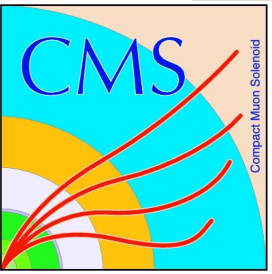


MG,Compressed spectrum and some boring feedback from CMS experiment...

Alexis Kalogeropoulos

MG Meeting,Natal, Brazil

6th October 2012

Outline

- ISR in Signal Scans
- Motivation for Compressed Spectrum
- Simplified Models in CMS
- CMS 7TeV MC production

Motivation of modeling ISR in Signal Scans

Search for suppressed SUSY signals is tricky:

- Reduced HT,MET or small rates

Which implies searches involving

- Gluinos in the compressed region (small $\Delta M = m_{gl} - m_{LSP}$)
- Gluino with cascades where $\Delta M = m_{NLSP} - m_{LSP}$
- Light 3rd generation (stops, sbottoms)
- Direct EWK production (neutralinos, charginos, sleptons,...)

Maybe hard-ISR can give us a hand...

However....

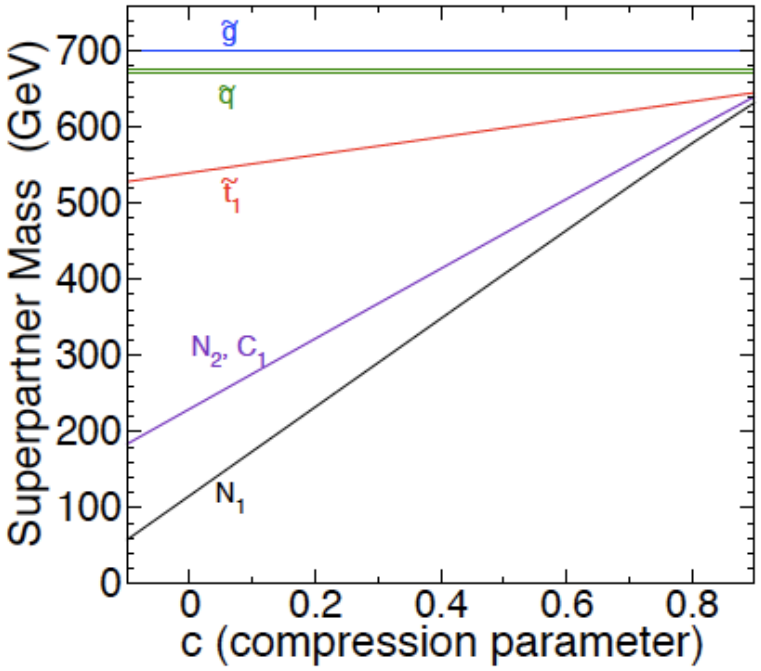
Can cover the subject in 10'....

Compressed Spectrum aka low DeltaM splitting

$$M_2 = \left(\frac{1+2c}{3}\right) M_{\tilde{g}}. \qquad M_1 = \left(\frac{1+5c}{6}\right) M_{\tilde{g}},$$

