

# RA4 Muon Study

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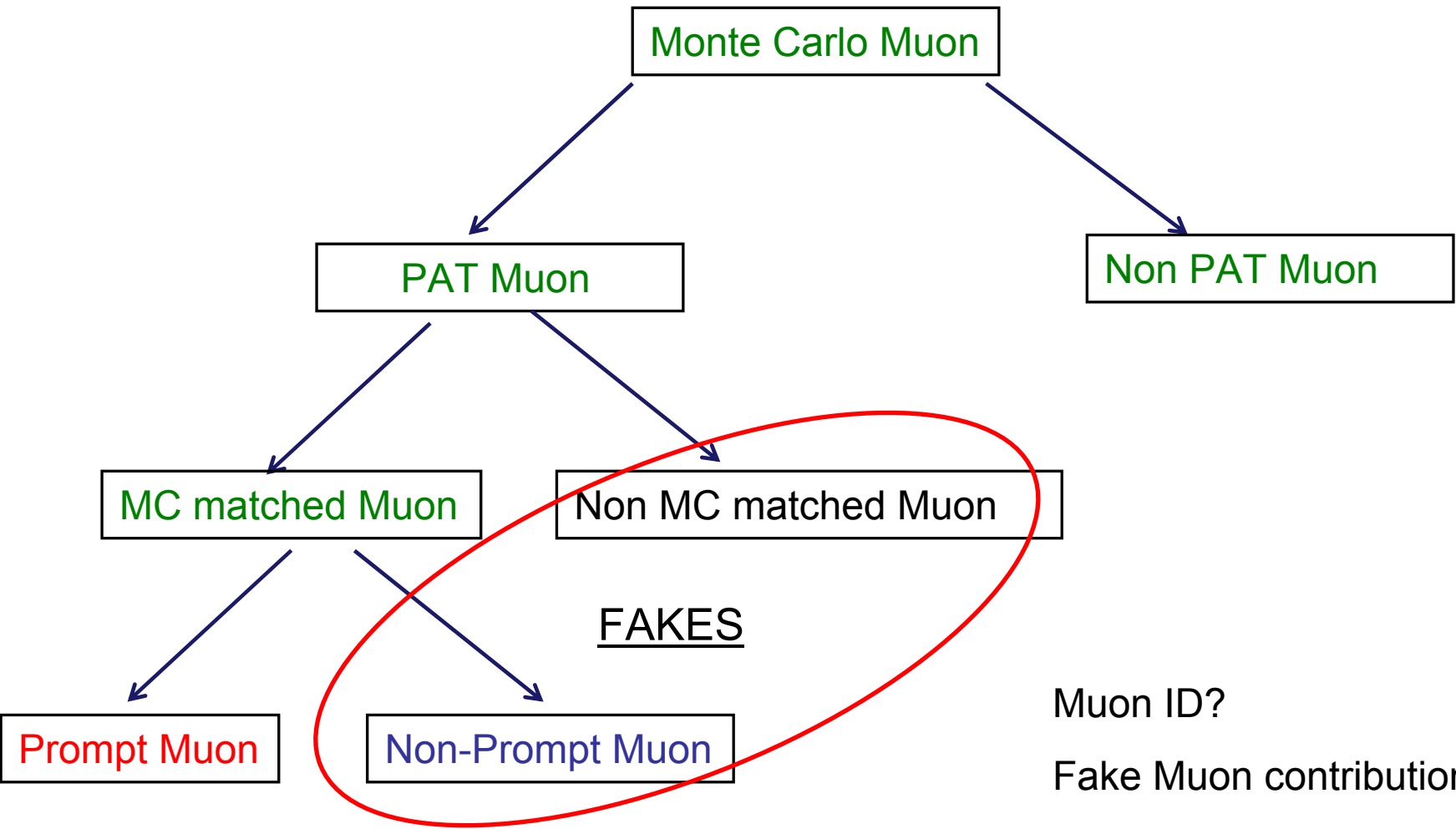
Weekly Budapest-Debrecen-CERN meeting

*Supported by NKTH and OTKA (NK67974, 74153, H07-C 74281 )*

31/08/2009

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Muon ID?  
 Fake Muon contribution?  
 Efficiency?

# RA4 Muon selection (baseline cuts)

Quantity	PAT Object and Member Function	Cut	Comment
Mu type	pat::Muon => isGood("GlobalMuonPromptTight")	GlobalMuonPromptTight	Chi <sup>2</sup> <10
p <sub>T</sub>	pat::Muon => pt()	≥ 20 GeV	
abs(eta)	pat::Muon => eta()	≤ 2.1	
Rel. Isolation	pat::Muon => hcallIso(), ecallIso(), trackIso(), pt()	< 0.1	
chi <sup>2</sup> /dof	pat::Muon => combinedMuon()->chi2(), combinedMuon() ->ndof()	< 10	
abs(d <sub>0</sub> )	pat::Muon => track()->d0 *	< 0.2 cm	
N hits	pat::Muon => track()->numvalhits()	≥ 11	
HCal Iso Deposit E	pat::Muon => hcallIsoDeposit->candEnergy()	< 6	
ECal Iso Deposit E	pat::Muon => ecallIsoDeposit->candEnergy()	< 4	

Requirement	Comment
Global normalized- $\chi^2 < 10$	Watch out for long tails in real data
$ d_0  < 2$ mm	From beamspot; could be tighter; careful about b-quarks
$N_{hits} \geq 11$	Could be made as function of $\eta$
Reject fits ending in 1st barrel station	Watch out for low $p_T$
Reject fits ending in 1st endcap station	Must wait for fix in CMSSW 2.2.0

Table 1: Summary of baseline global muon requirements. Only the first requirement is implemented in GlobalMuonPromptTight.

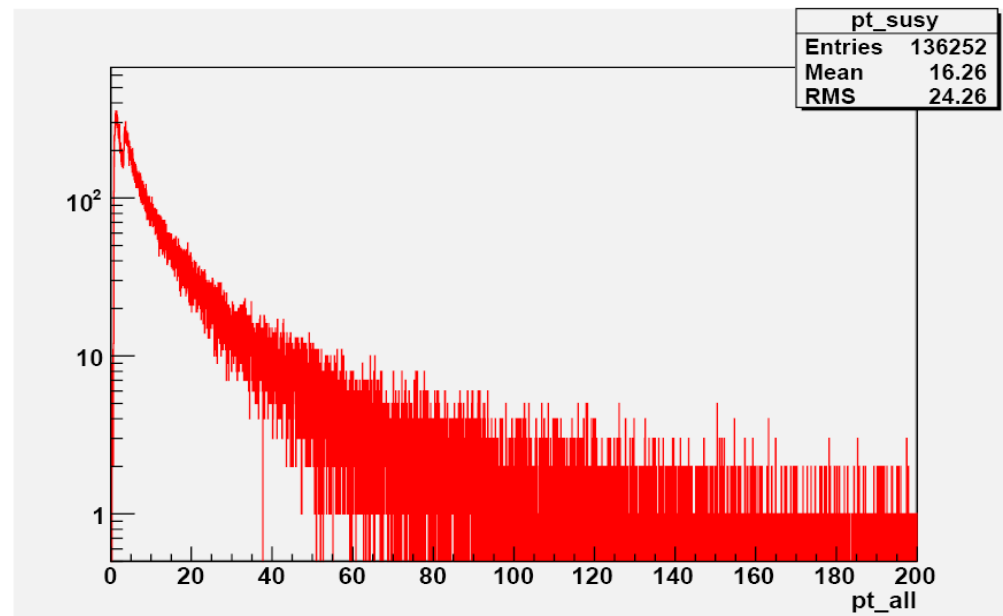
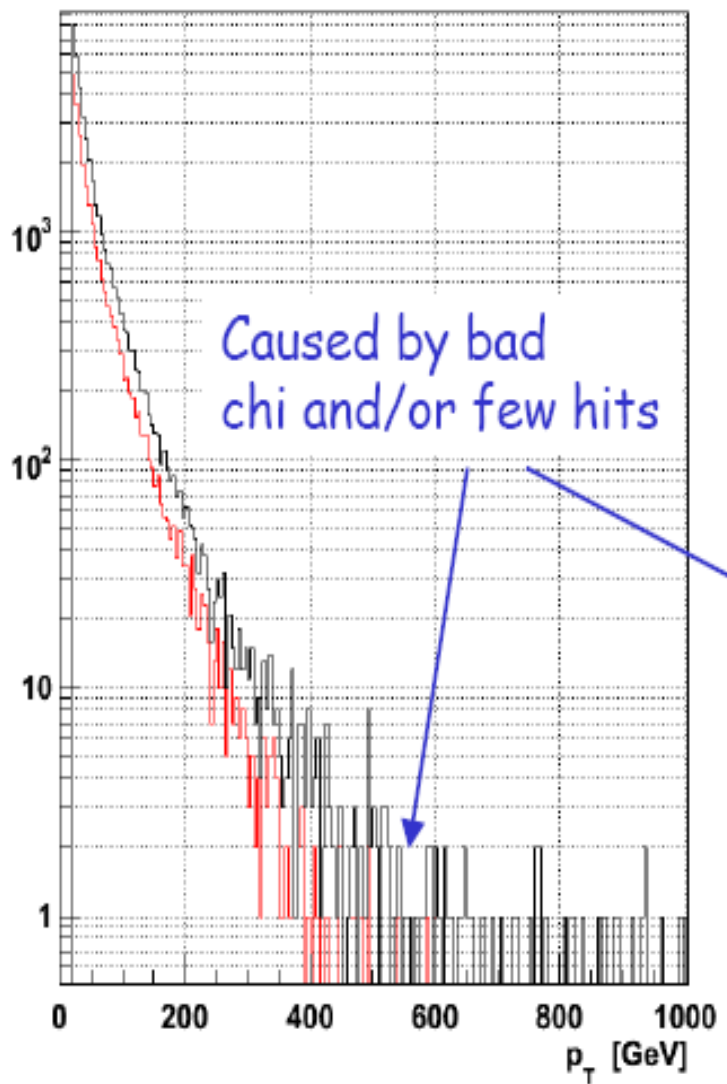
More detailed in: [https://twiki.cern.ch/twiki/bin/view/CMS/SusyRA4SingleMuonProjectTable#Muon\\_Selection](https://twiki.cern.ch/twiki/bin/view/CMS/SusyRA4SingleMuonProjectTable#Muon_Selection)

