

Top Quark Physics at the Precision Frontier

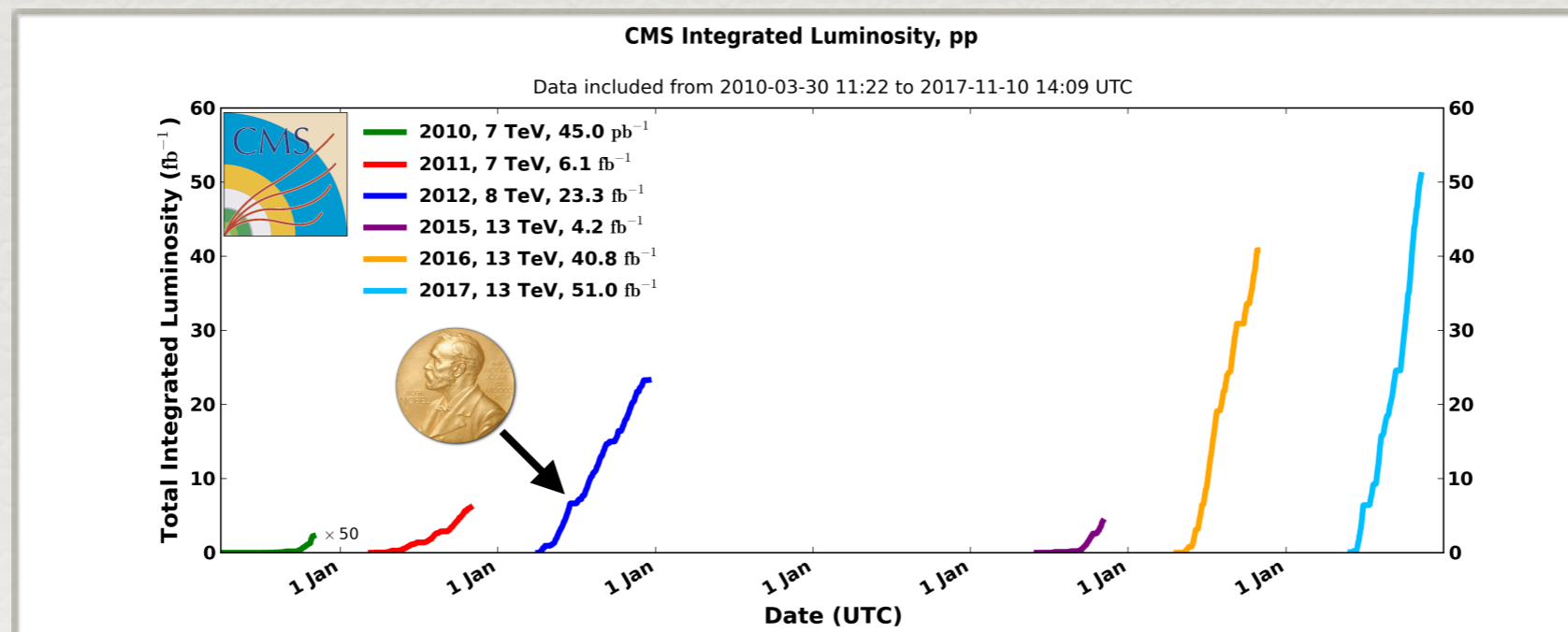
Introduction: Workshop goals

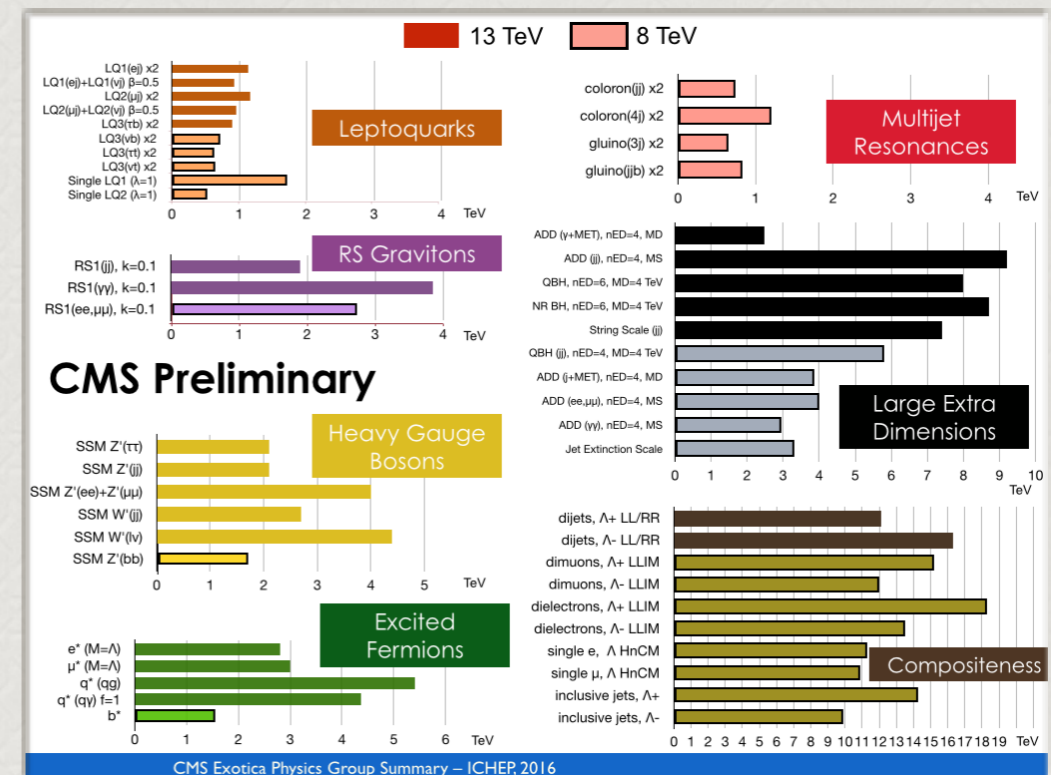
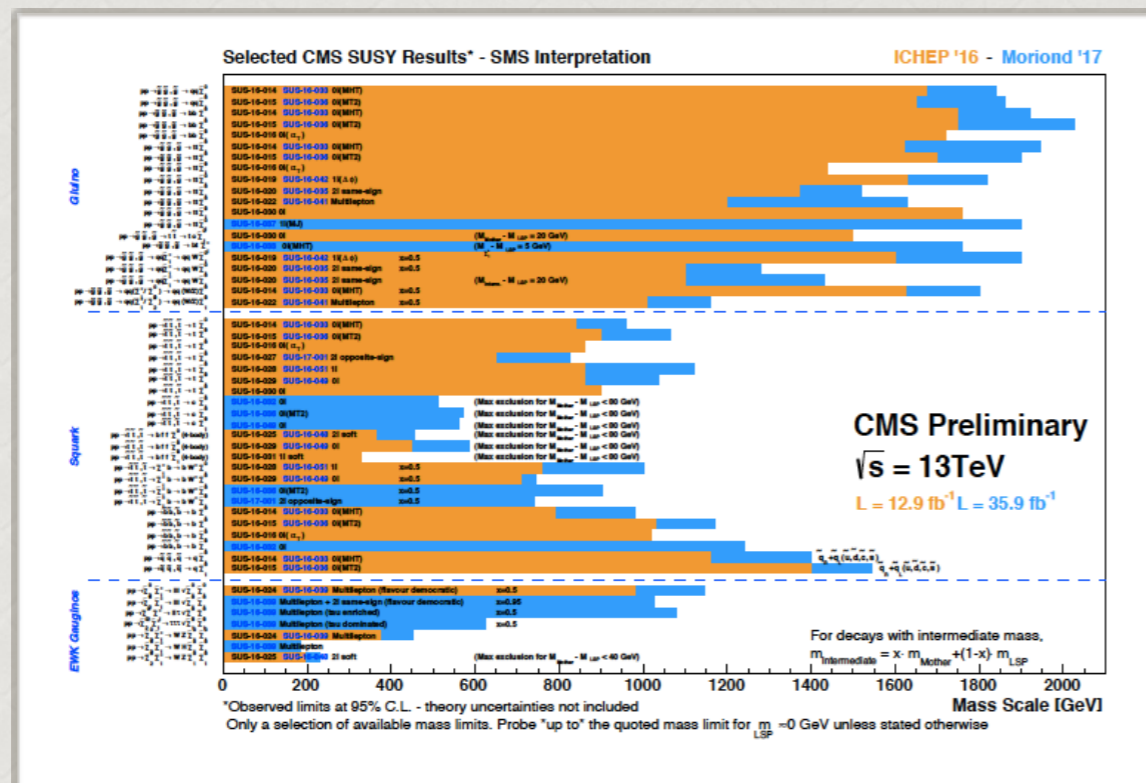
Rebeca Gonzalez Suarez

(University of Nebraska, Lincoln)

Where do we stand?

- ✧ *The last BIG discovery in particle physics happened 6 years ago:*
 - ✧ **2012: Higgs boson discovery at the LHC**
- ✧ *Since then, the LHC has delivered more than 100fb^{-1} of integrated luminosity, and has pushed the energy frontier by increasing the collision energy up to 13TeV*





- ✿ *The hunt for new physics is on*
 - ✿ *We want to address the many **open questions that the SM cannot answer yet***
- ✿ **Considerable effort at the LHC experiments focused on BSM searches**
- ✿ *But so far: no new particles have been found...*

The precision frontier

- ✦ *The new phenomena may very well be hidden in precision measurements*
- ✦ *Tiny deviations with respect to the SM expectations could open the door to further understanding of Nature's deepest secrets*
- ✦ ***The top quark may be the key to that door***

“In my view, for the next couple of years precision $t\bar{t}$ and $t(t\bar{t})$ measurements have the highest physics potential both in SM studies and to constrain some of the wilder aspects of BSM physics and we should encourage people to work on it!”

—Steve Wimpenny

The perks of having a top quark factory



- ✦ ***The study of the top quark is already stress-testing the SM at the LHC***
 - ✦ *The large top quark production rate is opening the precision frontier*
 - ✦ *As we will see during today's and tomorrow's sessions*

Why the LPC?

- ✦ To **raise visibility** on this topic in the US
 - ✦ re-emphasizing the precision frontier in the light of no clear BSM observed yet
 - ✦ highlighting the top quark potential
 - ✦ touches a wide range of physics, with very large statistics collected



The top quark was 'born' here in Fermilab

- ★ ***Workshop goals***

- ★ *Going through the current top quark physics panorama*

- ★ *Discuss:*

- ★ *what are our strengths and limiting factors*

- ★ *what we can expect in the short and long-term*

- ★ *identify upcoming challenges*

- ★ *Spark new ideas*

- ★ *collaborations, lines to follow*

- ★ ***Encourage people to join and contribute***

- ★ *Keep the conversation open, including experiments and theory*