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Trigger selections for

invisible Higgs in qq->qqH, H->$\chi\chi$, (M_H=120 GeV); Level-1 + HLT

lepton+τ-jet channels (H->2τ-> e(μ)+τ-jet); Level-1

Sept 2002 CMS week, joint Calo Trigger/JetMET meeting

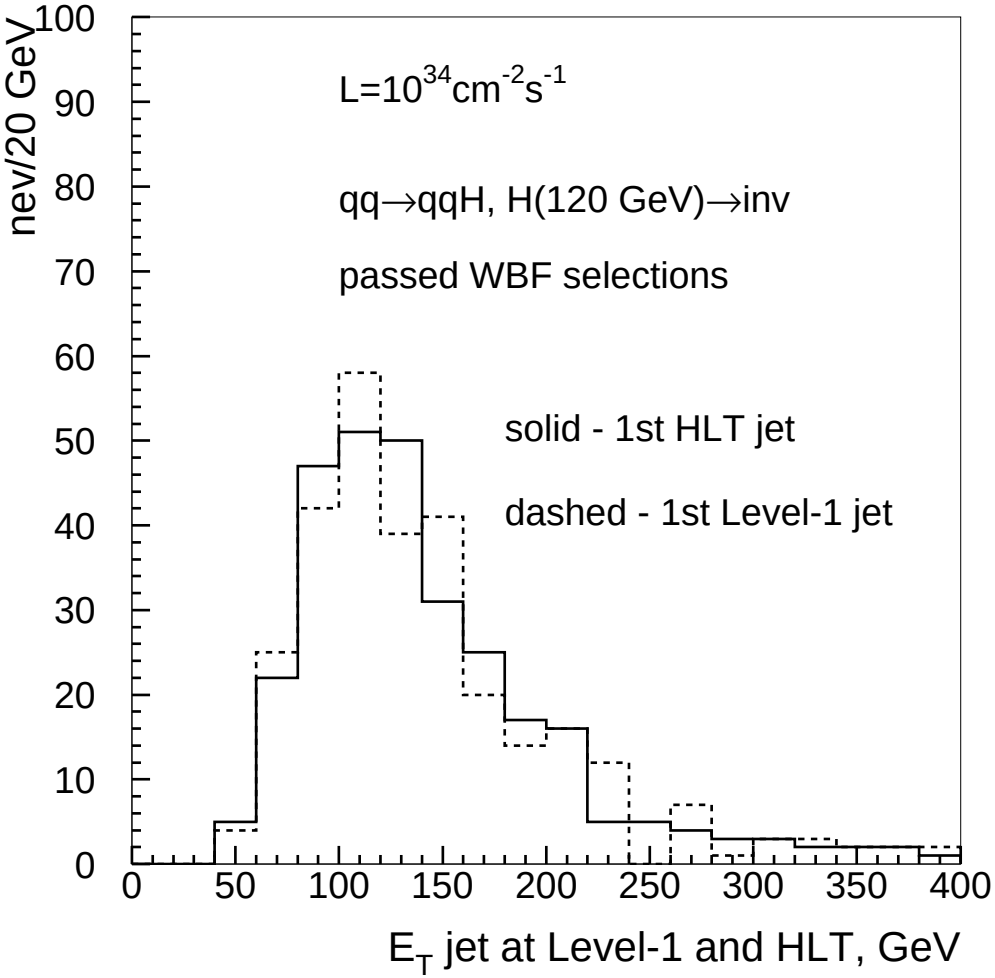
qq->qqH, H->invisible : possible strategy at Level-1 (I)

Level-1 Jet + E_T^{miss} (similar to SUSY triggers , see talk of S. Abdullin)

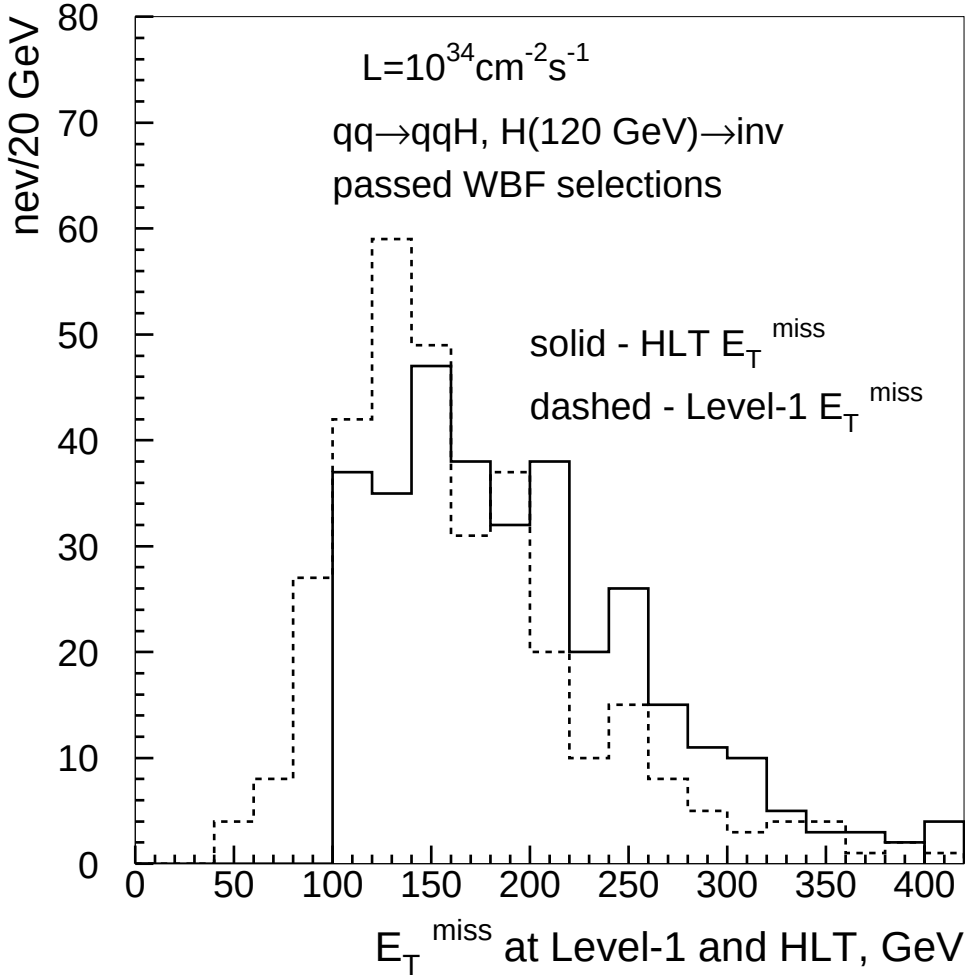
efficiency is defined for Higgs events passed off-line WBF cuts :