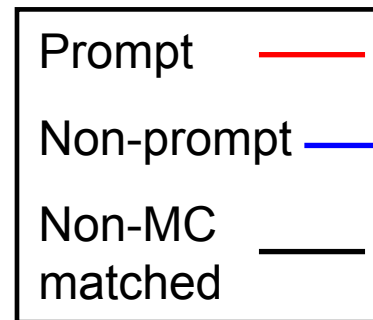
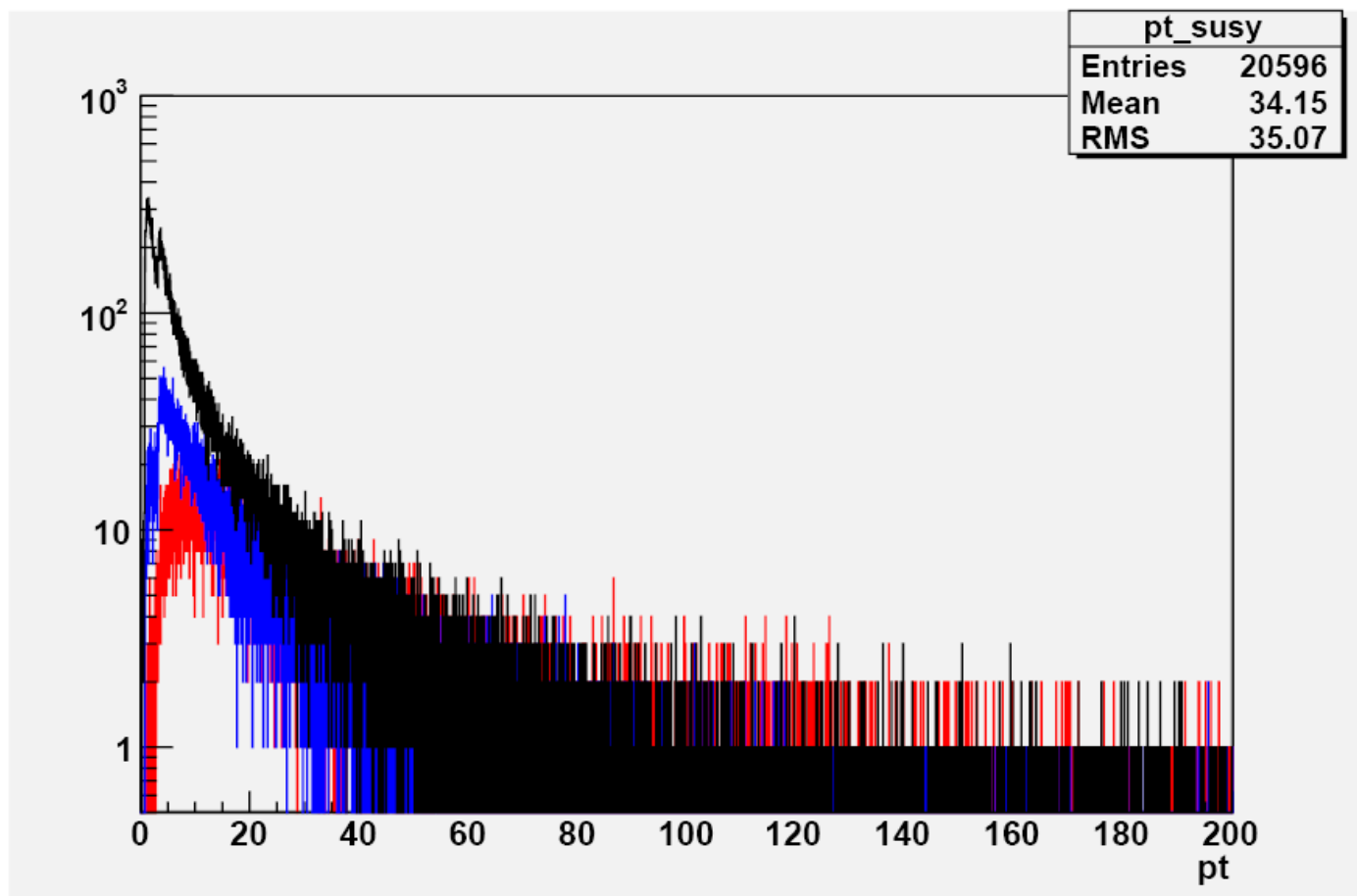
Quantity	PAT Object and Member Function	Cut	Comment
Mu type	pat::Muon => isGood("GlobalMuonPromptTight")	GlobalMuonPromptTight	OK
p_T	pat::Muon => pt()	<del>≥ 20 GeV</del> > 10 GeV	
abs(eta)	pat::Muon => eta()	≤ 2.1	OK
<del>Rel. Isolation</del>	<del>pat::Muon =&gt; caloose(), ecaloose(), trackloose(), pt()</del>	<del>&lt; 0.1</del>	
chi <sup>2</sup> /dof	pat::Muon => combinedMuon()->chi2(), combinedMuon()->ndof()	< 10	OK
abs(d_0)	pat::Muon => track()->d0 *	< 0.2 cm	OK
N hits	pat::Muon => track()->numvalhits()	≥ 11	OK
<del>HCal E</del>	<del>pat::Muon =&gt; hcalooseDeposit-&gt;sumEnergy()</del>	<del>&lt; 6</del>	
<del>ECal E</del>	<del>pat::Muon =&gt; ecalooseDeposit-&gt;sumEnergy()</del>	<del>&lt; 4</del>	

