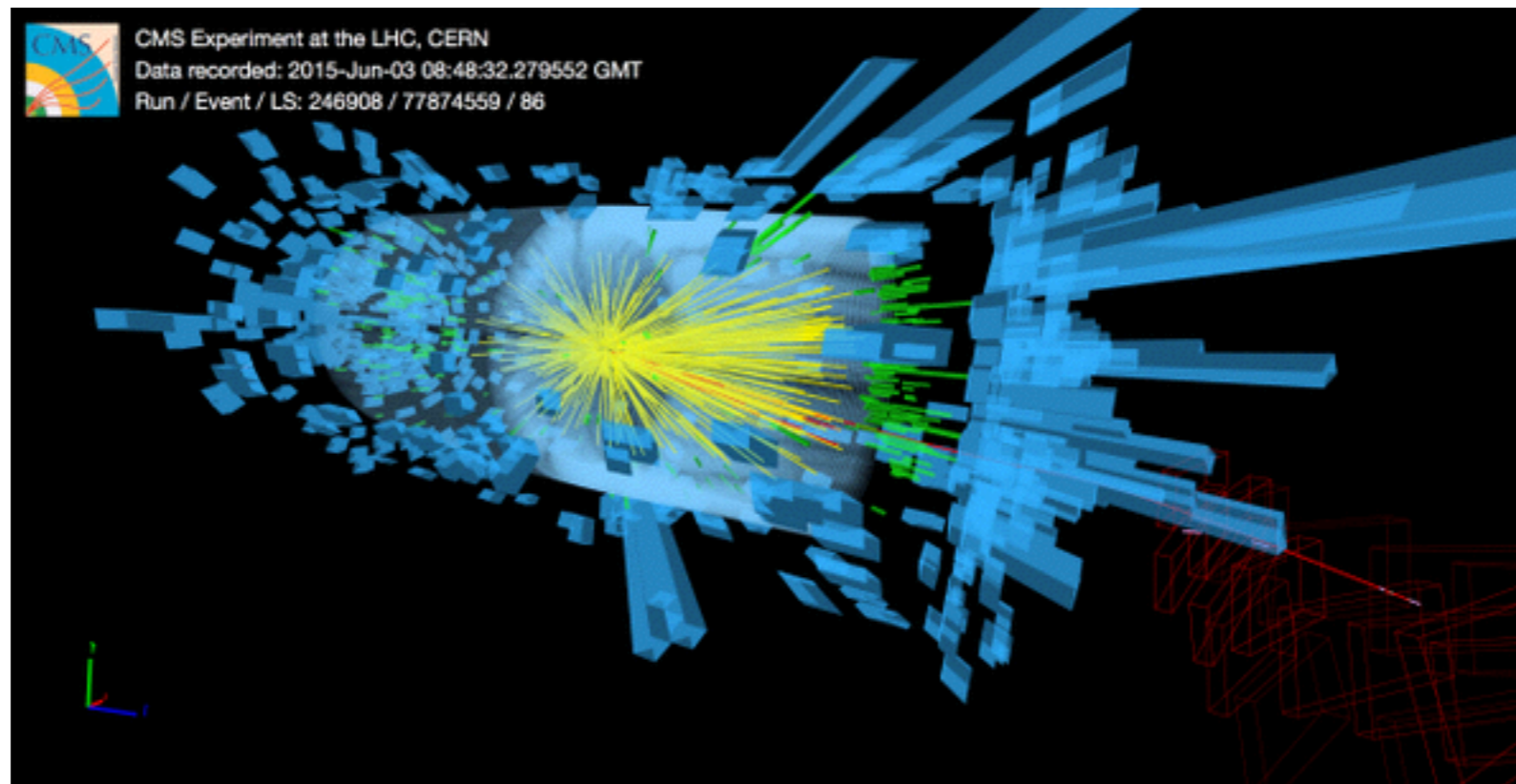


Les Houches: BSM WG

Conveners: C.Delaunay, A. Delgado(TH) G. Brooijmans
(Exp)



Collisions at 13 TeV!!!!!!