$E_T^J > 40$ GeV, $|\eta_{j1} - \eta_{j2}| > 4.4$, $\eta_{j1}\eta_{j2} < 0$, $M_{j1j2} > 1200$ GeV, $\phi_{j1j2} < 1$, $E_T^{miss} > 100$ GeV

1st (highest E_T) Jet



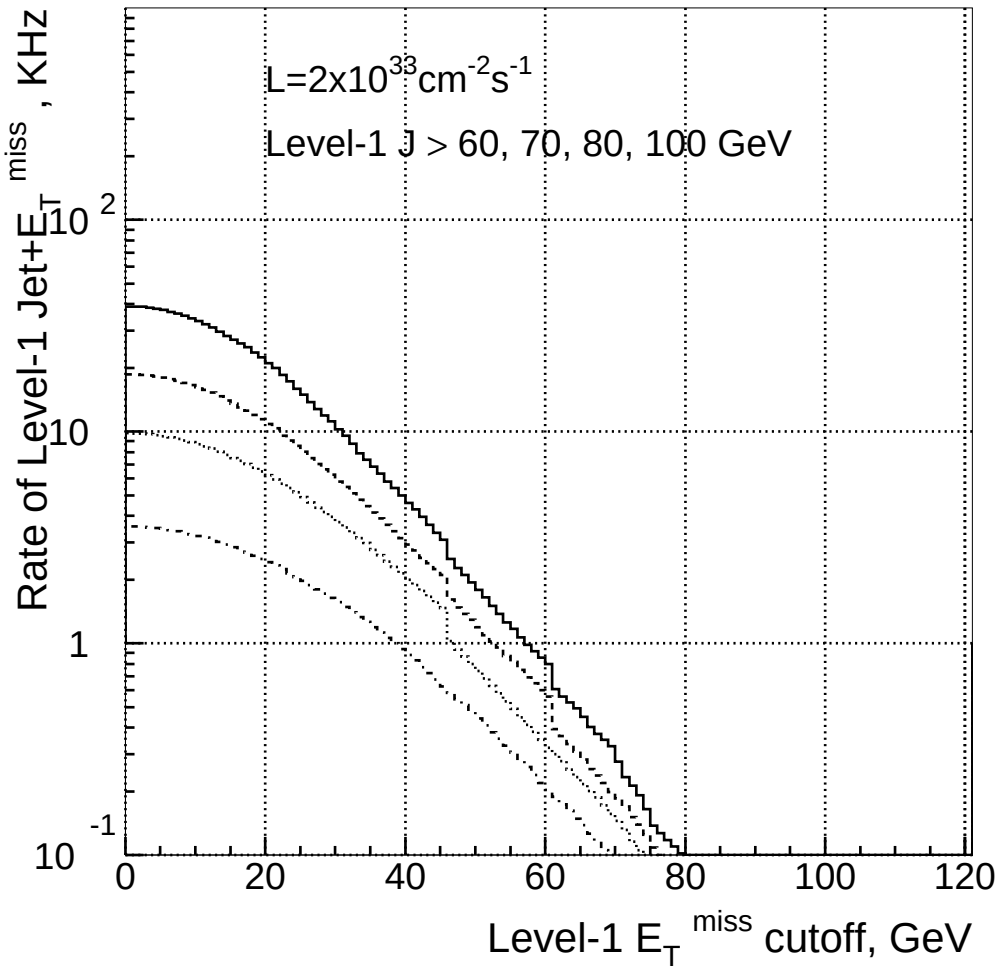
missing E_T



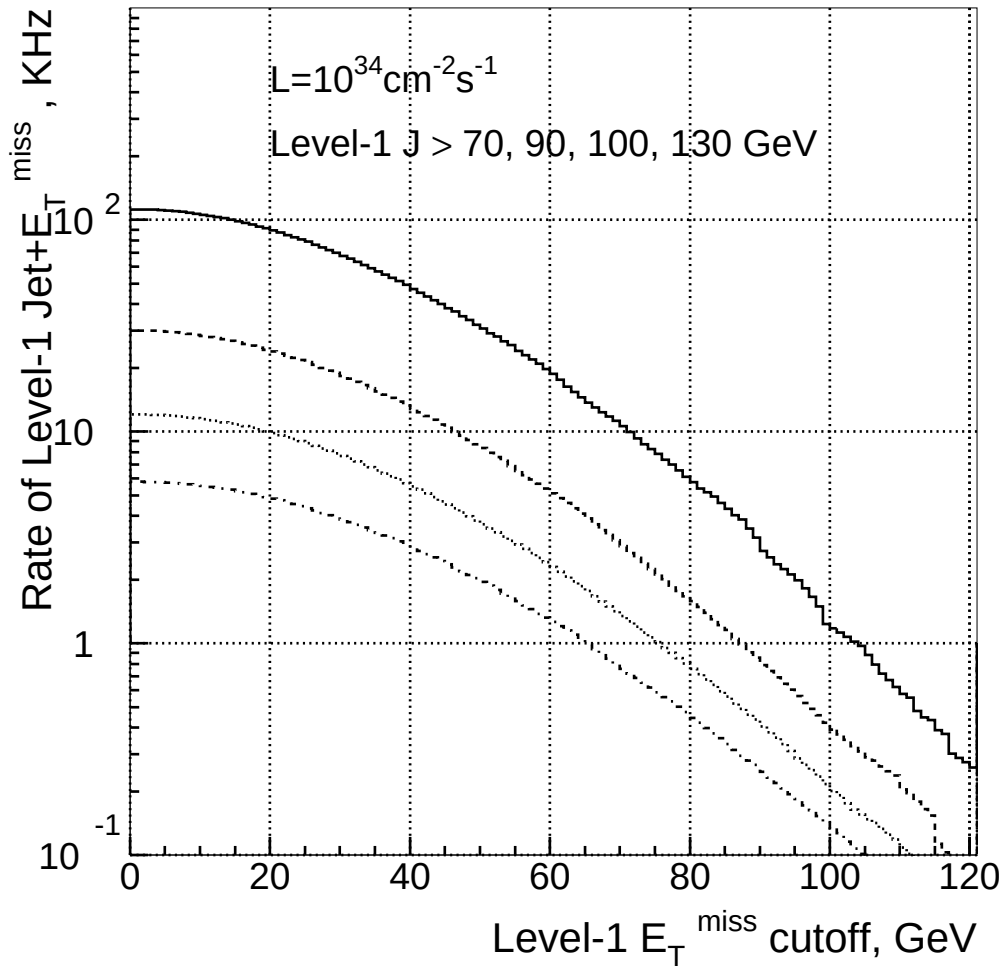
qq->qqH, H->invisible : possible strategy at Level-1 (II)