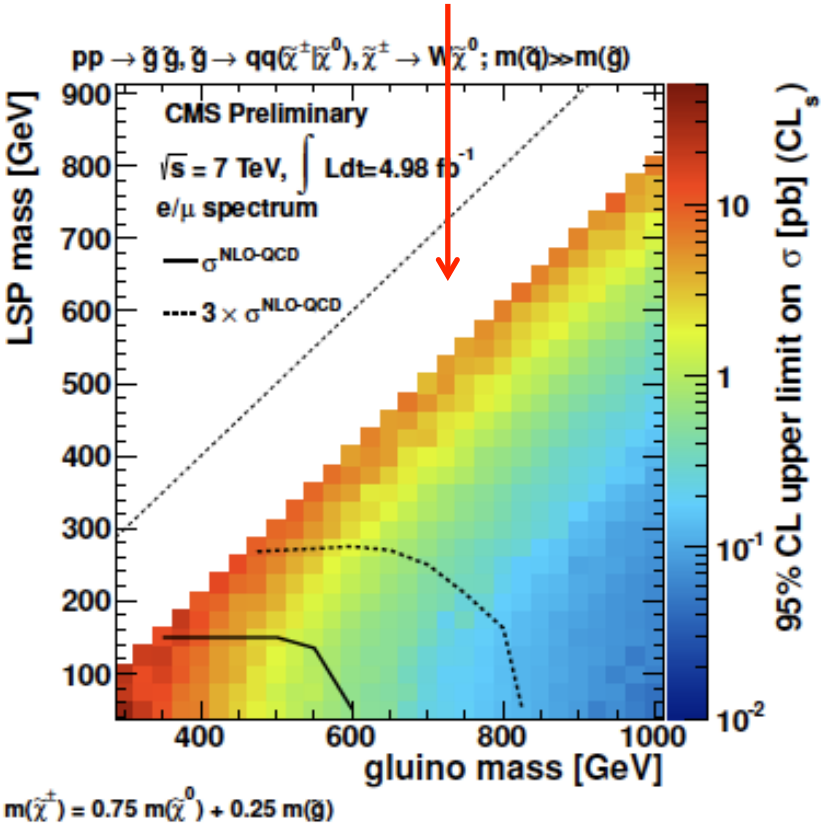
C=0….1 , 1=fully compressed

mSUGRA : m_gl=6* m_LSP



arXiv:1105.4304, arXiv:1111.6897

What can we do to reach this ?



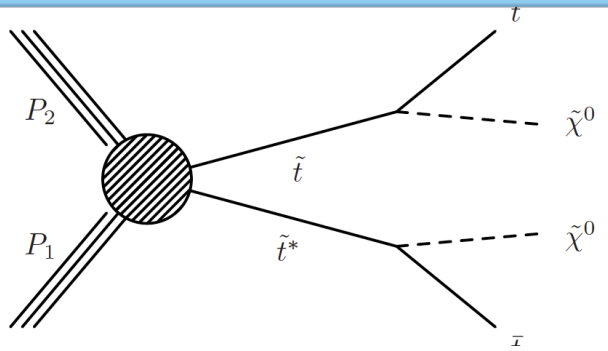
https://twiki.cern.ch/twiki/bin/view/CMSPublic/SUSYSMSSummaryPlots