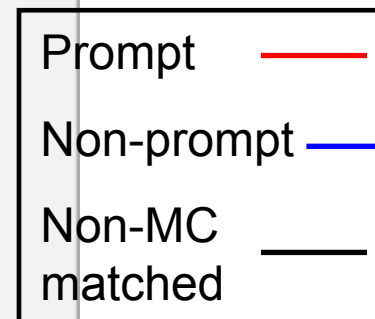
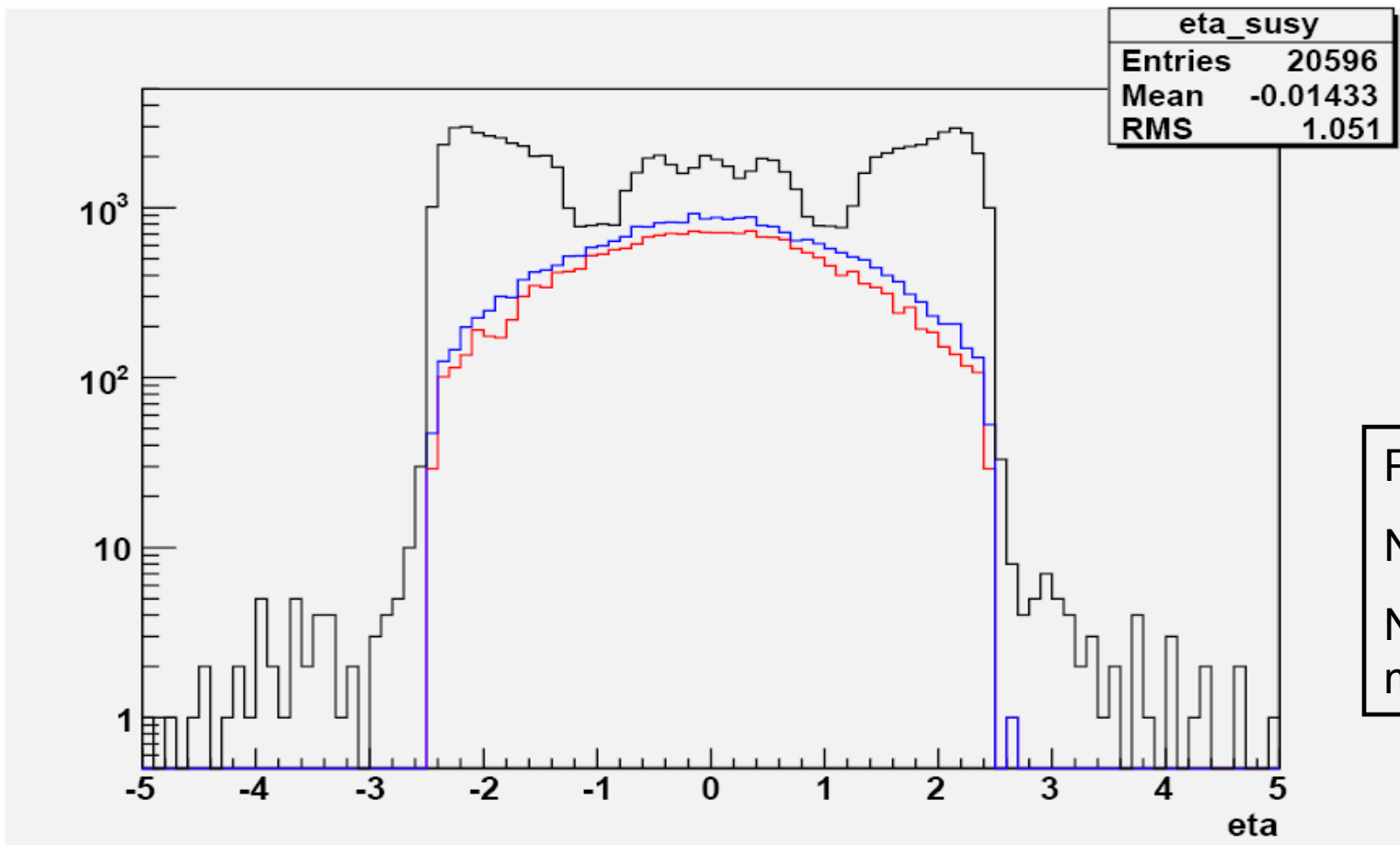
TrkIso pat::Muon->trackIso() < 6 GeV  
 ECalIso pat::Muon->ecalIso() < 6 GeV  
 HCalIso pat::Muon->hcalIso() < 6 GeV

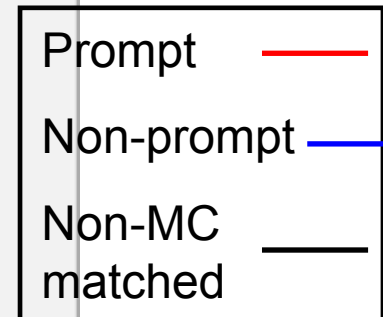
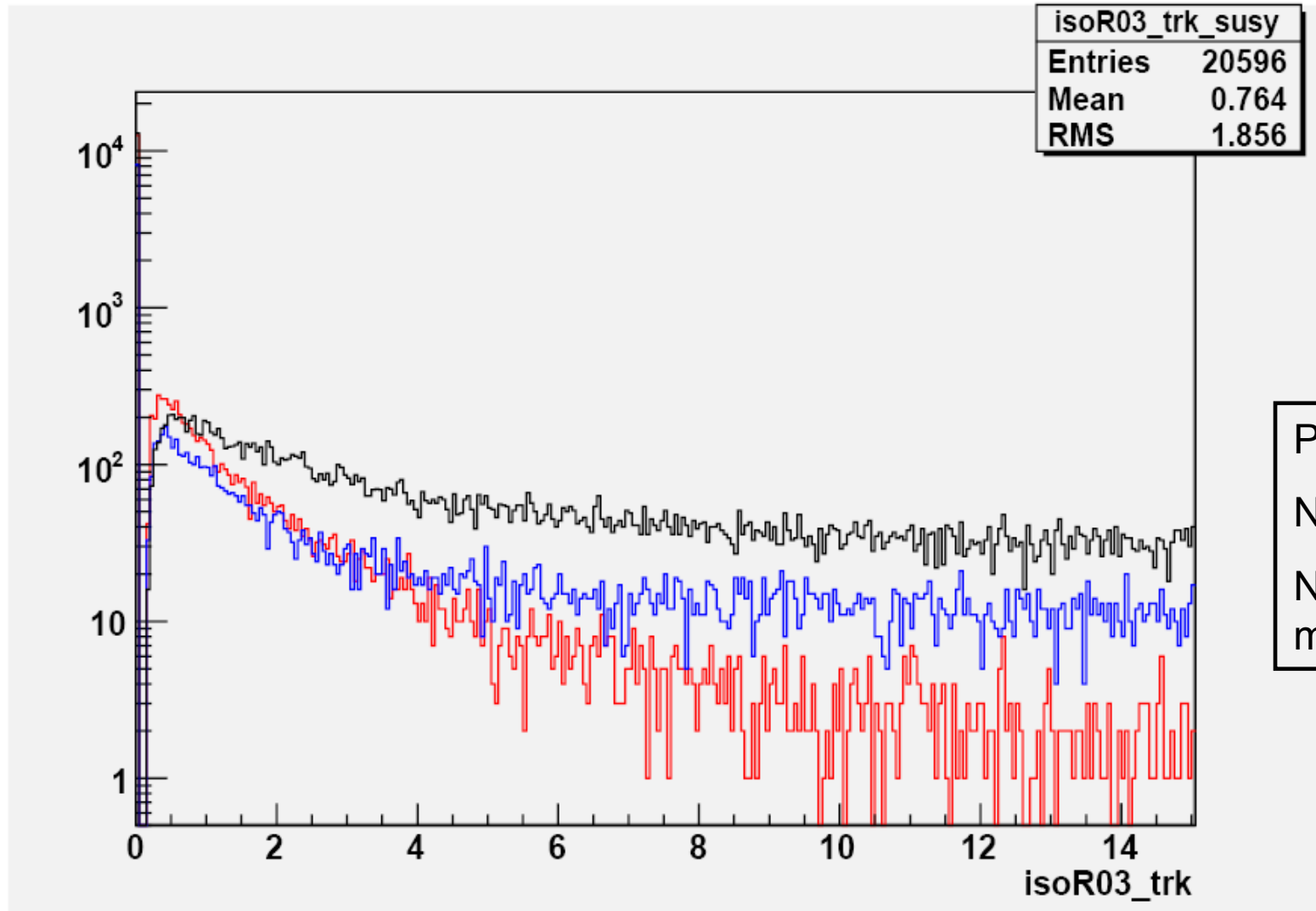
More detailed in: [Muon Id for RA4 – Follow up \(02/07/2009\)](https://twiki.cern.ch/twiki/bin/view/CMS/SusyRA4SingleMuonProjectTable#Muon_Selection),  
[https://twiki.cern.ch/twiki/bin/view/CMS/SusyRA4SingleMuonProjectTable#Muon\\_Selection](https://twiki.cern.ch/twiki/bin/view/CMS/SusyRA4SingleMuonProjectTable#Muon_Selection)