Level-1 Jet + E_T^{miss} rates

low lumi



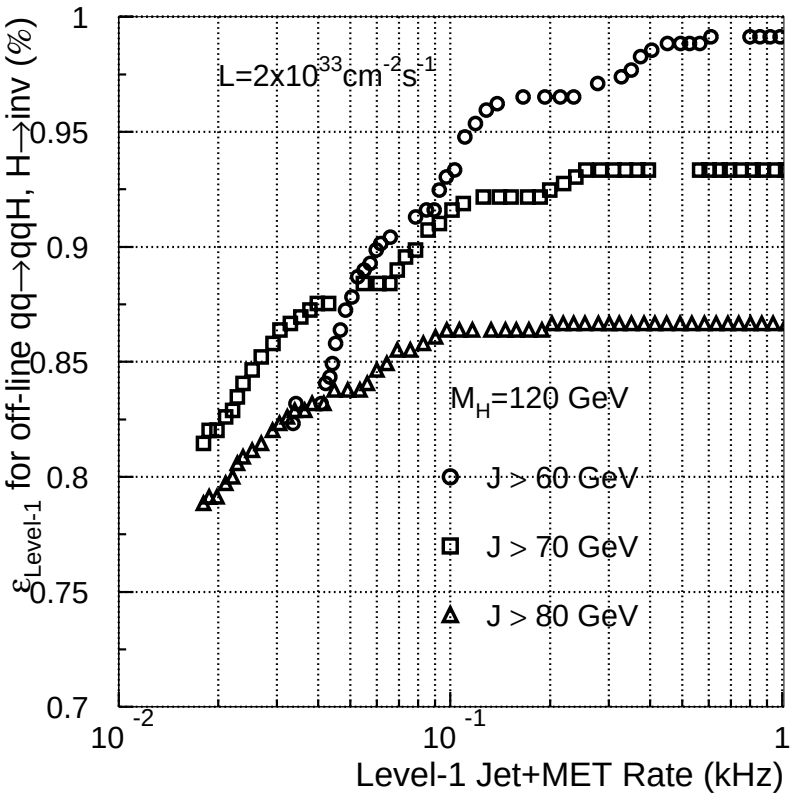
high lumi

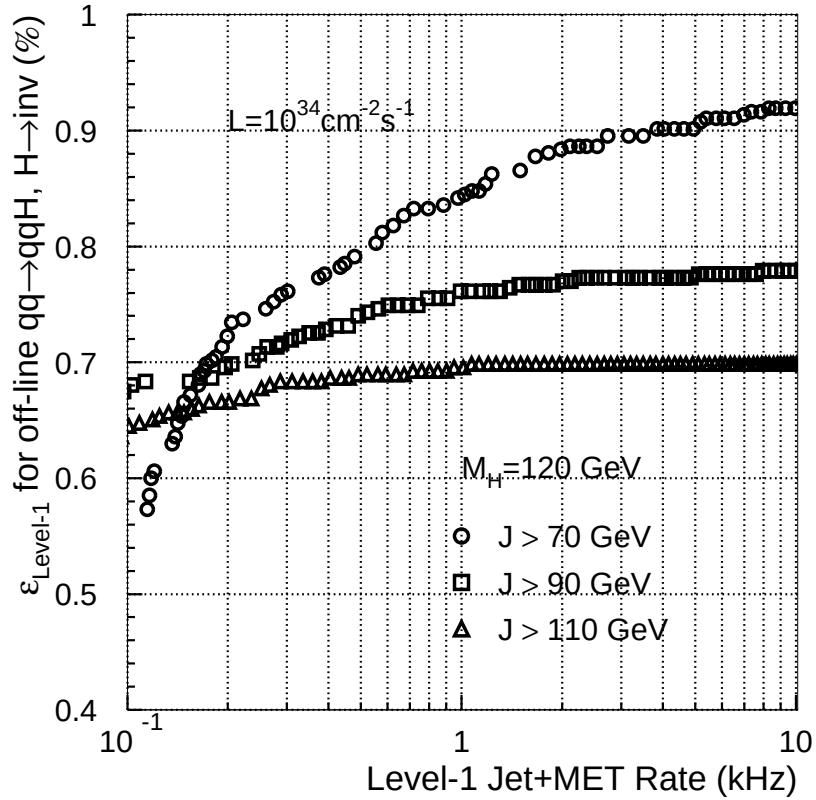


optimization on the next page

qq->qqH, H->invisible : possible strategy at Level-1 (III)

