

Like-sign Di-Muon Update

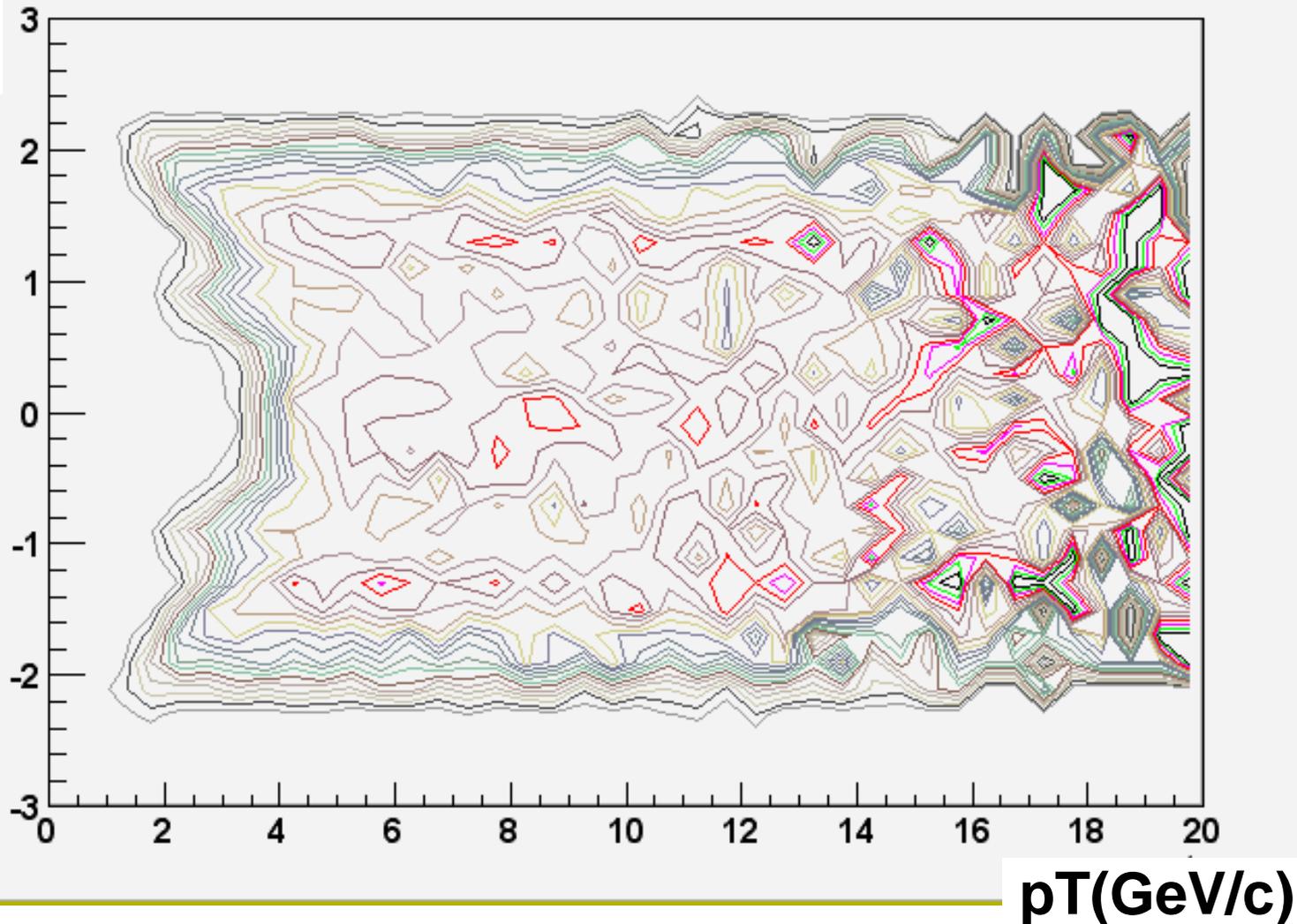
- Currently concentrating on MC backgrounds
 - $b\bar{b}$, $c\bar{c}$, WZ , ZZ , $Wb\bar{b}$
- Generated 19.2pb^{-1} of inclusive $b\bar{b}$ with $p_T > 20\text{GeV}/c$ ($\sigma = 0.12\mu\text{b}$) with p13.04.00
 - Use d0mess to require 2 MC muons, no p_T cut
 -
 - 2,300,000 pythia events, 154,653 selected
- Use this to tune cuts for MC generation
 - Need to lower generator p_T threshold
 - $\sigma \times \text{d0mess cut fraction}$ is larger at $p_T > 10\text{GeV}/c$
 - Need $\sim 70\text{pb}^{-1}$ integrated luminosity