Im1

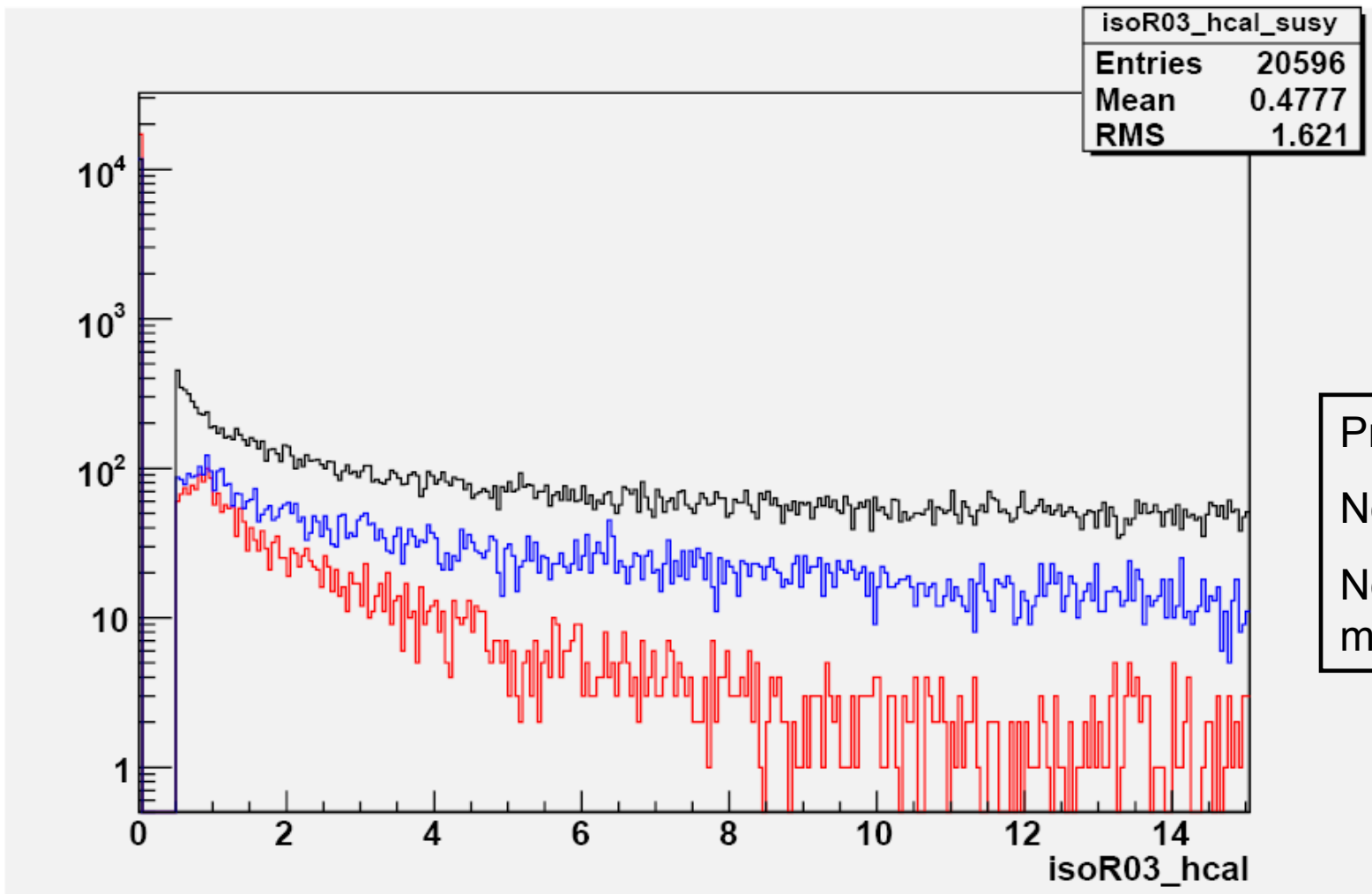


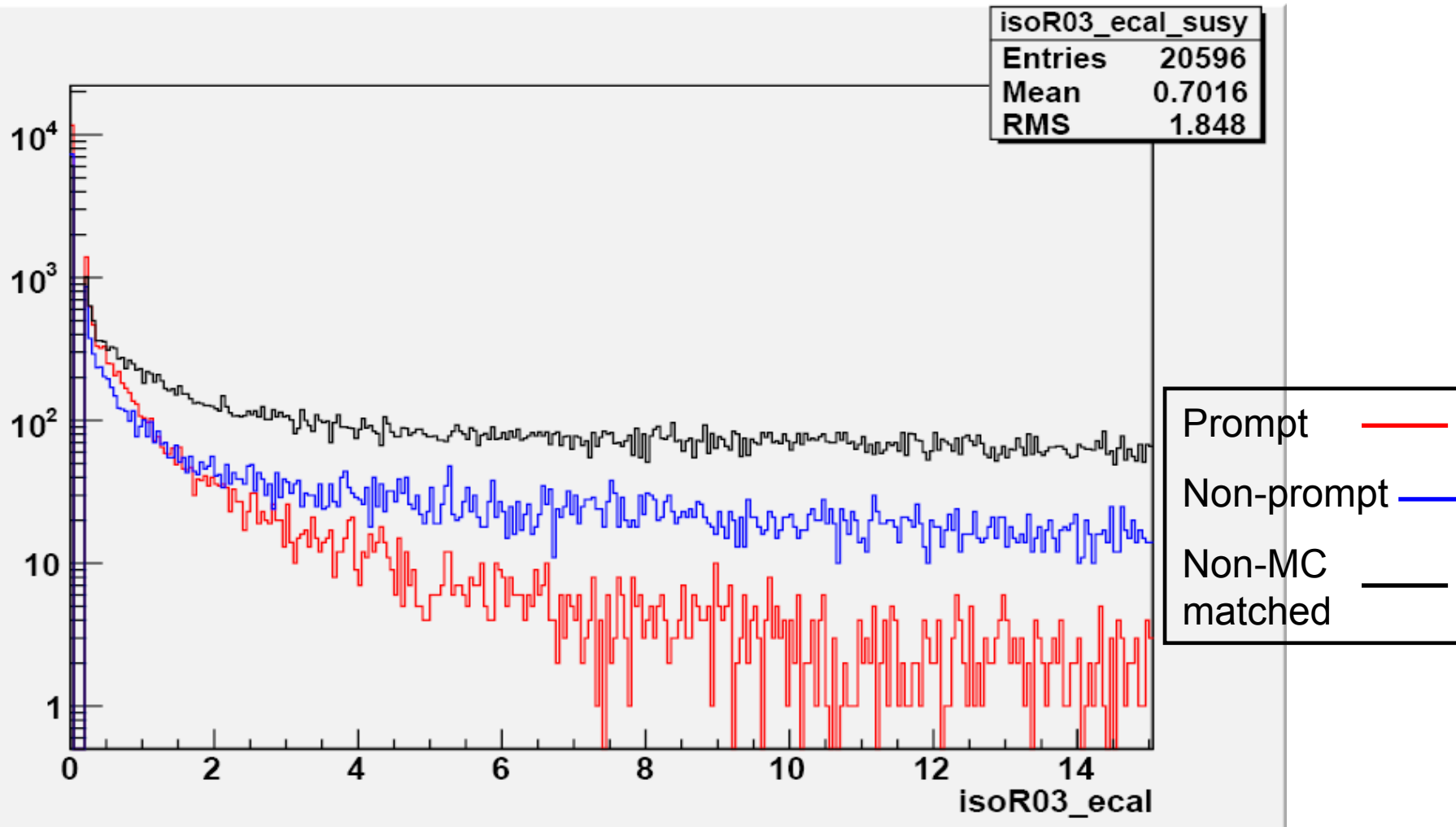


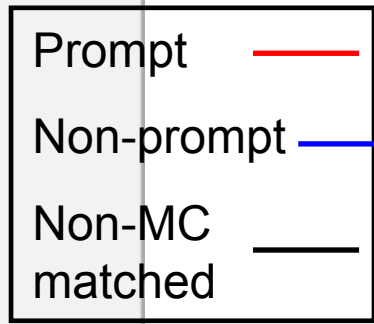
