
LPC-theory connection

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In 2004 we (“the community”) believed that:

- a 4th generation of quarks and leptons may exist ...
- Higgsless models may be the correct description of nature ...
- squarks have masses of ~ 100 GeV ...
- Vector-like quarks may be lighter than the weak scale ...

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and many other things that CMS has now ruled out!

Prediction: At the “LPC Turns **20**” Symposium we are going to laugh at how little we knew in 2014.

Remarkable scientific progress – possible (in part) due to a strong experiment-theory connection.

Few places have that connection as strong as the LPC.

Topic of the Week seminars – theory speakers: Craig, Davoudiasl, Dawson, Ellis, Evans, Feng, Kats, Kilic, Low, Luty, Matchev, ... + 20 more

Physics forum – one experimentalist + one theorist (whiteboard talks!)

Coffee hour – informal discussions

Workshops, meetings, schools, ...

> 20 Fermilab theorists always ready to help:

QCD, backgrounds: Campbell, Ellis, Giele, Mrenna, Parke;
Furlan, Rontsch; Zhou ...



BSM searches: Carena, Dobrescu, Eichten, Fox, Harnik, Hill,
Lykken, Quigg; Agrawal, Bauer, Frugiuele, Yu; Bishara ...



“These regions of parameter space are now ruled out.”

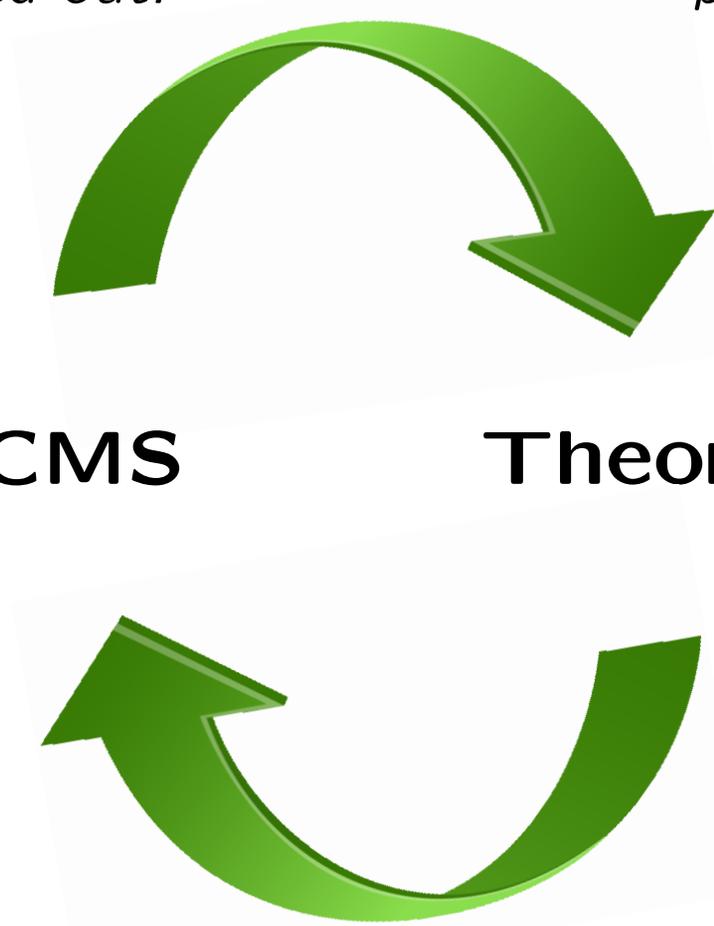
“Your estimate of NNLO corrections provides a poor fit to the data.”

CMS

Theory

“Please extend your search to smaller masses.”

“Here’s a type of particle that no one has ever searched for.”



Many possible new particles:

- New gauge bosons (Z' , W' , G' , γ' , ...)
- Vectorlike fermions, Majorana fermions, ...
- Various scalar particles, extended Higgs sectors, ...
- ...

Discovering such particles at the LHC would point to new symmetries or deeper organizing principles.

More exotic phenomena (strongly coupled sectors, deviations from field theory, etc.) could be uncovered. We need a 'wide-net' approach, using many diverse searches.

THERE'S STILL THE POSSIBILITY FOR A LOT OF NEW THINGS.

WE HAVEN'T SEEN ANYTHING CRAZY YET, BUT THERE COULD STILL BE STRANGE PINK ELEPHANTS IN THERE, WAITING TO POP OUT.

EVERY TIME YOU OPEN YOUR E-MAIL, OR EVERY TIME SOMEONE MAKES A PLOT...

THAT COULD BE THE TIME YOU HEARD SOMEONE SAY, "OOH, WE SEE SOMETHING..."



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