RECO vs. MC Muon Efficiency

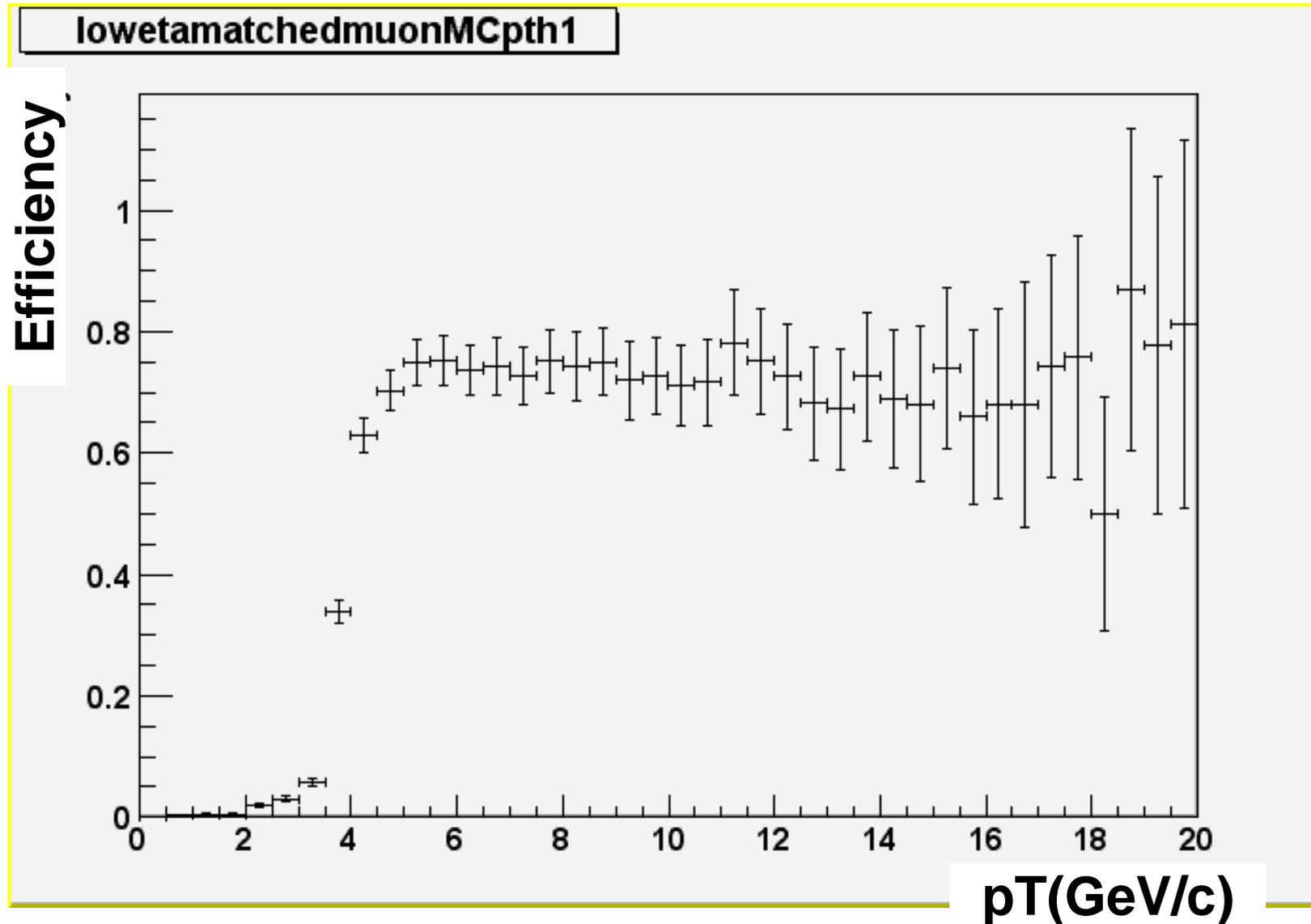
- Search for RECO muon matching MC muon
 - RECO muons require $n_{\text{seg}}=3$ and $0 < \chi^2 < 200$
 - Require $\Delta R < 0.1$ for match
- Calculate efficiency as $N(\text{MC}+\text{match})/N(\text{MC})$
- First plot efficiency for MC muon p_T vs η
 - Select low η region ($|\eta| < 0.4$) since it has highest p_T threshold
- Plot efficiency as a function of MC muon p_T for muons with $|\eta| < 0.4$
 - Full efficiency at MC $p_T > 5 \text{ GeV}/c$
 - Absolute efficiency not relevant since sample includes MC muons outside detector acceptance (φ)