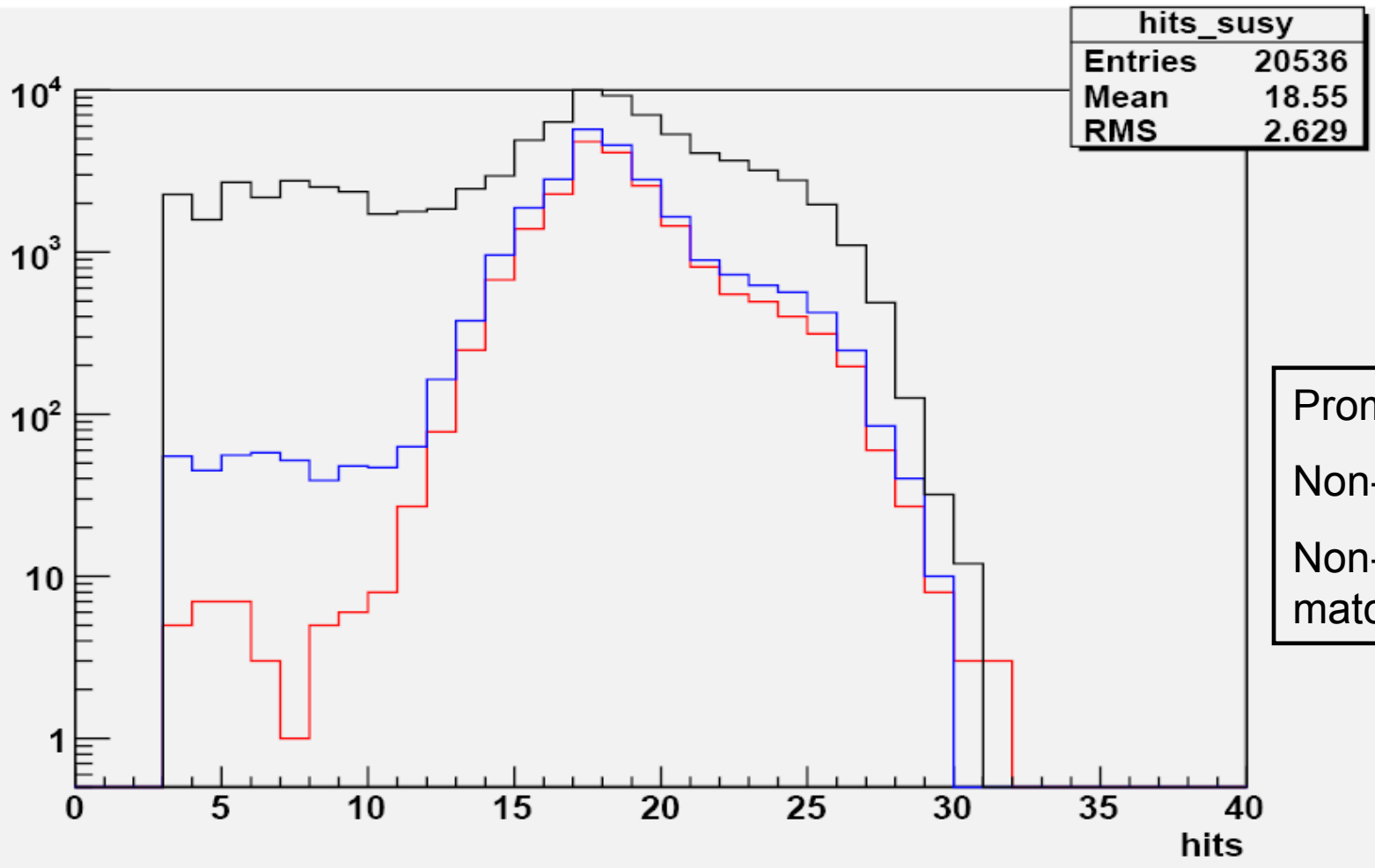


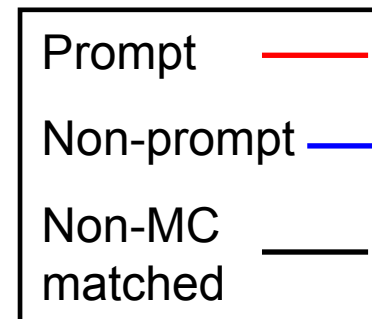
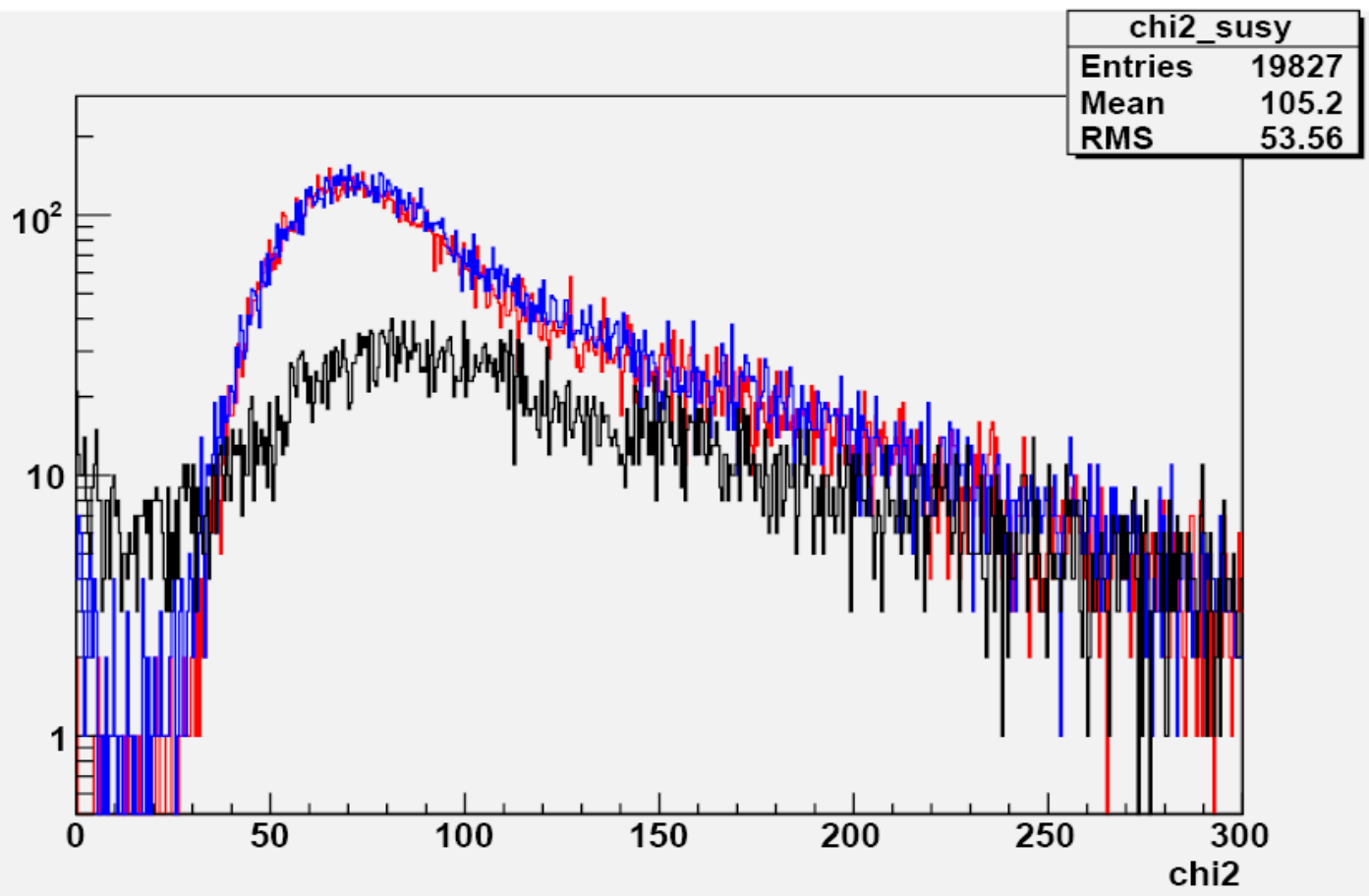




