



New Phenomena 2009→2012

Status/Plans

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Topics for consideration: “what’s going on in the NP in 2009”

● Recently submitted (or just about to be):

1. Trileptons
2. Charge Massive Stable Particle
3. Stop \rightarrow dilepton
4. Squarks and Gluinos in tau+jets+MET
5. 1st gen. LeptoQuark in ee, ev, vv

Shown @Moriond'09
Update on going (5 fb⁻¹)
First time @D0

each line “in current activity” corresponds to a different “team” working on that topic

Did you know that NP was that dynamic?

● Current activity in 2009:

1. Model Independent Search
2. R-parity violating sneutrino in e+mu
3. squarks and gluinos (+CDF/D0 combi.)
4. GMSB in $\gamma\gamma$ +MET
5. LED in γ +MET
6. stop \rightarrow dilepton
7. stop/sbottom/LQ3 in jet+MET
8. RS/LED in diEM
9. Charge Massive Stable Particle
10. GMSB in e/gamma+dilep+MET
11. Hidden valley dark photon in γ +ll+MET
12. Hidden valley in long-lived decay in b
13. Vector quark in W/Z+jets
14. stop in b+chargino
15. SUSY same sign dimuons
16. Universal Extra Dim. (UED) in SS $\mu\mu$
17. Z' in diEM
18. Compositeness in ee/ $\mu\mu$
19. W' \rightarrow WZ

● + maybe in future:

1. Sbottom in gluino decay
2. Quirks quark
3. Trilepton

The “Veterans French” in the New Phenomena: status

- Squarks & gluinos $\rightarrow \tau + \text{jets} + \text{MET}$
 - ▶ Pub. in 2009



Catherine Biscarat



Patrice Verdier

- Squarks & gluinos



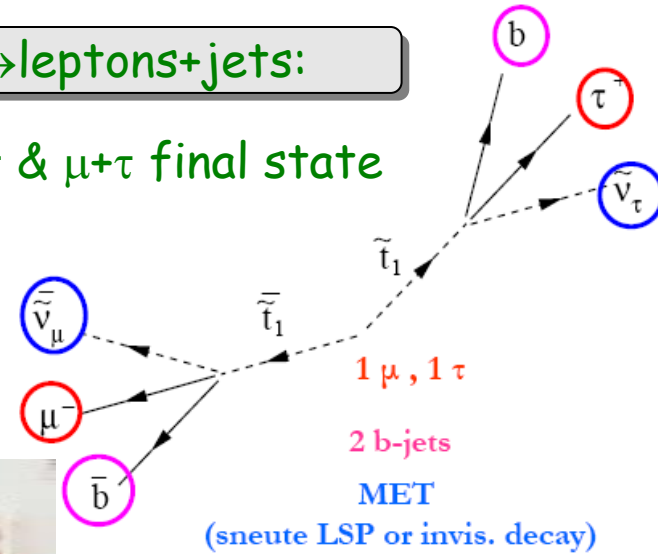
Jean-Francois Grivaz



Philippe Gris

- Stop \rightarrow leptons + jets:

- $e + \tau$ & $\mu + \tau$ final state



- $LQ_1 \rightarrow eejj$ & $evjj$
 - ▶ Pub. in 2009



Marie-Claude Cousinou



Anne-Fleur Barfuss

- “sbottoms” in gluinos decay:



Patrice Lebrun



Steve Muanza

If $m_{\tilde{t}_1} > m_{\tilde{\chi}_1^+}$
 $\tilde{t}_1 \rightarrow b \tilde{\chi}_1^+$



Arnaud Duperrin



The remaining “french troops”: as from this summer 2009



The New Phenomena relies now on USA Univ.!



The New NP strategy

(in light of the LHC delays...)