Big Questions

- Although the Run-I of the LHC has been a huge success with the Higgs discovery.....
- There are still several questions that 'we hope' the Run-II of LHC will be able to address.....
- Data are being taken right now so keep your fingers crossed.

Higgs WG
(Collaboration across
WG is encouraged)



- We still have to know if the Higgs is just the SM higgs or its nature is different
- Related to the previous point (or maybe a different way of saying it), how is EW breaking realized?

NB: I am going to through ideas on the board

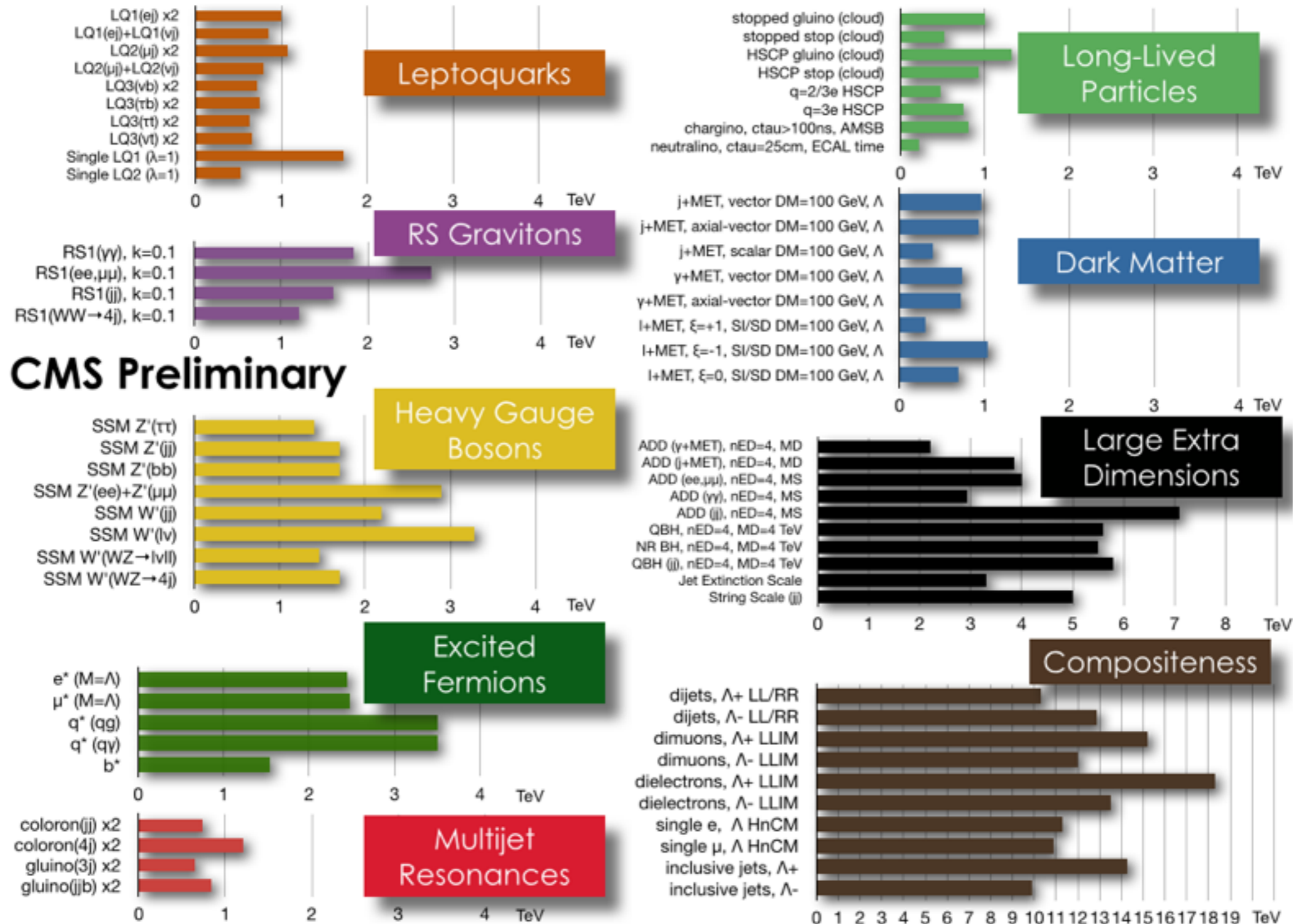
- The nature of the EWSB could be:
 - weakly coupled: SUSY, little Higgs, fine-tuned as in the SM
 - strongly coupled: Composite Higgs