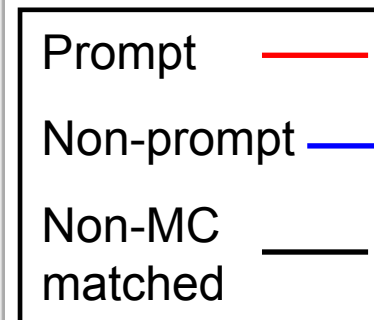
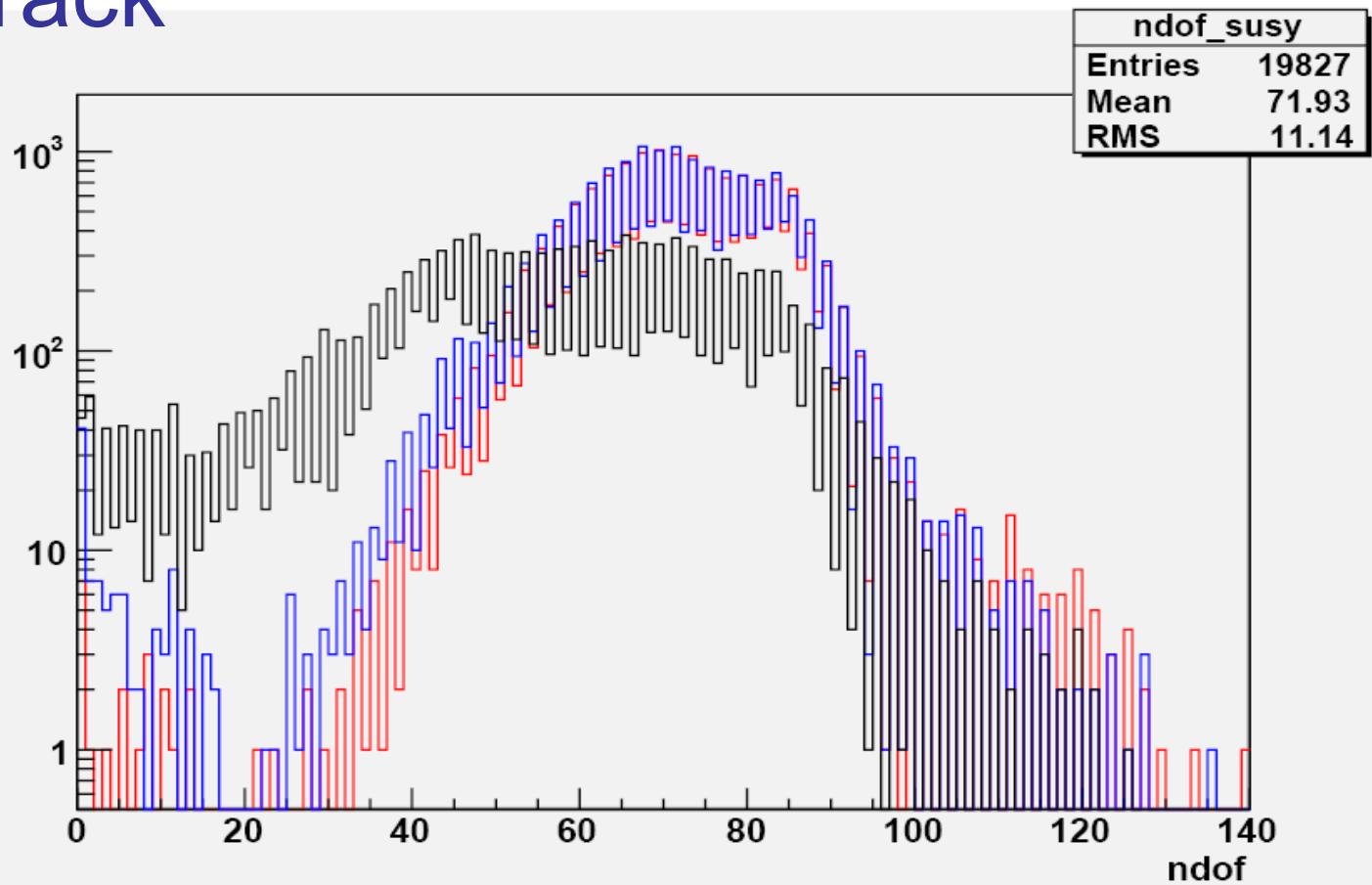


