LEPTONIC SUSY SEARCH WITH SAME SIGN DIMUONS

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OUTLINE

- Review of the analysis strategy
- Work environment and dataset
- Signal selection
- First look at OS muons end point
- To do list

THE ANALYSIS STRATEGY

- Glunio as a Majorana particle has equal probability to cascade decay to either a positive or a negative muon. Squark is another source of dimuons.

  (this channel can efficiently suppress SM background with the topology of SS dimuons,high pt jets and large missing ET.)

$$qq \to \tilde{g}\tilde{g} \to \tilde{\chi}_1^+ q\bar{q}\,\tilde{\chi}_1^+ q\bar{q} \to \tilde{\chi}_1^0 \mu^+ \nu_\mu q\bar{q}\,\tilde{\chi}_1^0 \mu^+ \nu_\mu q\bar{q} \to 2\mu^+ + 4Jets + MET$$

- The Strategy is to search for excess in number of events over expected number from SM background events.(counting experiment)

WORK ENVIRONMENT AND DATASET

- Work with CMSSW_2_2_1
- SUSY data LM1 point
  /SUSY_LM1_sftsht/Summer08_IDEAL_V11_redigi_v1/GEN_RAW_RECO (Does anybody know the meaning of the name?)
  76000 SUSY Events (free decay)

SIGNAL SELECTION (1/3)

- Muon Selection:

  same sign

  Pt>10GeV

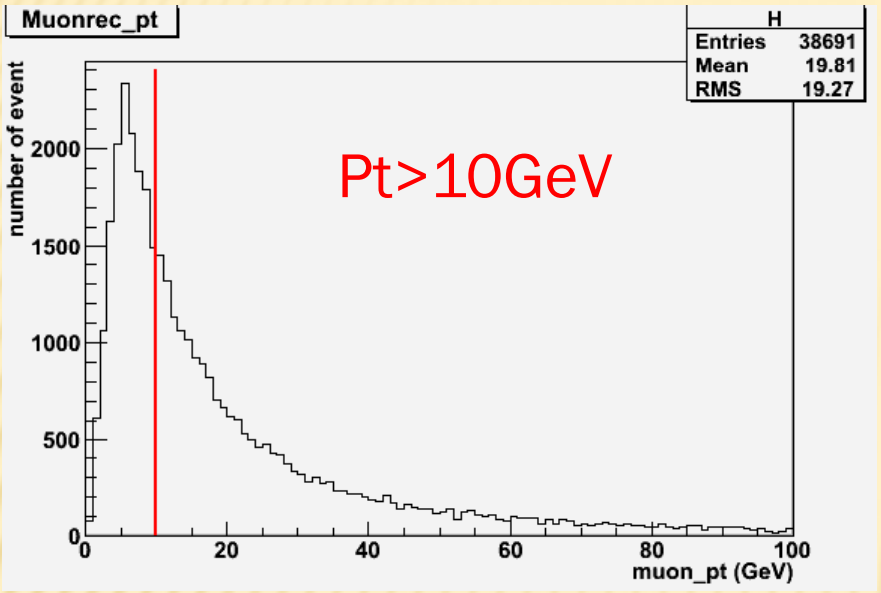
  $\Delta R \geq 0.01$

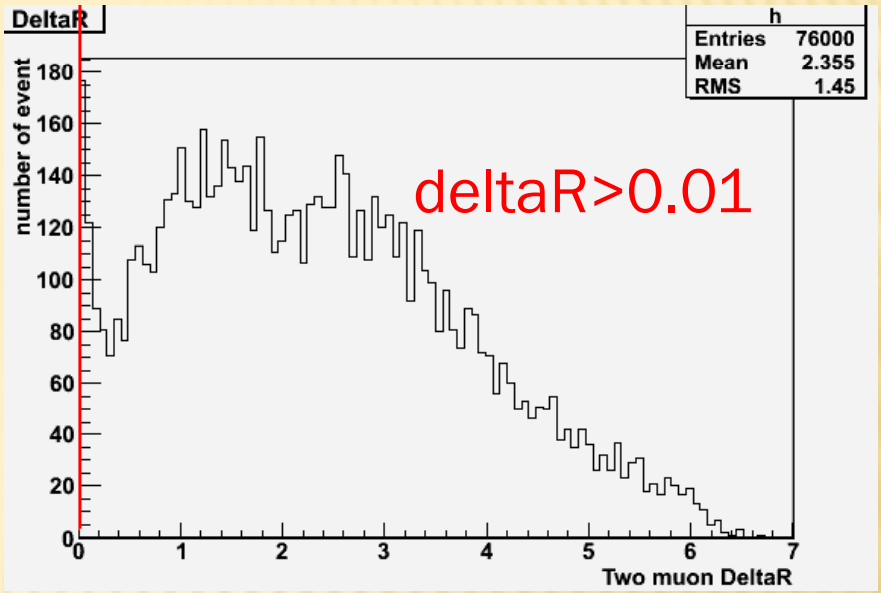
  normalizedChi2≤3

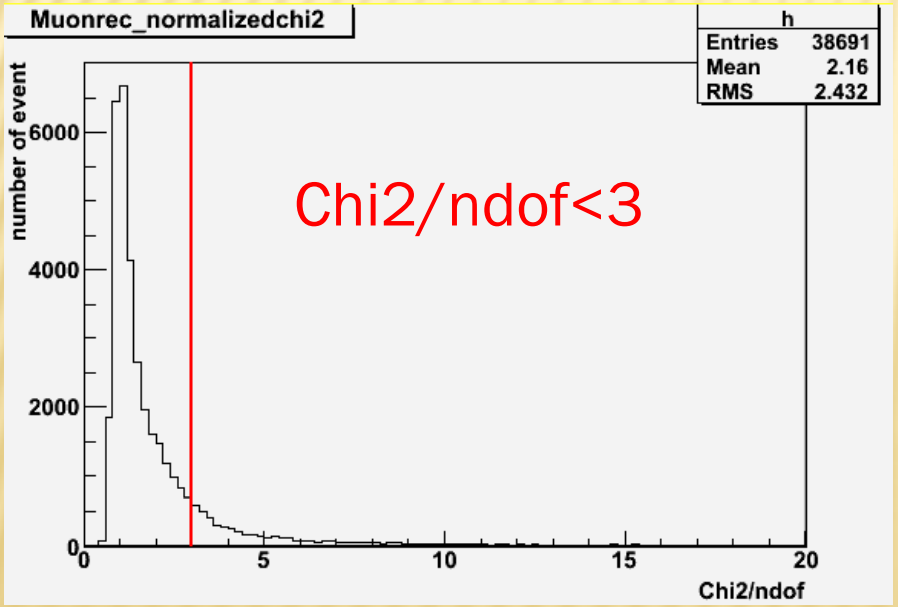
  number of valid hit >13

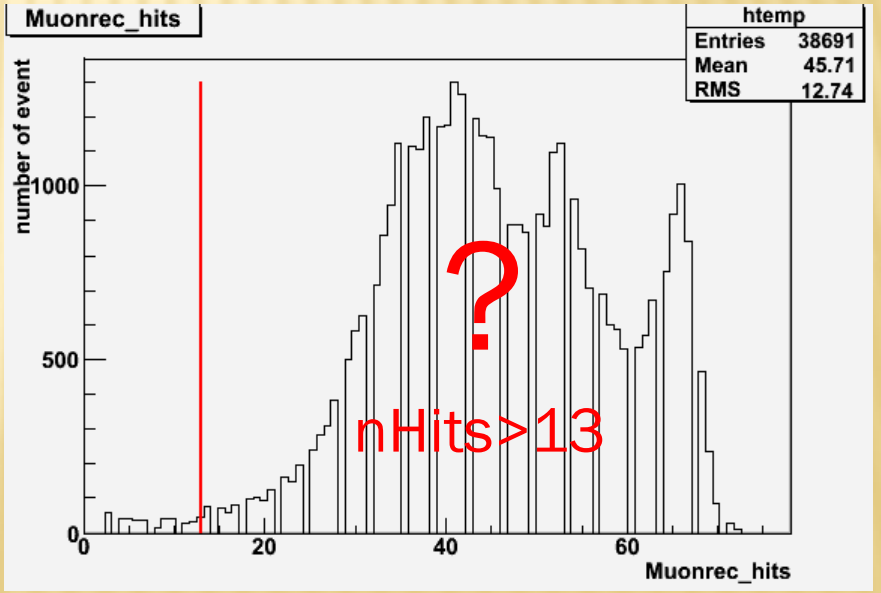
  Iso = IsoByTk+0.75*IsoByCalo (Iso$\mu_1 \leq$10GeV,Iso $\mu_2 \leq$ 6GeV)