⇒ approached the USA institutions with the following message:

- "XX has worked on ATLAS detector construction and commissioning for several years, he/she really should get his/her thesis done in the next 1-2 years."
- "Due to large LHC beam collision uncertainties, what about considering to let XX works on his thesis in D0?"
- New Phenomena is an excellent place to succeed! (i.e. can do a quickly an analysis without a competition like the one of the Higgs group for instance)
- After XX can apply (back) to LHC as "postdoc"
- The deal: no service task but sign only his paper



Yes it works: recent examples



- ◆ Ning Zhou (ATLAS, Columbia)
 - ▶ Randall-Sundrum gravitons and/or LED in di-em channel
- ◆ Alan W Wilson (ATLAS, Michigan University)
 - ▶ GMSB in dilepton+ γ +MET $\tilde{\chi}_1^0 \tilde{\chi}_1^0 \rightarrow Z\gamma\tilde{G}\tilde{G} \rightarrow l^+l^-\gamma E_T$
- ◆ Seth Caughron (ATLAS, Columbia)
 - ▶ resonances like vector quark $\rightarrow Wq$ (so you have $pp \rightarrow Qq \rightarrow Wqq$)
- ◆ Mark Cooke (ATLAS, Columbia)
 - ▶ GMSB in diphotons+MET

+ New Students Joining NP: recent examples

- ◆ Sung Wong Cho and HyeonSeung Lee (Korea University)
 - ▶ Charge Massive Stable Particle (μ)
- ◆ Jason Masour (Universitat Bonn)
 - ▶ SUSY LS dimuon

New Phenomena

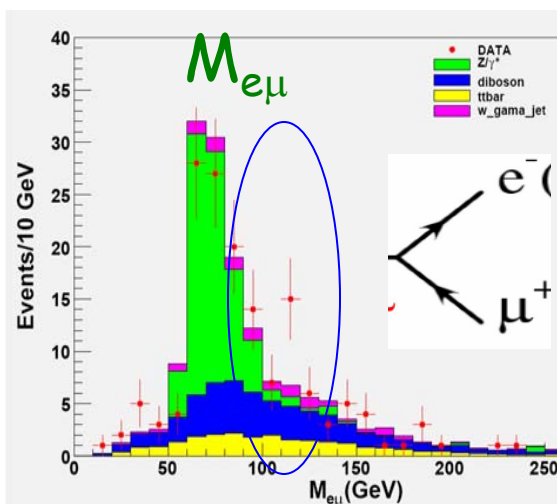


1. analyze as many search channels as possible with:
 - a) covering classic signatures (squarks/gluinos, trileptons, di-EM resonances) with large lumi sets
 - b) expanding to new searches that have wide open phase space (e.g. long-lived particles)

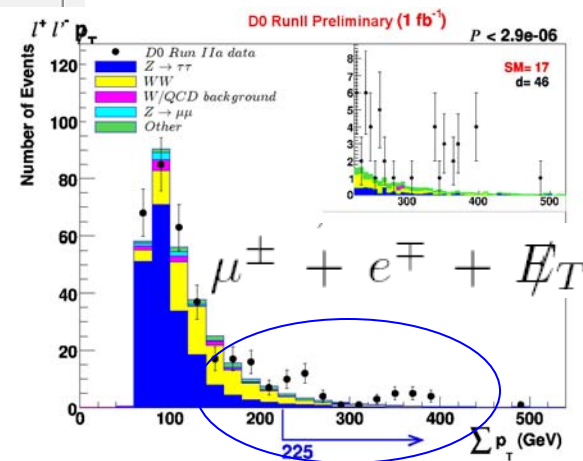
2. promote conversion of analyses from other groups into NP searches (e.g. Z Afb to di-EM search, Higgs in sbottom)

3. Investigate potential discrepancies already observed ($e+\mu$ +MET?)

4. be prepared to respond to a "discovery" at LHC



RPV $e+\mu$



MIS

Conclusion: 2009 → 2012

about 40 peoples currently active in NP (i.e. working on an analysis)

20 topics covered

Potential for discovery remains

You are welcome in the NP group!