Level-1 Jet + E_T^{miss} optimization: efficiency vs rate

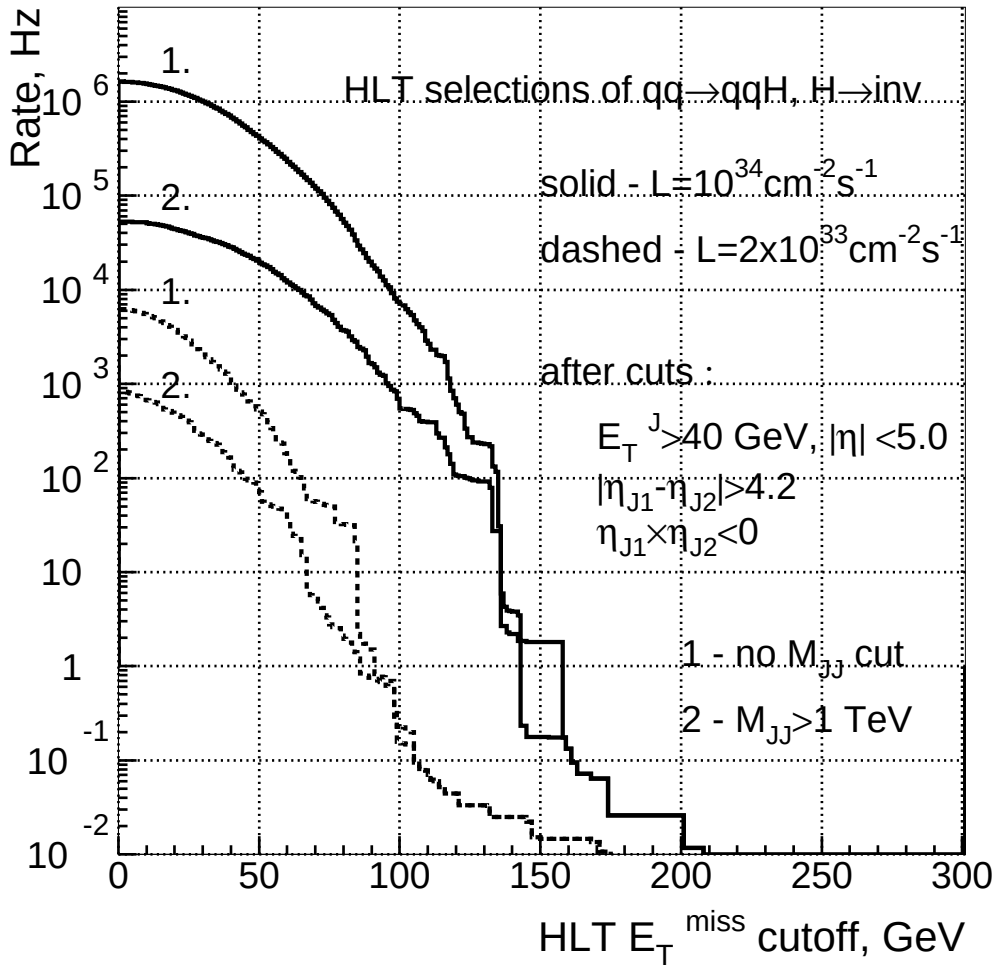


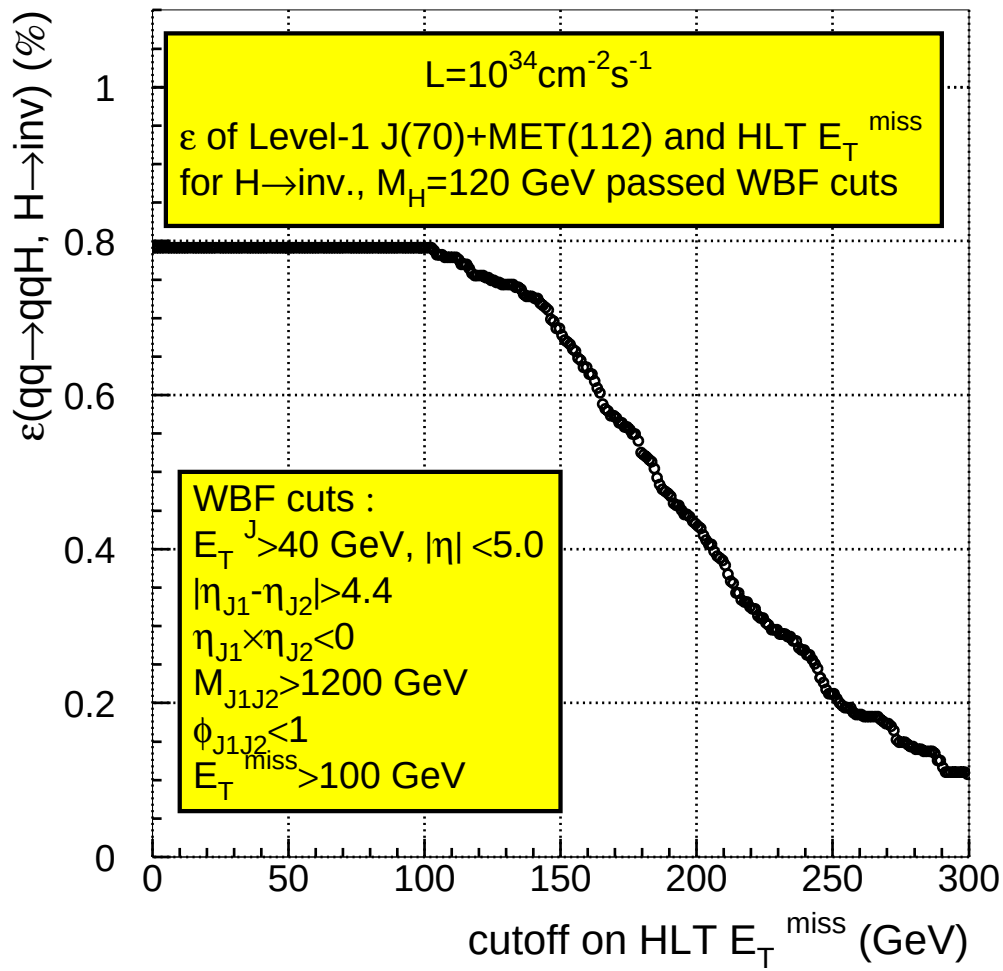


Level-1 Rate of J1+MET, kHz		0.2	0.5	1.0
$L=2x10^{33}cm^{-2}s^{-1}$	L1 J1, MET thresholds, GeV	60, 73	60, 64	60, 56
	L1 efficiency	0.96	0.98	0.99
$L=10^{34}cm^{-2}s^{-1}$	L1 J1, MET thresholds, GeV	70, 122	70, 112	70, 103
	L1 efficiency	0.72	0.79	0.84

qq->qqH, H->invisible : possible strategy at HLT (I)