  (no yet ?)


Muonrec_pt
H
Entries 38691
Mean 19.81
RMS 19.27
number of event
muon_pt (GeV)
Pt>10GeV


DeltaR
h
Entries 76000
Mean 2.355
RMS 1.45
number of event
Two muon DeltaR
deltaR>0.01


Muonrec_normalizedchi2
h
Entries 38691
Mean 2.16
RMS 2.432
number of event
Chi2/ndof
Chi2/ndof<3

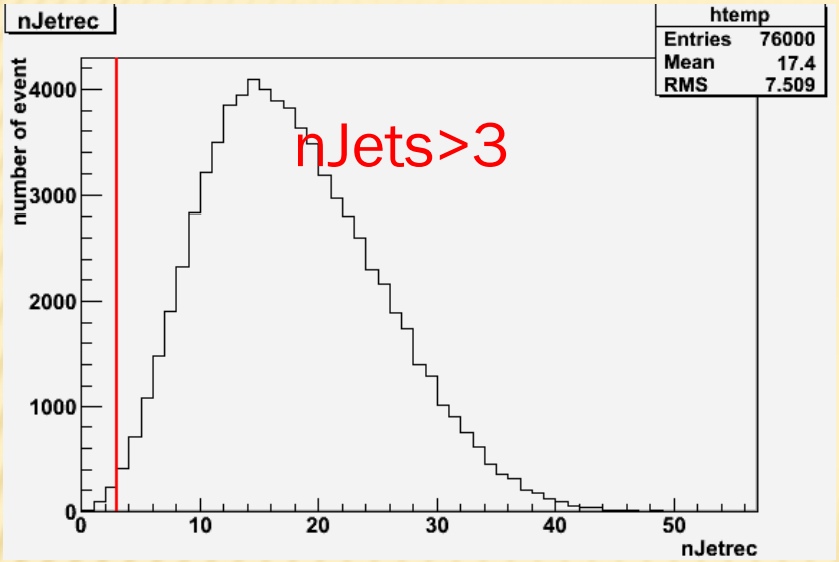

Muonrec_hits
htemp
Entries 38691
Mean 45.71
RMS 12.74
number of event
Muonrec_hits
?
nHits>13

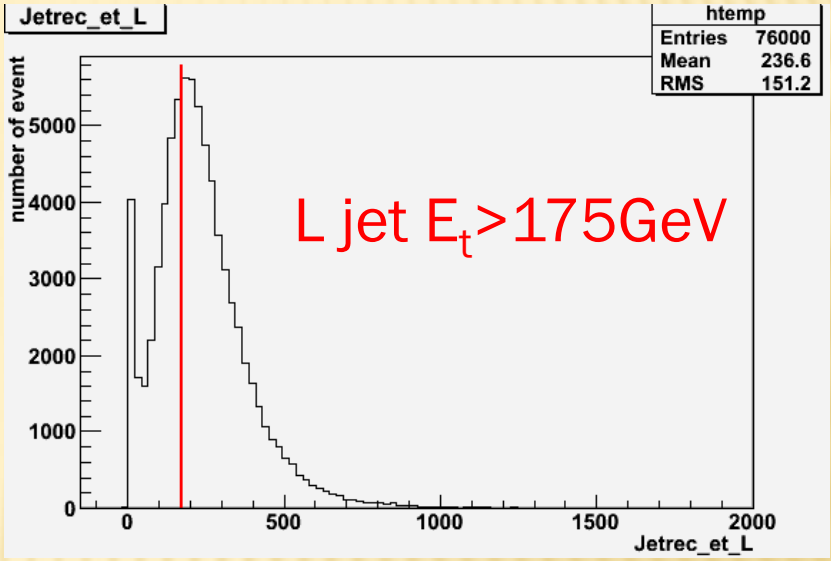
SIGNAL SELECTION (2/3)

