L1, L1\*L3, Sta, Glb & Tk: muon Eff. vs. pT Eff of L1Muon Eff of L3Muon Eff of StaMuon 0.8 0.8 0.8 0.6 dR<2.3 0.6 0.6 dR<0.02 dR<0.2 0.4 0.4 0.4 0.2 0.2 0.2 20 22 12 16 18 22 16 18 20 14 20 22 L1 µ pT /GeV 12 14 16 L3 u pT /GeV Sta µ pT /GeV Eff of L1Muon Eff of GlbMuon Eff of TkMuon 0.8 0.8 0.8 dR<0.02 0.6dR<0.02 0.6 0.6 dR<1.3 0.4 0.4 0.4 0.2 0.2 0.2 18 20 22 12 14 16 10 20 22 12 16 18 20 22 L1µ pT/GeV Glb µ pT/GeV Tk µ pT/GeV

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#### LI, LI\*L3, Sta,Glb & Tk: muon Eff. vs. $\eta$



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## Efficiency Measurements

The overall dimuon efficiencies of the measurement are assumed to be the product of several parts

$$\mathcal{E} = \mathcal{E}_{acceptance} \times \mathcal{E}_{trigger} \times \mathcal{E}_{offline}^{2}$$
$$\mathcal{E}_{trigger} = \mathcal{E}_{L1} \times \mathcal{E}_{HLT}$$
$$\mathcal{E}_{offline} = \mathcal{E}_{global} \times \mathcal{E}_{isolation}$$

$$\varepsilon_{\text{global}} = \varepsilon_{\text{standalone}} \times \varepsilon_{\text{tracker}} \times \varepsilon_{\text{matching}}$$

 $\mathbf{r}$ 

- Choose a *tag* muon
  - A "high quality" reconstructed muon
- □ Choose a *probe* track
  - A probable muon in tracker or muon system
- Requiring  $M_{\mu\mu}$  consistent with  $M_{J/\Psi}$  yileds a high-purity and almost unbiased sample of *probe* muons

# Description of TAG and PROBE

TAG	Global muon with $p_T > 5 GeV$
	Associated to a L3 muon

Probe Type	Description
<u>G</u> olden	Global muon that is also a TAG
<u>Matched</u>	Global muon that is not a TAG
<u>U</u> nmatched	Tracker track AND Standalone muon found, but they are not associated with a Global Muon
<u>T</u> racker Only	Only a tracker track
Stand Alone Muon	Only a standalone muon

With the five types of probes, we get five combinations of tagand-probe: GG, GM, GU, GS, GT

## Tracking and Matching Efficiencies

Standalone, Tracking, and Matching efficiencies calculated with simple event counting

$$\begin{split} \boldsymbol{\varepsilon}_{\text{standalone}} &= \frac{2N_{GG} + N_{GM} + N_{GU}}{2N_{GG} + N_{GM} + N_{GU} + N_{GT}} \\ \boldsymbol{\varepsilon}_{\text{tracker}} &= \frac{2N_{GG} + N_{GM} + N_{GU}}{2N_{GG} + N_{GM} + N_{GU} + N_{GS}} \\ \boldsymbol{\varepsilon}_{\text{matching}} &= \frac{2N_{GG} + N_{GM}}{2N_{GG} + N_{GM} + N_{GU}} \end{split}$$

## Glb Muon efficiency: Preliminary