HLT with loose WBF cuts; optimization of E_T^{miss} cutoff

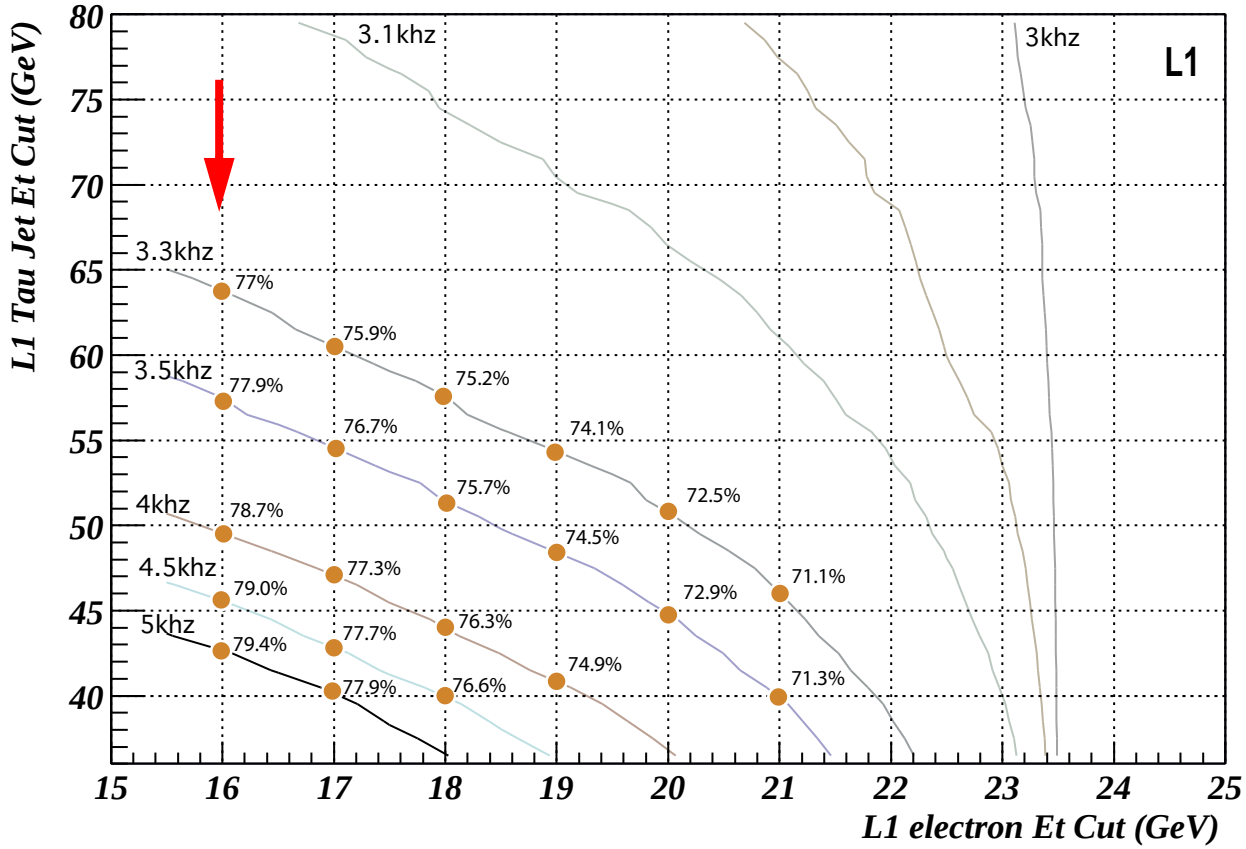




- ϕ_{j1j2} cut is not desirable for H->inv, since prevents physics background estimates from the data (QCD/EW W/Z bkg)

H->2τ-> e+τ-jet, Level-1 for L=2x10^{33}cm^{-2}s^{-1} (I)

Level-1 rate and efficiency of single e/γ OR e&T triggers at 23 GeV threshold for the single e/γ trigger



The τ-jet candidate, at Level-1, is defined as the most energetic τ-jet which is not collinear with the 1st Level-1 e/γ candidate. In ~ 40% of the signal events Level-1 η,ϕ of 1st Tau = η,ϕ of the 1st e/γ

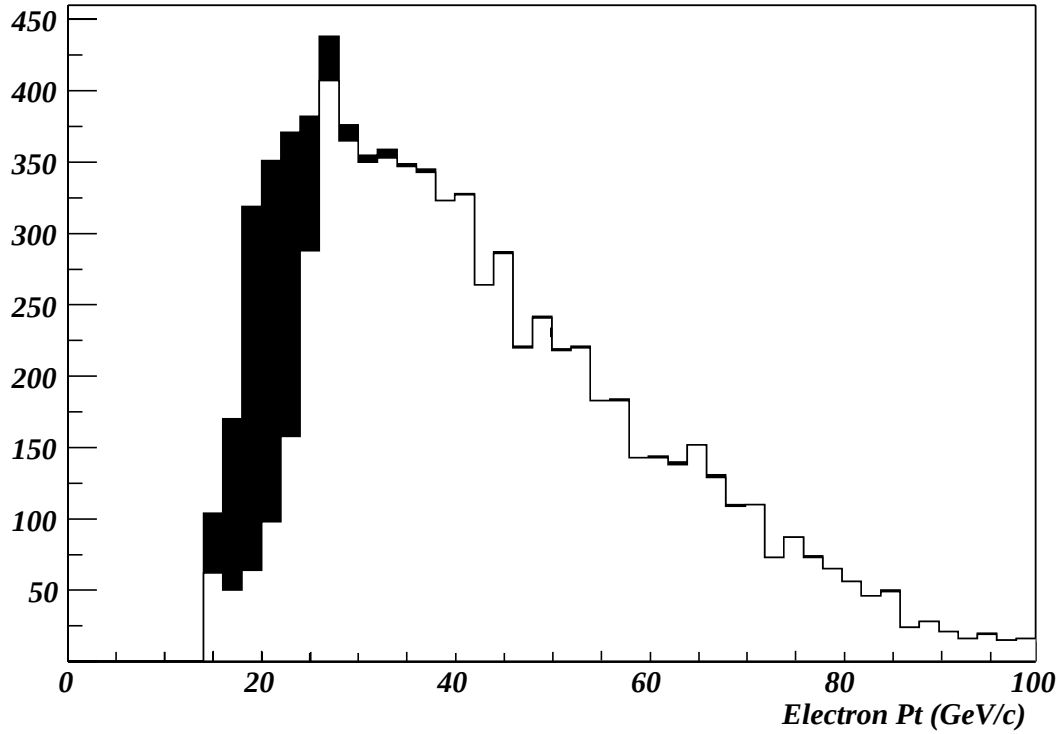
Purity of τ-jet candidate is 88 % and e/γ candidate is 92 %.