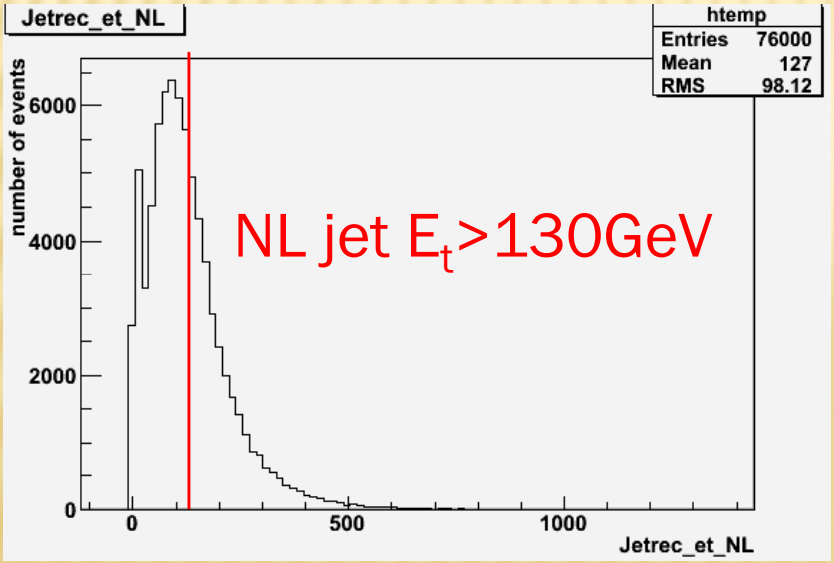
- Jet Selection:

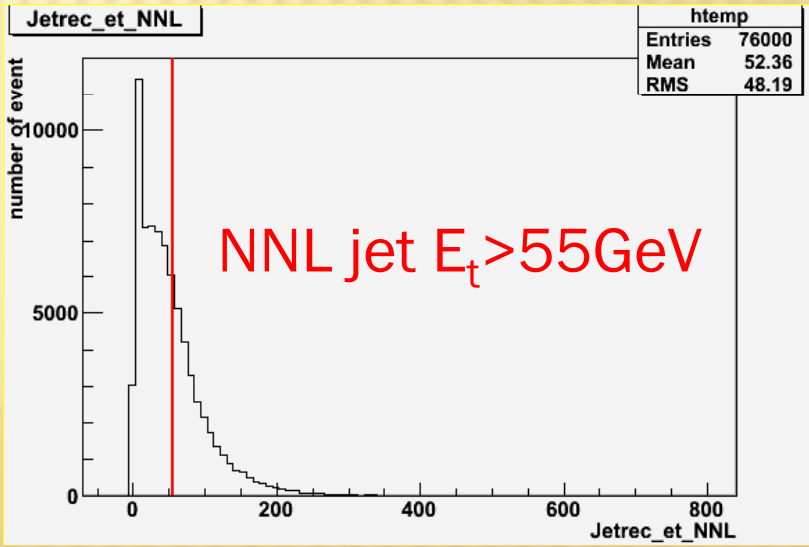
  nJets > 3

$$E_T^{j1} > 175GeV \quad E_T^{j2} > 130GeV \quad E_T^{j3} > 55GeV$$


nJetrec
htemp
Entries 76000
Mean 17.4
RMS 7.509
number of event
nJetrec
nJets>3


Jetrec_et_L
htemp
Entries 76000
Mean 236.6
RMS 151.2
number of event
Jetrec_et_L
L jet E_t>175GeV