T2tt SMS Model

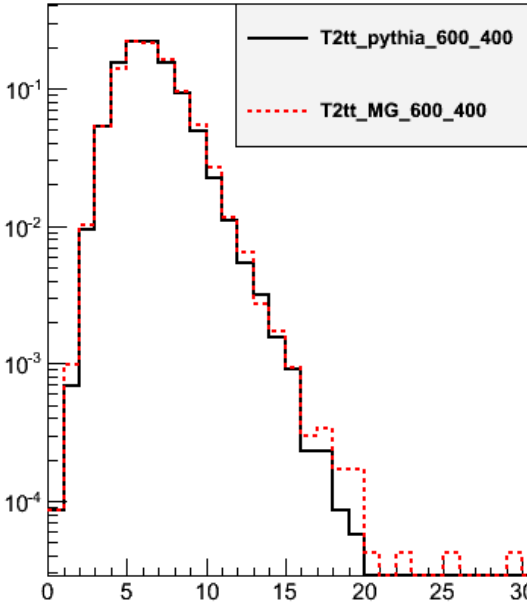
T2tt

M_t_1=600

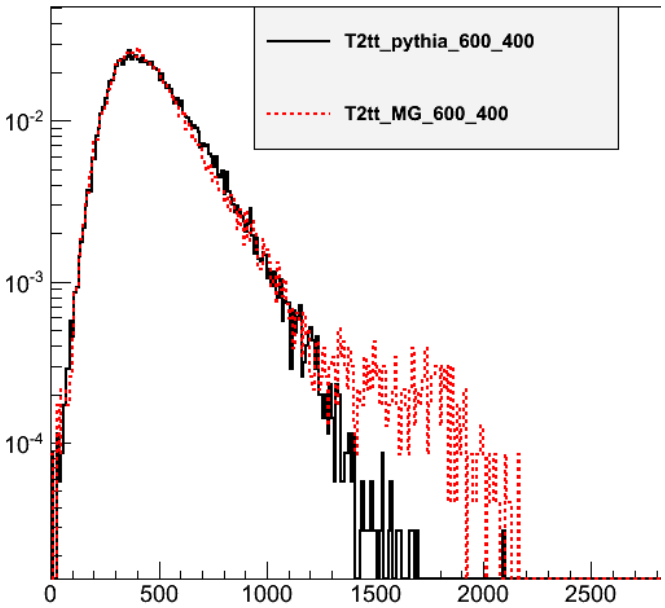
M_n1=400



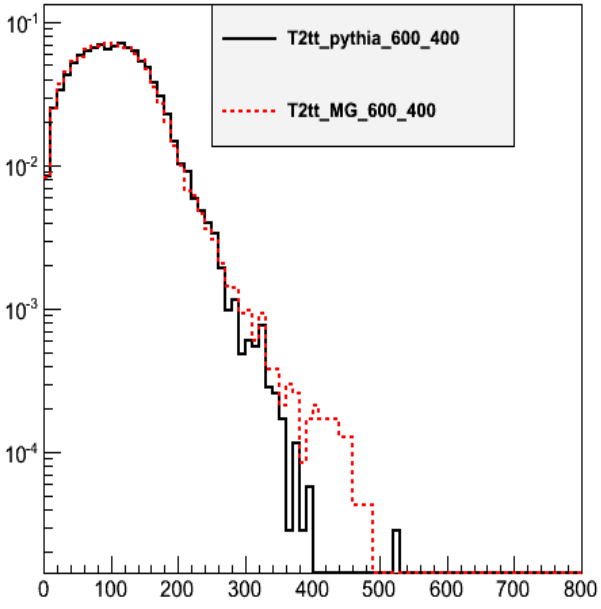
NJets



HT



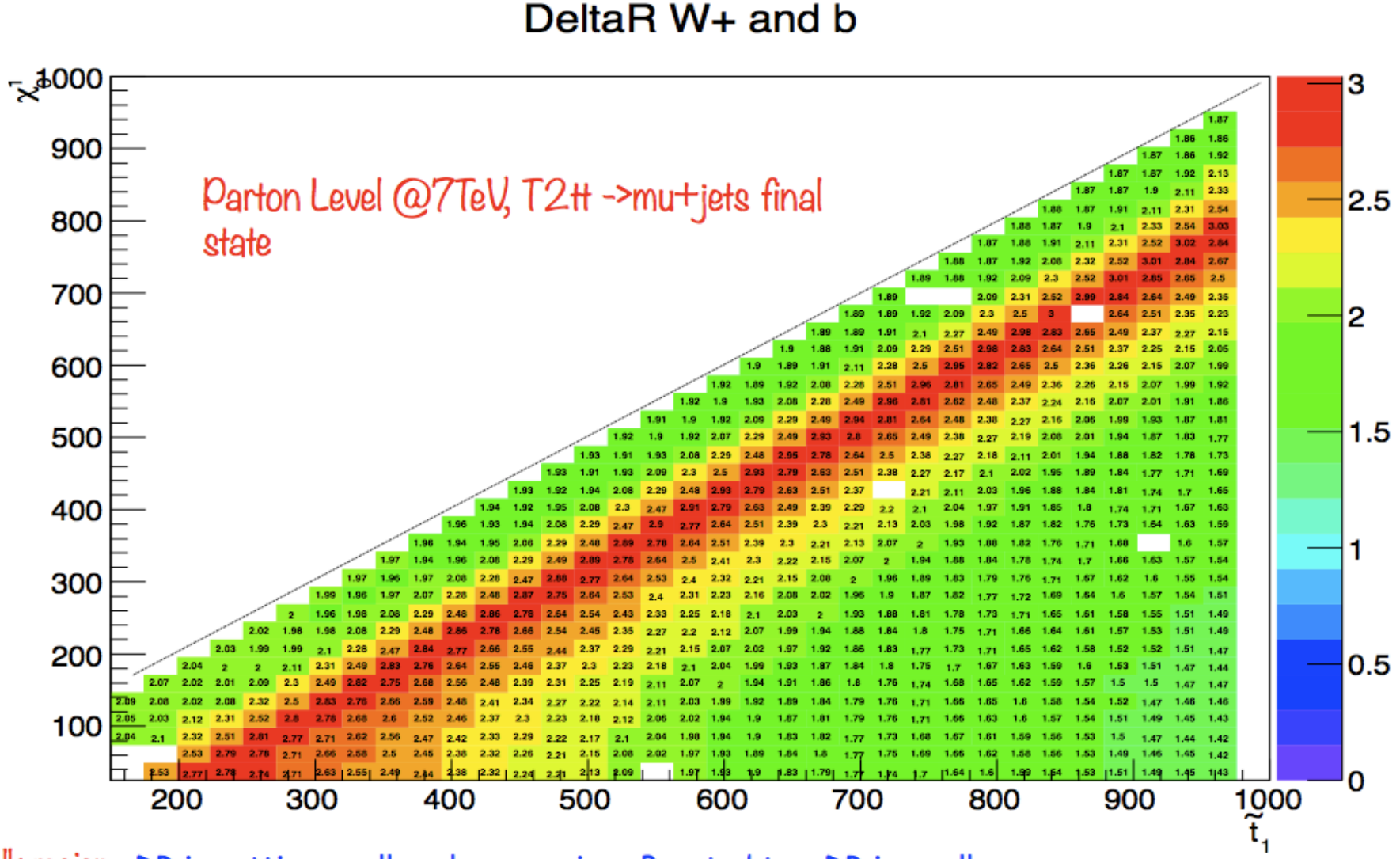
tt~ Pt



Small but discrete differences

HT kinky shape - Maybe not optimal matching choice, but there is something..