H->2τ-> e+τ-jet, Level-1 for L=2x10^{33}cm^{-2}s^{-1} (II)

Additional efficiency from Level-1 e&T

efficiency is defined for Higgs events passed loose off-line cuts :

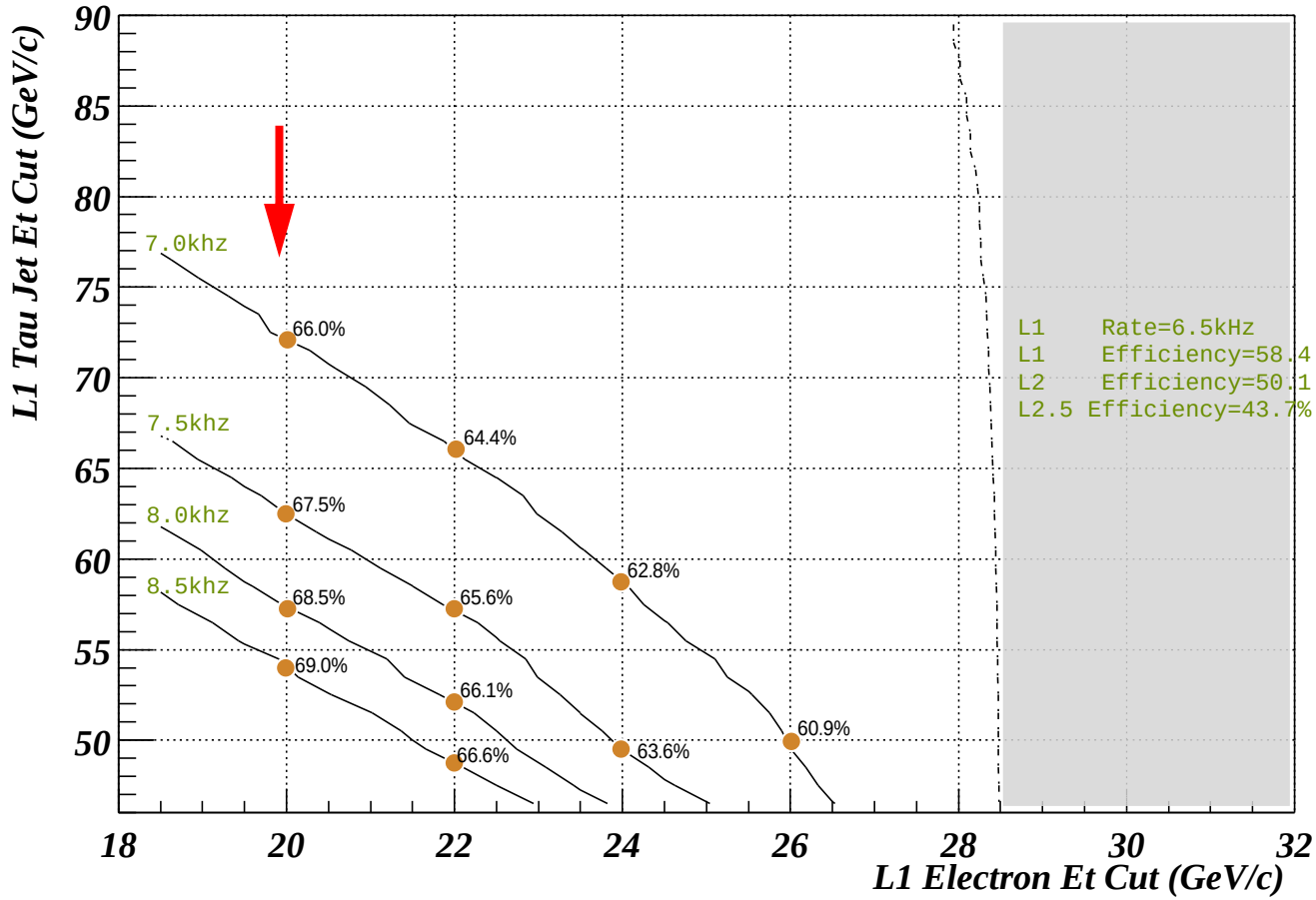
p_T^e > 14 GeV, $p_T^{\tau\text{-jet}}$ > 30 GeV, $\eta^{e,\tau\text{-jet}}$ > 2.4



Level-1 Trigger	e > 23	e > 23 OR (e>16 & T>57, 50, 45, 43)			
Level-1 Rate, kHz	3.0	3.5	4.0	4.5	5.0
Level-1 efficiency , %	68.0	77.9	78.7	79.0	79.4

H->2τ-> e+τ-jet, Level-1 for L=2x10^{34}cm^{-2}s^{-1} (III)

Level-1 rate and efficiency of single e/γ OR e&T triggers at 28 GeV threshold for the single e/γ trigger



Level-1 Trigger	e > 28	e > 28 OR (e>20 & T > 72, 62, 57, 54)			
Level-1 Rate, kHz	6.5	7.0	7.5	8.0	8.5
Level-11 efficiency , %	58.4	66.0	67.5	68.5	69.0

H->2τ-> μ+τ-jet, Level-1 for $L=10^{34}cm^{-2}s^{-1}$ (I)

