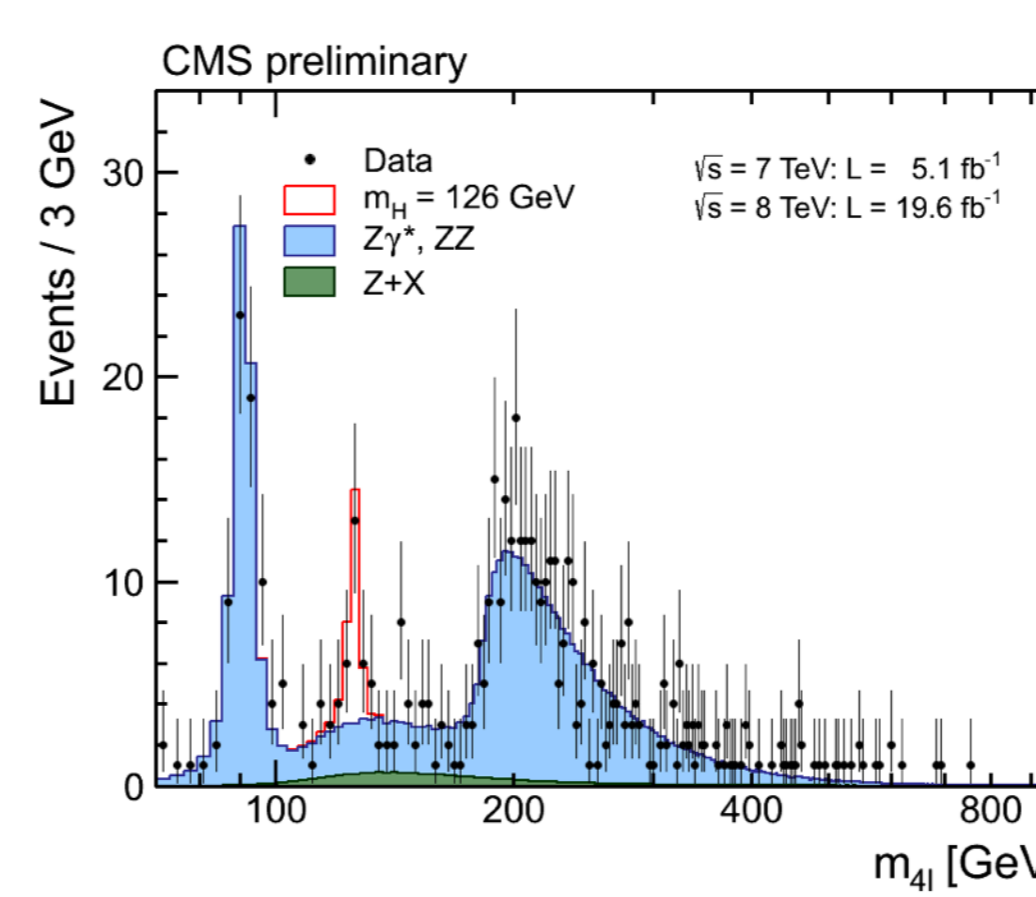
“the golden channel”, versatile mode with clean, distinctive signature

Higgs properties

to understand the nature of the Higgs

H → WW → lνlν

“the workhorse channel” sensitive over a large search mass range



H → γγ

benchmark channel with good mass resolution

H → bb and H → ττ

challenging search modes probing couplings of the Higgs to fermions