Efficiency: MC p_T vs. η

Reco μ pt vs. η efficiency

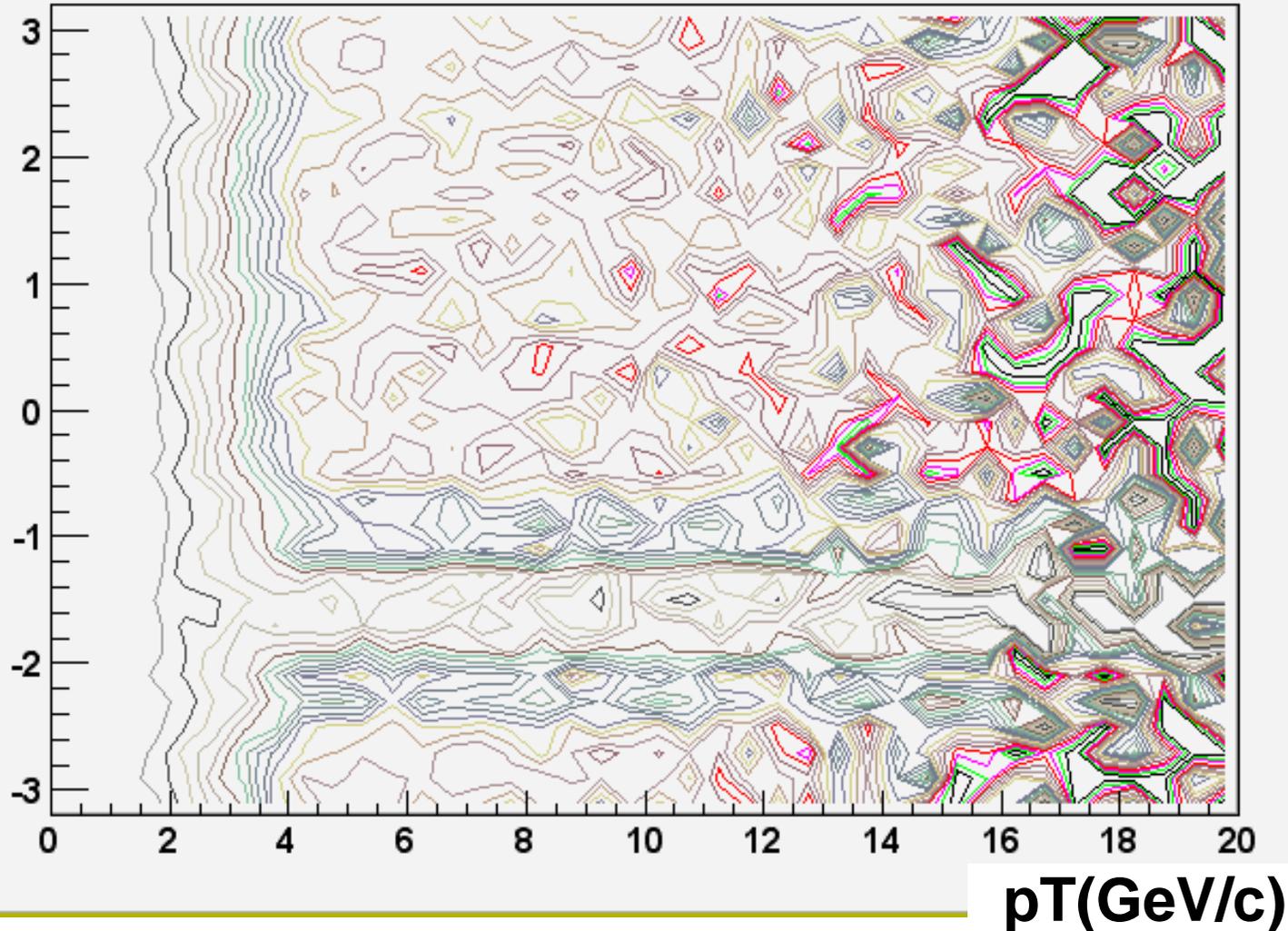


Low Eta Muons $\varepsilon(\text{MC } p_T)$



Efficiency: MC p_T vs. ϕ

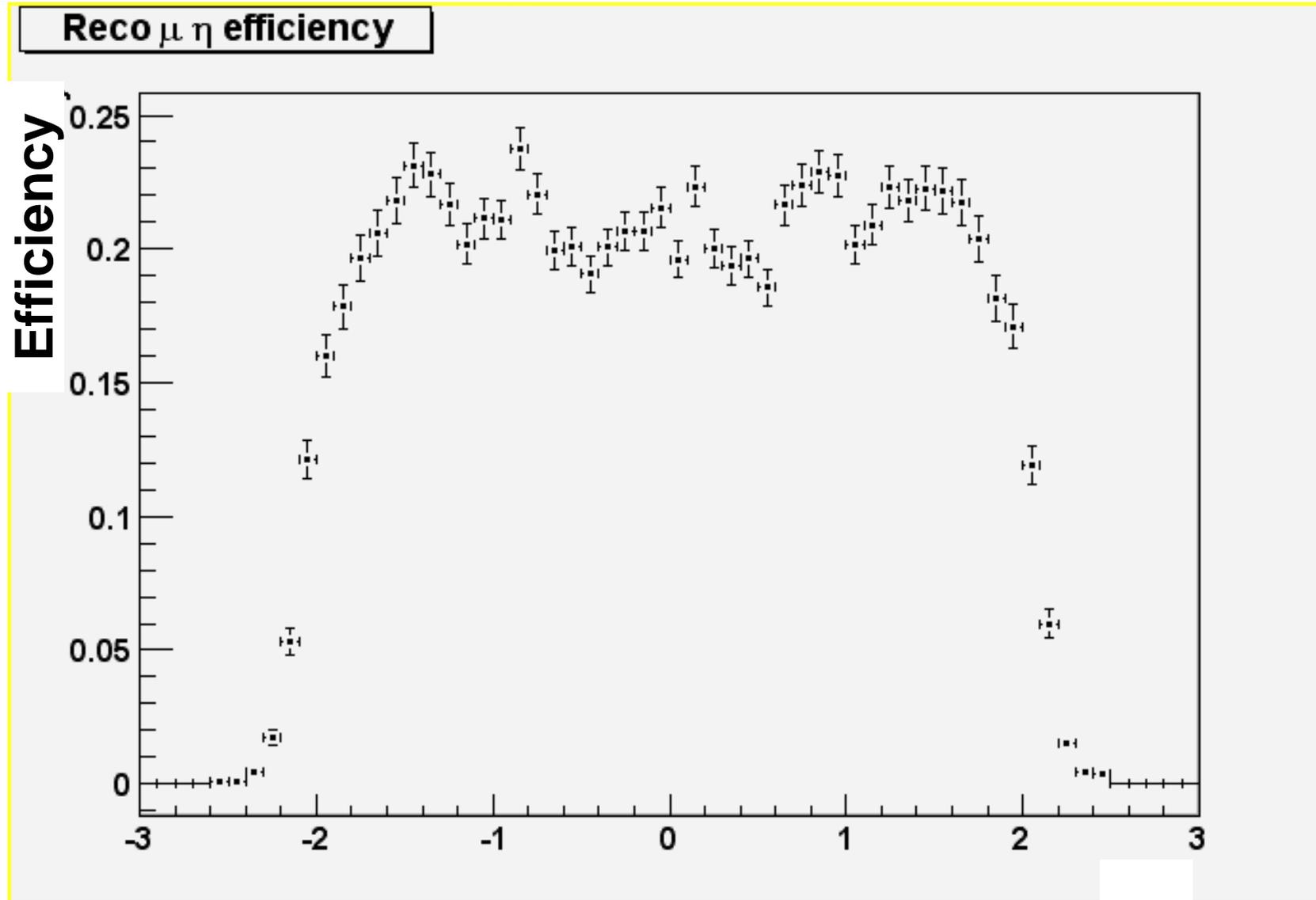
Reco μ pt vs. ϕ efficiency



Eta Acceptance and Cuts

- Examine eta range for RECO muons
 - Plot efficiency as function of eta
 - Track requirement reduces acceptance
- Translate these plots into tighter d0mess cuts
 - Require 2 muons with $p_T > 4 \text{ GeV}/c$ and $|\eta| < 2.5$
- New MC jobs currently running (p13.06.01)
 - Lower bbbar p_T to $10 \text{ GeV}/c$ ($\sigma = 1.74 \mu\text{b}$)
 - 1,000,000 pythia events cut to $\sim 1,300$