Jetrec_et_NL
htemp
Entries 76000
Mean 127
RMS 98.12
number of events
Jetrec_et_NL
NL jet E_t>130GeV


Jetrec_et_NNL
htemp
Entries 76000
Mean 52.36
RMS 48.19
number of event
Jetrec_et_NNL
NNL jet E_t>55GeV

SIGNAL SELECTION (3/3)

- MET Selection:

  MET>200GeV

RESULT

- We have 76000 SUSY events, and 172 events pass all above cuts.

FIRST LOOK (OS DIMUONS END POINT)

Muon selection:

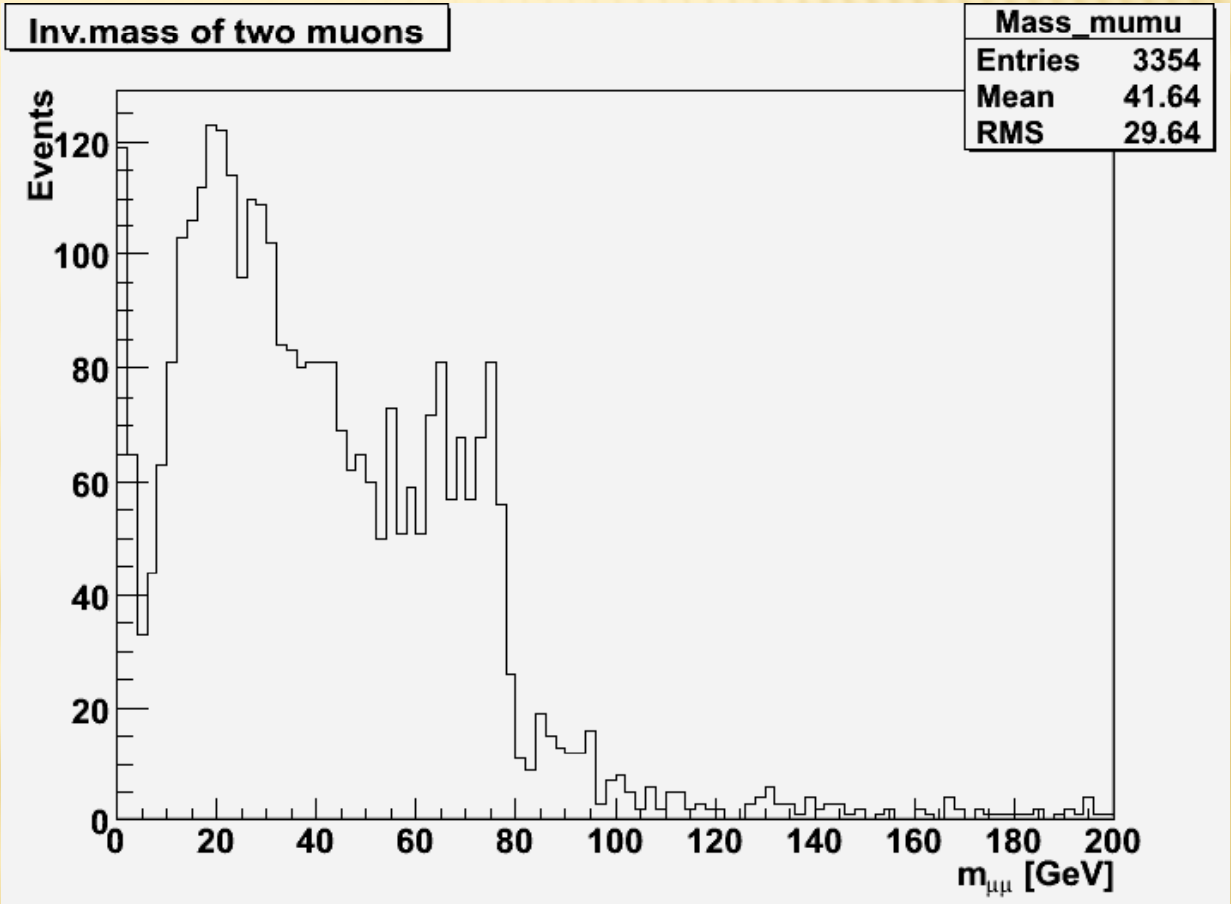
$Pt > 5GeV$

$|\eta| < 2.4$

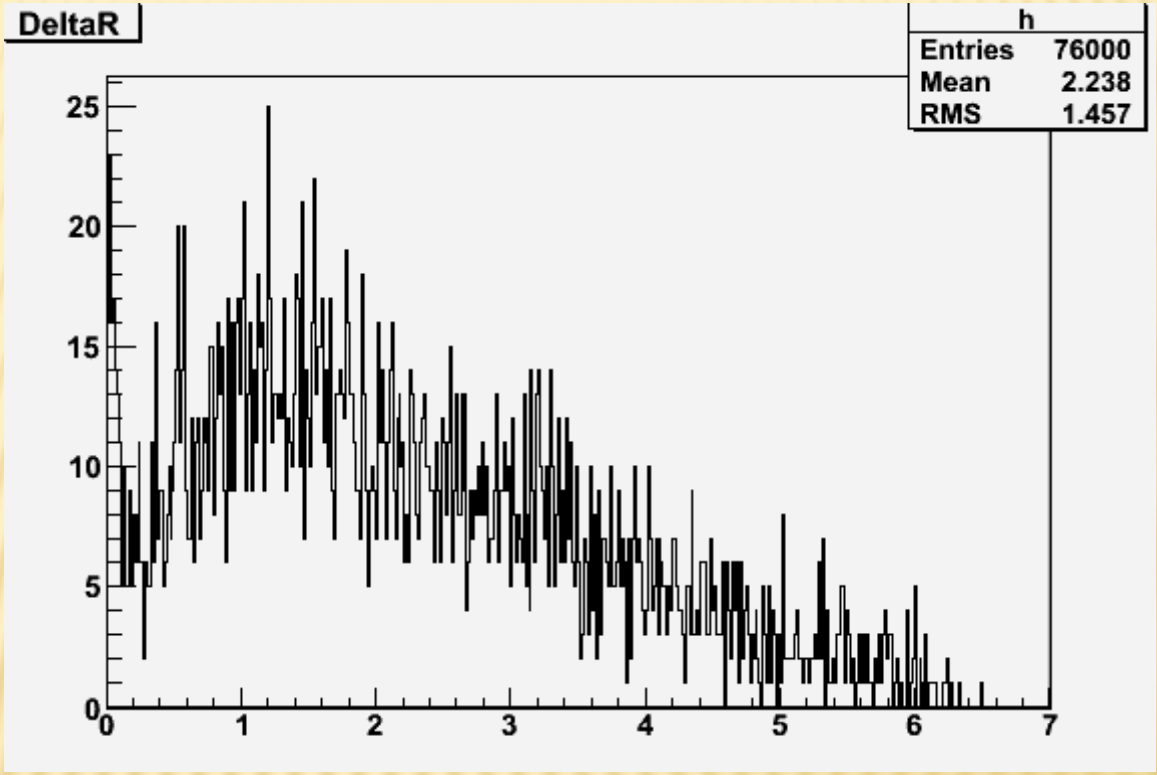
$nHits > 11$

$d0 < 0.2$

No jet and MET cuts



TWO MUONS ΔR DISTRIBUTION



TO DO LIST

- Study Data Format (very collection, very module, very member function)
- Study SS dimuon trigger efficiency (very important)
- Analysis SM background (QCD,ttbar.....)