- Naturalness still drives much of the model building:
 - Anthropic
 - SUSY
 - strongly coupled
 - neutral naturalness
 - Relaxation

- Dark matter, still the only BSM physics we are sure about (ok....neutrinos):
 - WIMP
 - SuperWIMP
 - Non-thermal
 - asymmetric
 -

- Baryogenesis/leptogenesis
- Inflation/tensor modes
- Flavour
- CC?
-

Experimental data

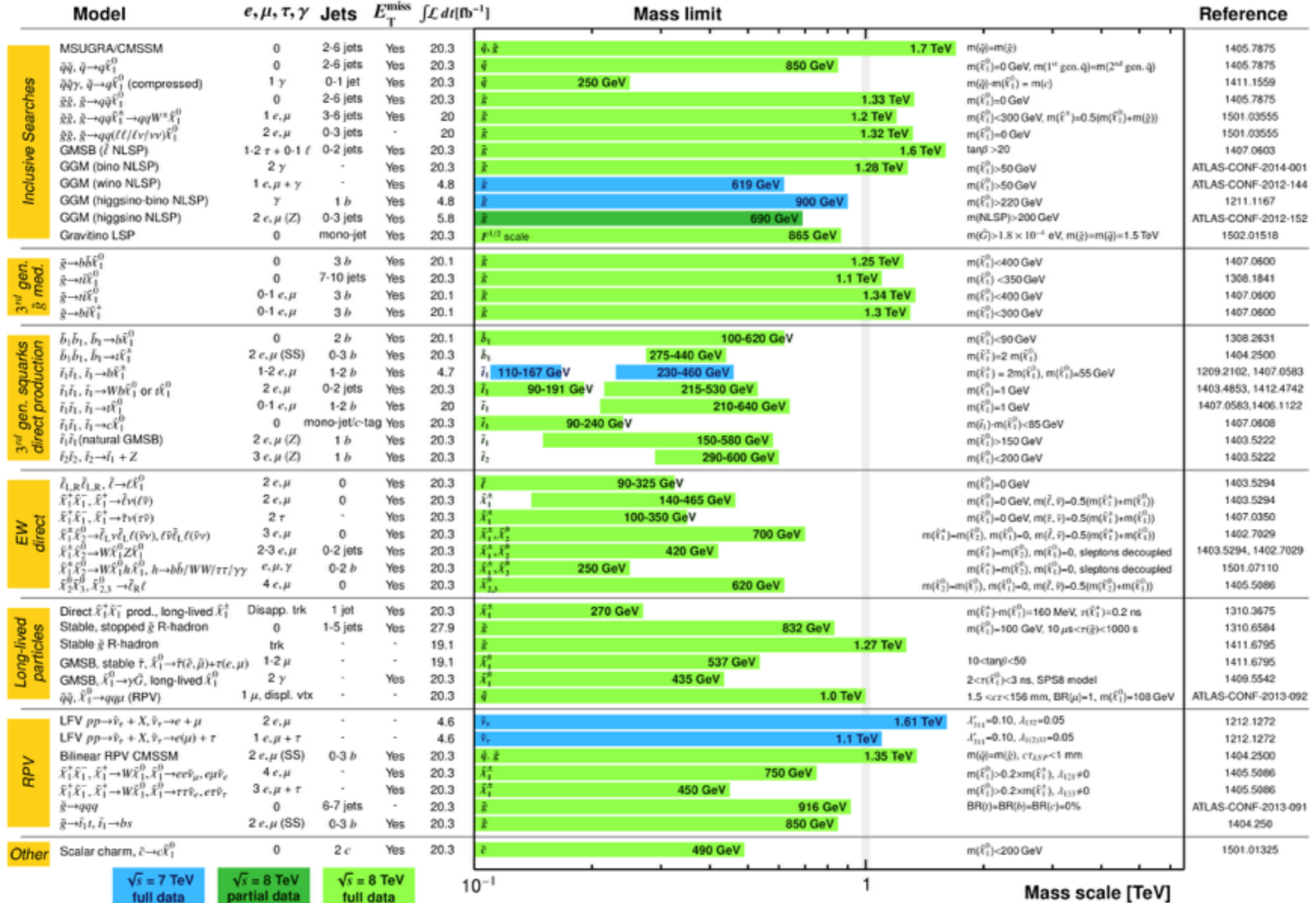


ATLAS SUSY Searches* - 95% CL Lower Limits

Status: Feb 2015

ATLAS Preliminary

$\sqrt{s} = 7, 8 \text{ TeV}$



$\sqrt{s} = 7 \text{ TeV}$ full data $\sqrt{s} = 8 \text{ TeV}$ partial data $\sqrt{s} = 8 \text{ TeV}$ full data

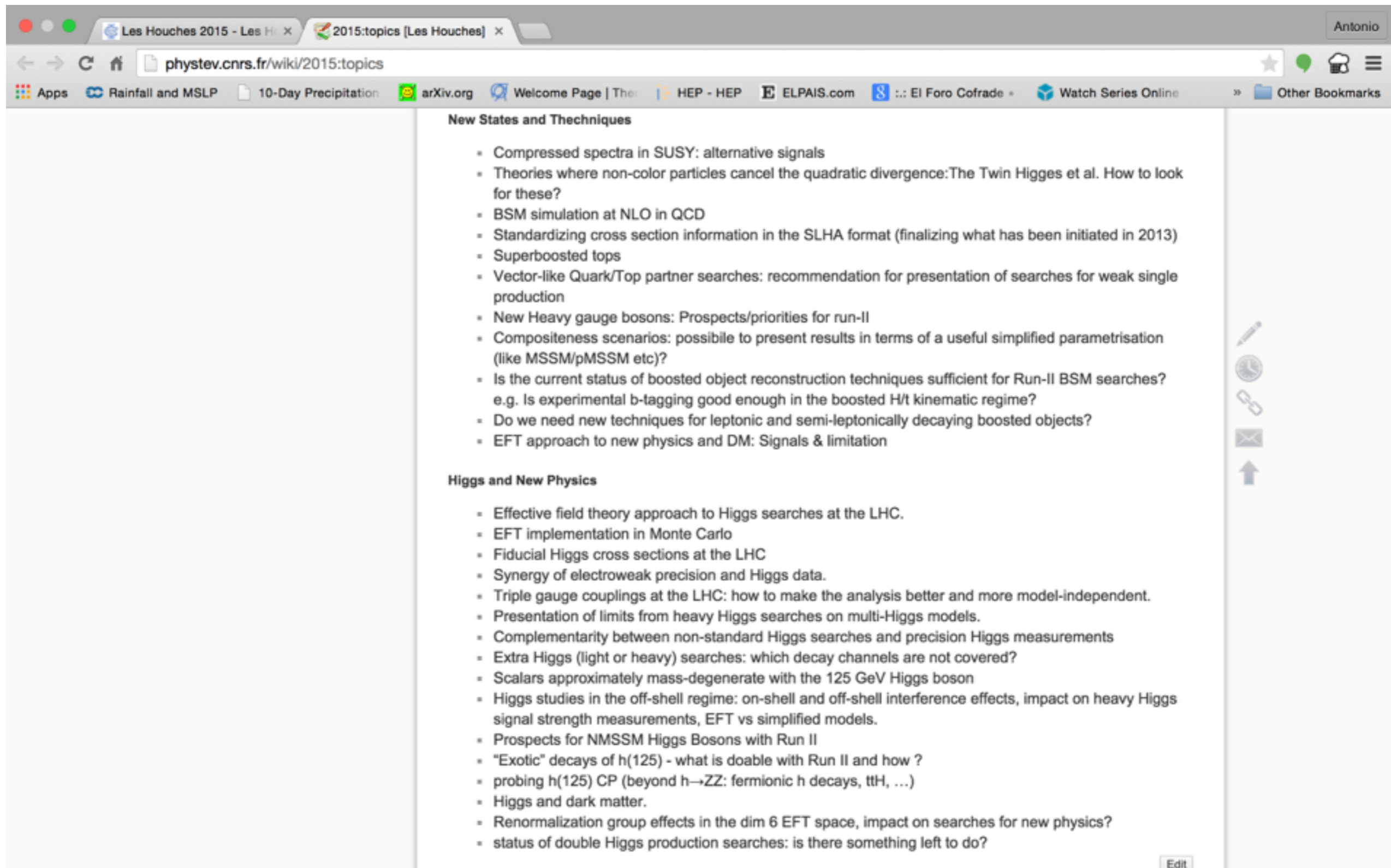
10⁻¹ 1 Mass scale [TeV]