 - Need 121.8M for 70 pb^{-1} i.e. $\sim 160,000$ events RECO'd
 - Lower bbbar p_T threshold ($5 \text{ GeV}/c$) does not change $\sigma \times \text{d0mess cut fraction}$ (checked for 100k events)

Eta Efficiency



Samples Being Generated

- Full (70 pb^{-1}) samples being generated now
 - $b\bar{b}$ and $c\bar{c}$ with $p_T > 10 \text{ GeV}/c$
 - WZ and ZZ with $p_T > 5 \text{ GeV}/c$
 - mSUGRA W1+Z2 with $p_T > 5 \text{ GeV}/c$ ($\sigma=4.2 \text{ pb}$)
 - ♦ $\tan\beta=3$, $m_0=100 \text{ GeV}$, $m_{1/2}=100 \text{ GeV}$, $A_0=0$, $\text{sign } \mu=-$
 - Don't yet know how to make OneTop run with mc_runjob: needed for Wbbbar background
- Next stage measure trigger efficiency w/data
 - Use NP dimuon stream, select events using Cal based trigger and look at L1 and L2 trigger bits
 - Starting on this while we wait for MC...

bbbar Background

- Ran current cuts on 19.2pb^{-1} b-bbar sample
 - 2,300,000 pythia events
 - 154,653 passed d0Mess cuts
 - 15,193 passed L1+L2 trigger (no L3 trigger)
 - 2,770 have two "good" RECO muons
 - ♦ $n_{\text{seg}}=3$, $0 < \chi^2 < 200$, $p_{\text{T}} > 5.0 \text{ GeV}/c$
 - 1,209 have 2 like sign muons
 - 19 have 2 isolated, like sign muons
 - ♦ isolated track, $E(0.4 \text{ cone} - 0.15 \text{ cone}) < 1.0 \text{ GeV}$
- Current cuts give $\sim 1 \text{ pb}$ b-bbar background vs. 4.2 pb generator cross-section for SUSY point being considered