Simplified Models in CMS



Bulk region : DR is getting smaller along x-axis -> Boosted top, DR is smaller
DR is getting bigger for fixed stop mass, (along y axis)-> Top is "slower"

Diagonal: DR is getting smaller again – Deep off-shell stop & top decays might be the answer why.ISR plays a role?

CMS 7TeV MC Campaign

Huge task and a big challenge with no doubt

More than 10B @parton Level
More than 3B Fully Reconstructed and counting…

Parton Level

RqstStat	N	Nevents
Defined	33	2721570000
Done	274	10155950000
GEN	0	0
HiddenDefined	0	0
New	60	4785500000
SUBMIT	16	541500000

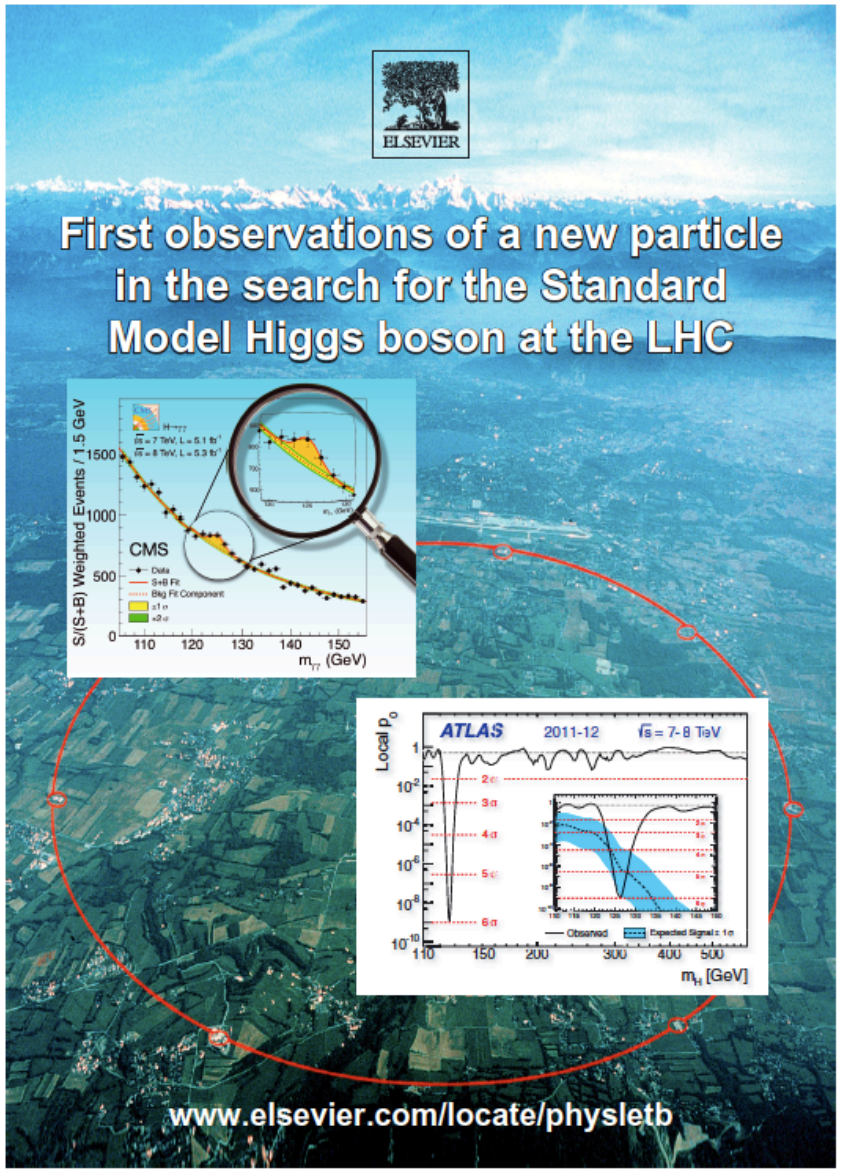
Full Sim

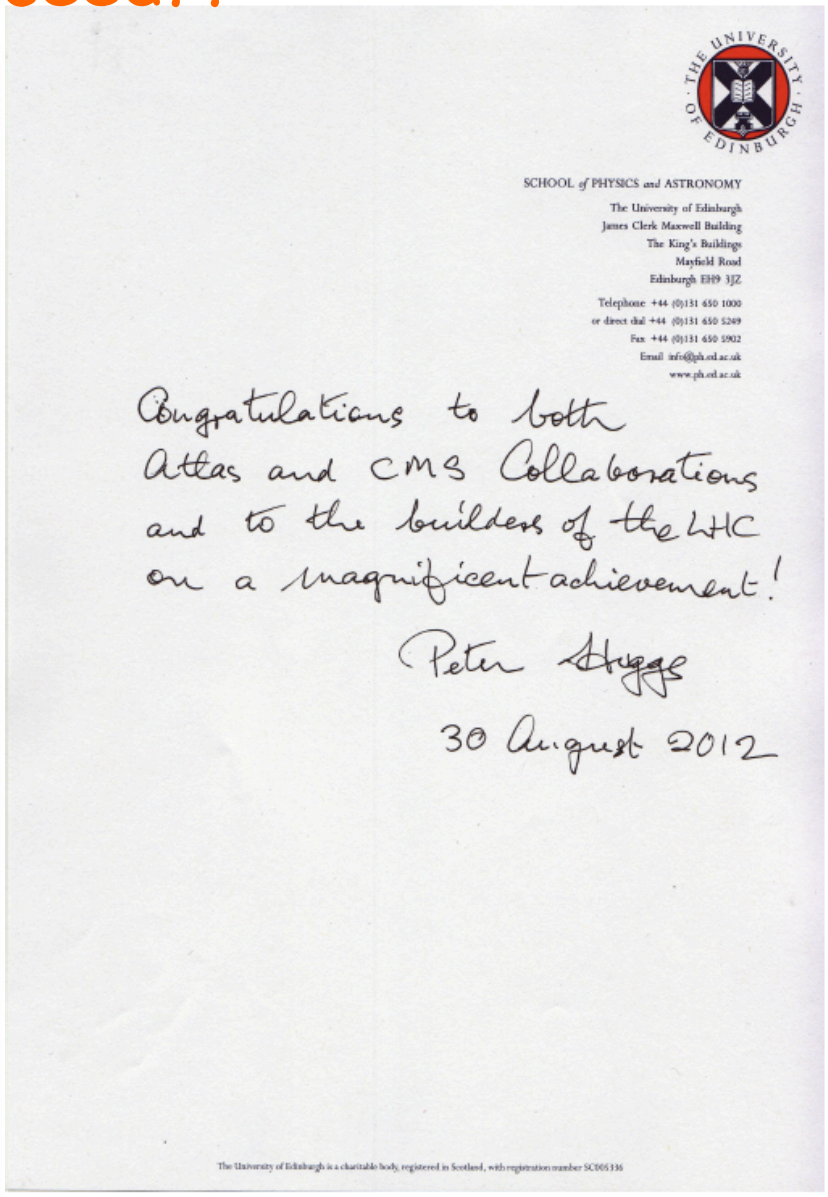
RqstStat	N	Nevents
Defined	89	266740000
Done	3113	3345136832
GEN	0	0
HiddenDefined	83	449544750
New	153	681055180
SUBMIT	269	426710000

- CMS wants to exploits MG in its full potential
  - Dedicated support team for the whole of CMS
  - Preparation for major conferences next year with MG for Signals in SUSY/EXO/B2G..

CMS 7TeV MC Campaign

Did we succeed??





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Congratulations to both Atlas and CMS Collaborations and to the builders of the LHC on a magnificent achievement!

Peter Higgs

30 August 2012

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http://mail.elsevier-alerts.com/go.asp?/bESJ001/mHCLF57F/uXF0O95F/xC0FX57F&utm_source=ESJ001&SIS_ID=1960&utm_term=20121004higgsbosonpts&utm_campaign=&utm_content=&utm_medium=email&bid=GBV657F:XF0O95F

Conclusion

GENERATION

- Really important to model ISR in Signal Scans
  - For some SMS, we can incorporate ISR in one go in MG
  - In general, no applicable to processes like p p > go go + 0,1j
- We definitely need BSM Decay
  - Optimized, debugged, with many decay modes

ACCURACY

Need MC@NLO , BSM@NLO fully intergraded in CMSSW

SYSTEMATICS

Automatic theoretical uncertainties in matched output

VALIDATION

Already having some tools, plans to integrate MadAnalysis in CMSSW

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Last but not least, a big THANKS

-On behalf of the CMS Collaboration.

-Personally for the support 24-h per day (especially Johan,Olivier,Fabio)