*Only a selection of the available mass limits on new states or phenomena is shown. All limits quoted are observed minus 1 σ theoretical signal cross section uncertainty.

Goals for Les Houches

- Form small groups to work on a particular topic relevant for the LHC
- Take advantage of having a good collection of theorists and experimentalist in a wonderful location
- Produce a document!!!!!!

Possible list of topics



The screenshot shows a web browser window with the URL `phystev.cnrs.fr/wiki/2015:topics`. The page content is organized into two main sections: "New States and Techniques" and "Higgs and New Physics".

New States and Techniques

- Compressed spectra in SUSY: alternative signals
- Theories where non-color particles cancel the quadratic divergence: The Twin Higgses et al. How to look for these?
- BSM simulation at NLO in QCD
- Standardizing cross section information in the SLHA format (finalizing what has been initiated in 2013)
- Superboosted tops
- Vector-like Quark/Top partner searches: recommendation for presentation of searches for weak single production
- New Heavy gauge bosons: Prospects/priorities for run-II
- Compositeness scenarios: possible to present results in terms of a useful simplified parametrisation (like MSSM/pMSSM etc)?
- Is the current status of boosted object reconstruction techniques sufficient for Run-II BSM searches? e.g. Is experimental b-tagging good enough in the boosted H/t kinematic regime?
- Do we need new techniques for leptonic and semi-leptonically decaying boosted objects?
- EFT approach to new physics and DM: Signals & limitation

Higgs and New Physics

- Effective field theory approach to Higgs searches at the LHC.
- EFT implementation in Monte Carlo
- Fiducial Higgs cross sections at the LHC
- Synergy of electroweak precision and Higgs data.
- Triple gauge couplings at the LHC: how to make the analysis better and more model-independent.
- Presentation of limits from heavy Higgs searches on multi-Higgs models.
- Complementarity between non-standard Higgs searches and precision Higgs measurements
- Extra Higgs (light or heavy) searches: which decay channels are not covered?
- Scalars approximately mass-degenerate with the 125 GeV Higgs boson
- Higgs studies in the off-shell regime: on-shell and off-shell interference effects, impact on heavy Higgs signal strength measurements, EFT vs simplified models.
- Prospects for NMSSM Higgs Bosons with Run II
- "Exotic" decays of h(125) - what is doable with Run II and how ?
- probing h(125) CP (beyond $h \rightarrow ZZ$: fermionic h decays, ttH, ...)
- Higgs and dark matter.
- Renormalization group effects in the dim 6 EFT space, impact on searches for new physics?
- status of double Higgs production searches: is there something left to do?

An "Edit" button is visible at the bottom right of the page content.