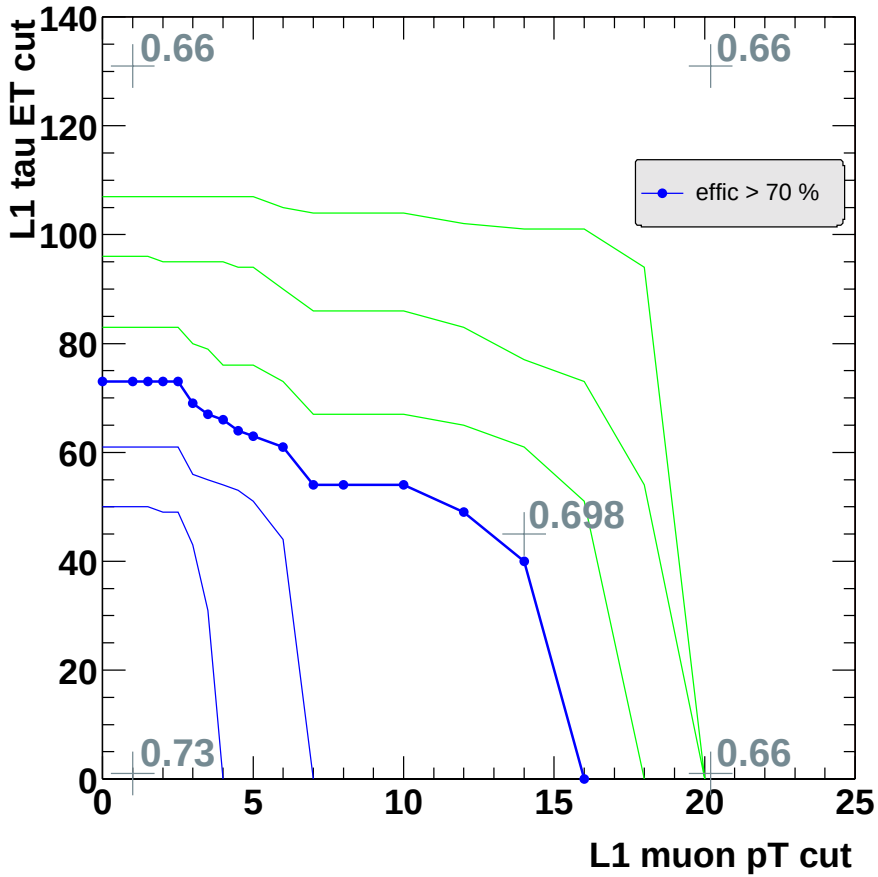
efficiency is defined for Higgs events passed loose off-line cuts :

$p_T^{\mu} > 14$ GeV, $p_T^{\tau\text{-jet}} > 30$ GeV, $\eta^{\mu,\tau\text{-jet}} > 2.4$

efficiency of Level-1

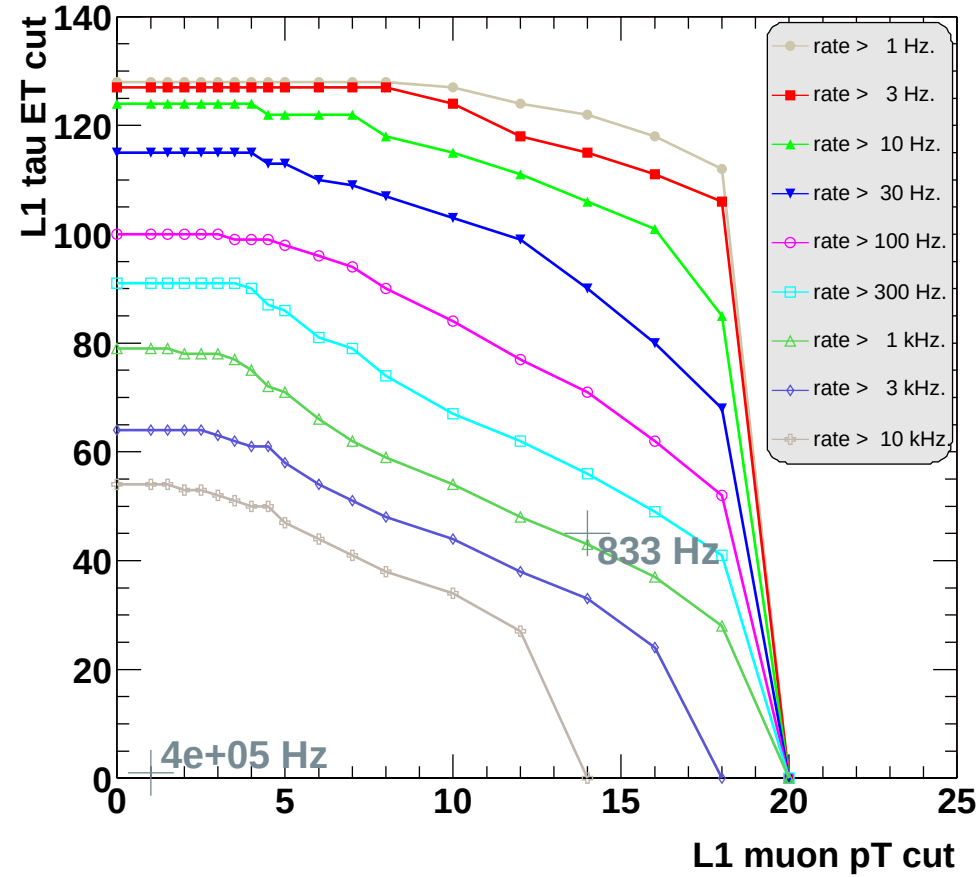
μ (20 GeV, 6 kHz) OR T (129 GeV, 2 kHz)

OR μ&T triggers



Level-1 rate from μ&T

additional to μ OR T



very modest gain from μ&T, since single μ threshold is low enough