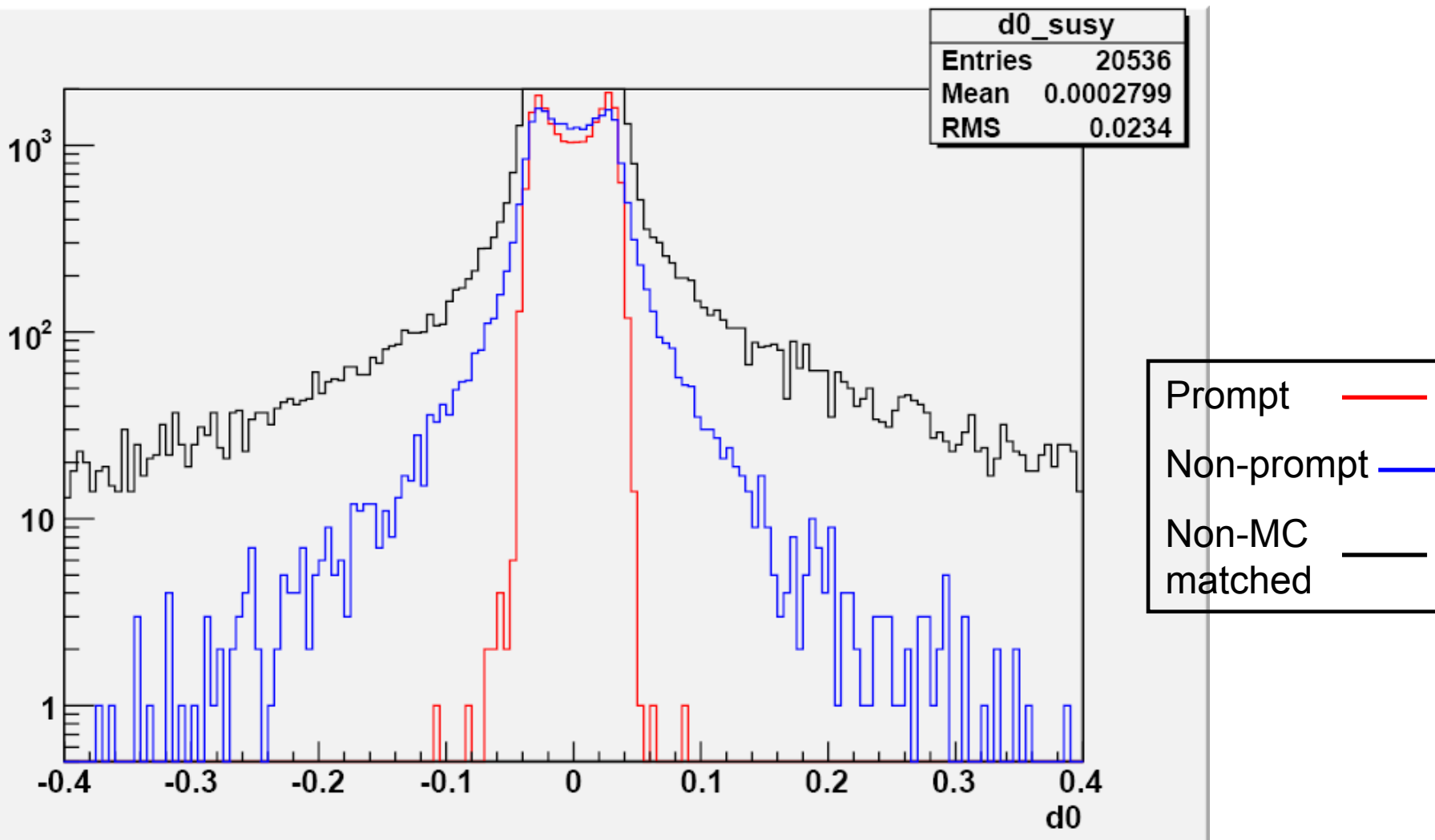


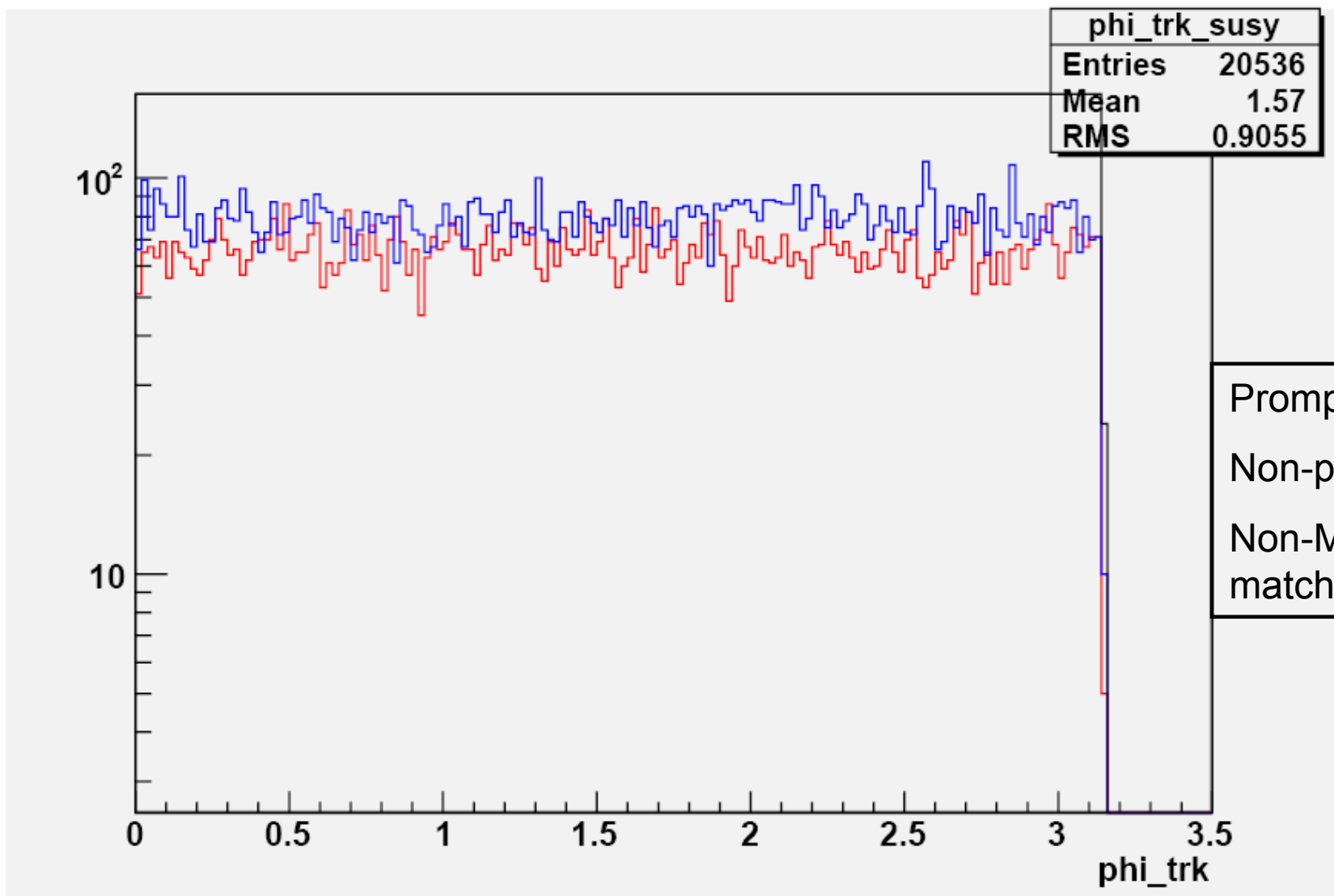


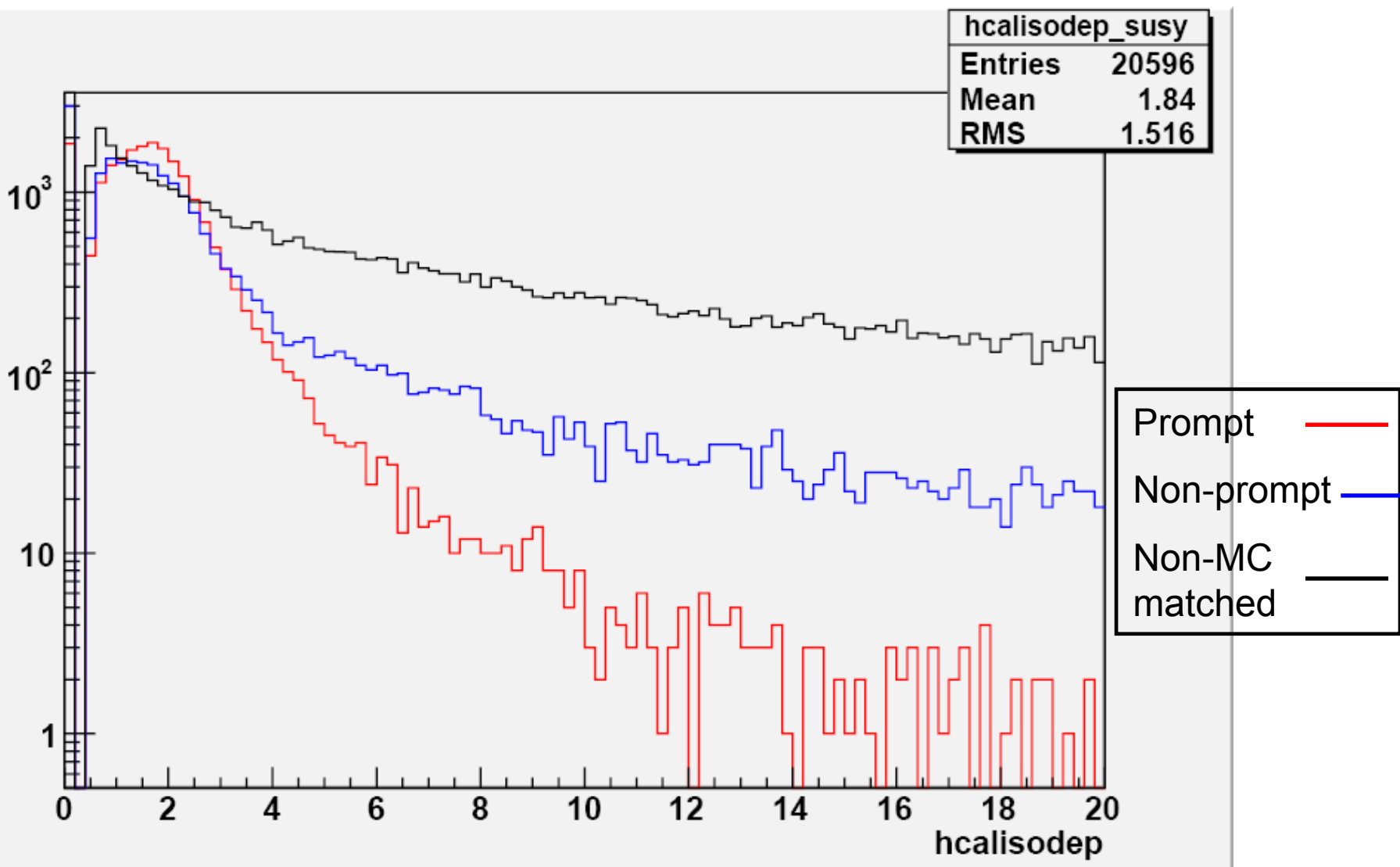


## Track

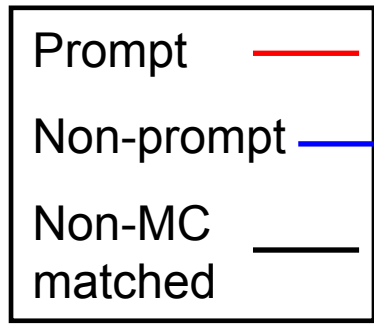
