Thesis outline

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Introduction

- Standard LHC schpiel, prospects for BSM
- Brief: importance of SUSY, currently mostly unconstrained
- Need both experimental probing and interpretation

Theory

- SM: Brief intro, predictive power (EWPOs), problems (H: w-scattering), hierarchy problem
- BSM: Motivate via problems with SM - i.e. what BSM needs to provide
- SUSY: Basic introduction to construction
- SUSY:
  - motivate R parity via proton
  - RP implies stable neutralino
  - Stable neutralino is CDM candidate
  - Motivate low mass neutralino
  - low mass neutralino implies MET
- Minimal SUSY:
  - MSSM introduction: how to we minimally get what we want from SUSY framework
- Models of SUSY: each gets rough theory treatment, and pheno: what differentiates it, why look for it, what is the “dead end” if any
  - Universal and 2 scale models: cMSSM, vcMSSM, mSUGRA
  - Non-universal models: NUHM{1,2}
  - pMSSM
  - OSET -> SMS

Exploring SUSY models

- Making use of MET signatures: alphaT
  - description
  - QCD backgroud parameterization
  - Signal model examples
  - Likelihood model (b-jet multiplicities)
  - ... (this seciton needs some discussion/input on areas to be covered)
- Results: presented in cMSSM and SMS with scaling (i.e. each of the three results so far)

Constraining models of SUSY

- Existing constraints:
  - EWPOs , bphysics, dark matter, lep higgs
  - Current state of models
- LHC-era constraints:
  - MET, Bsmumu, Xenon
  - Effect of direct searches, progressive (37pb->5fb)
  - Bestfit / benchmark scenarios (work with AbdusSalam et al)
  - State of play (best fit particle spectra, etc. progressive)
  - Comparison of spectra to SMS
  - Most sensitive now to...
- Universal / Two scale model prospects
- Reach of LHC (neutralino mass -> MET, production mech: glu, squ)

Future prospects for SUSY / BSM

- cMSSM / two scales: mostly flat, NUHM2 only real “predictive”
- Might not be something universal / RGE motivated:
  - pMSSM

Conclusion