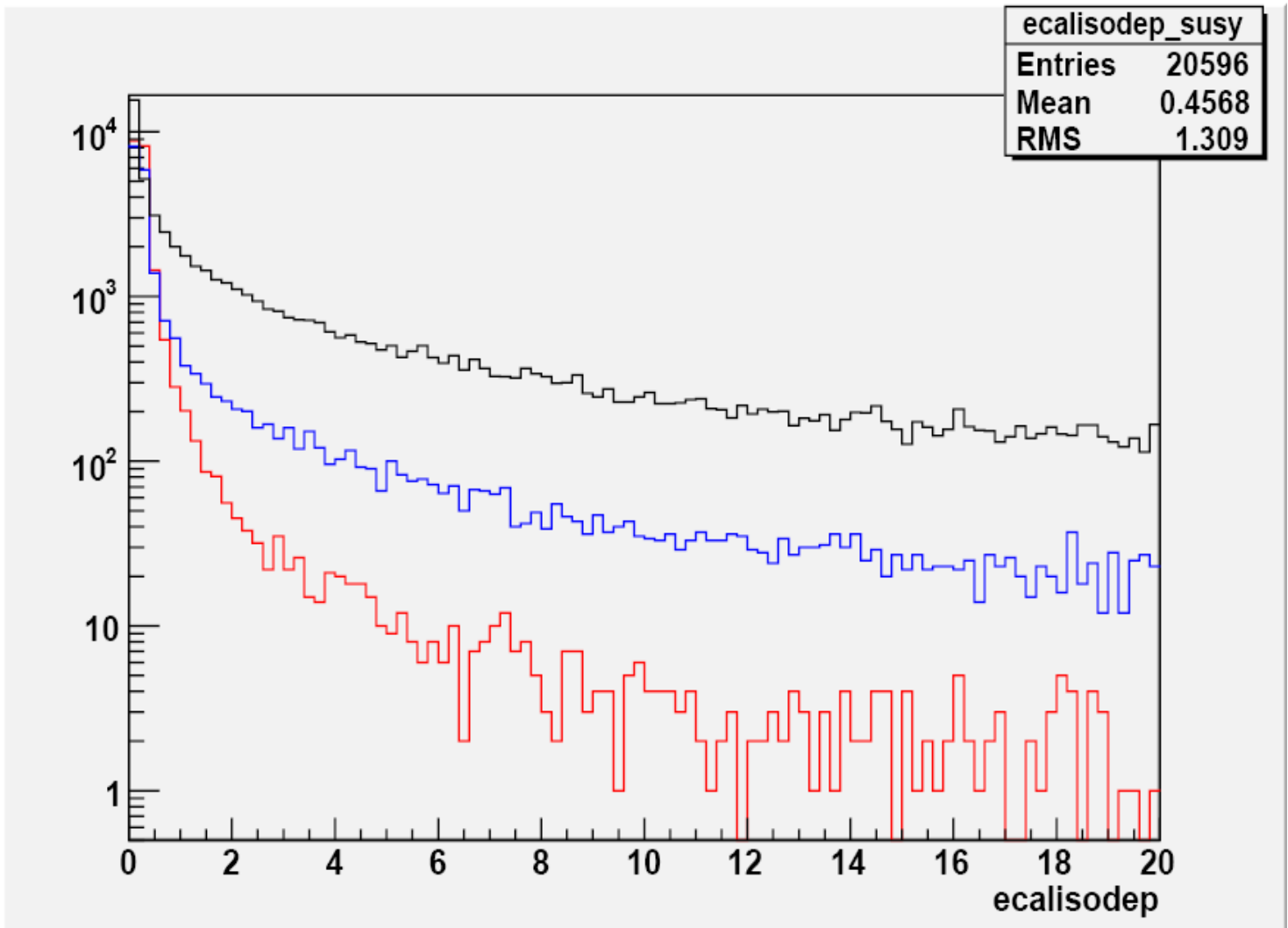


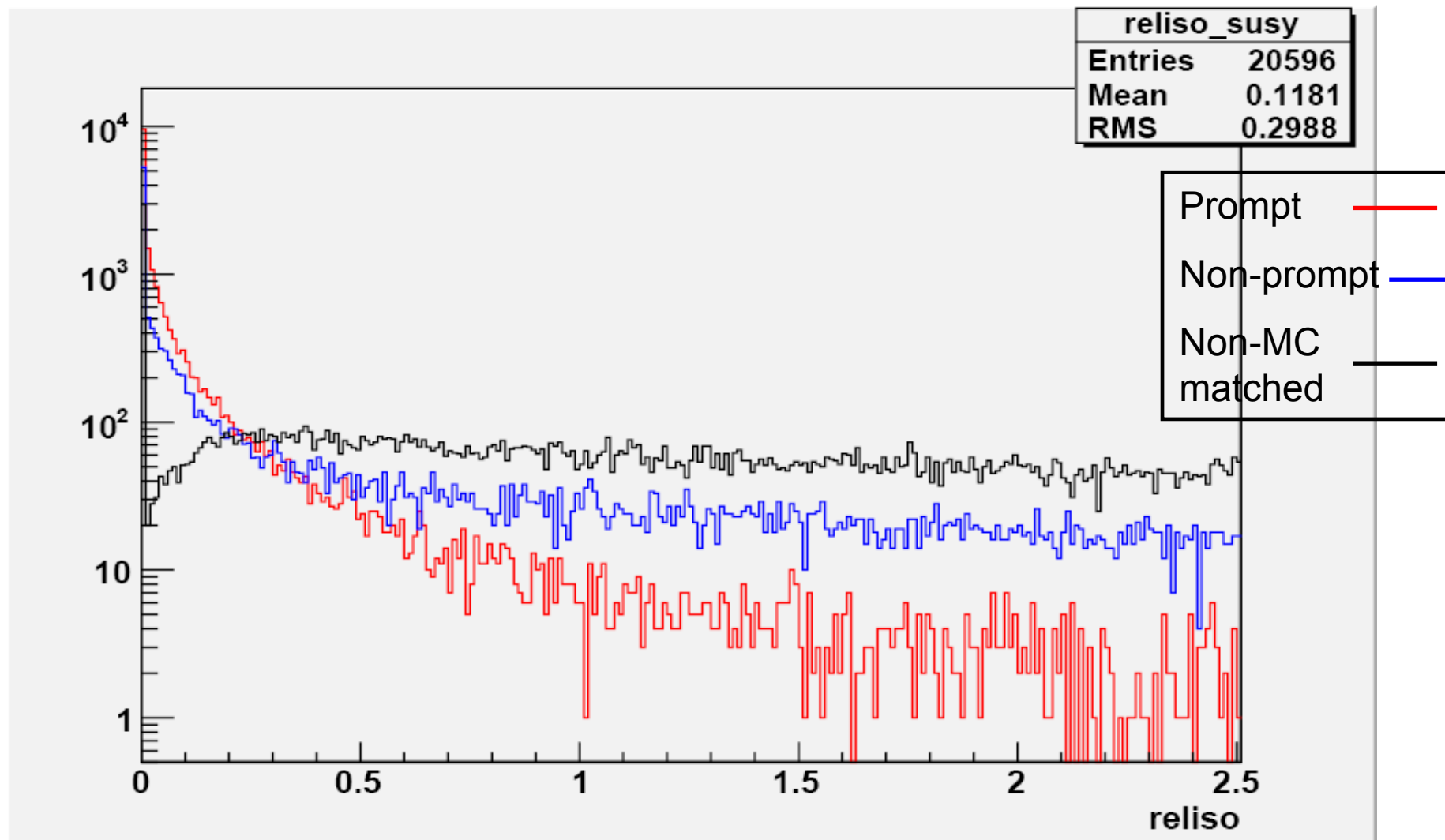












$(\text{Tracker\_iso} + \text{HCAL\_iso} + \text{ECAL\_iso}) / pt$