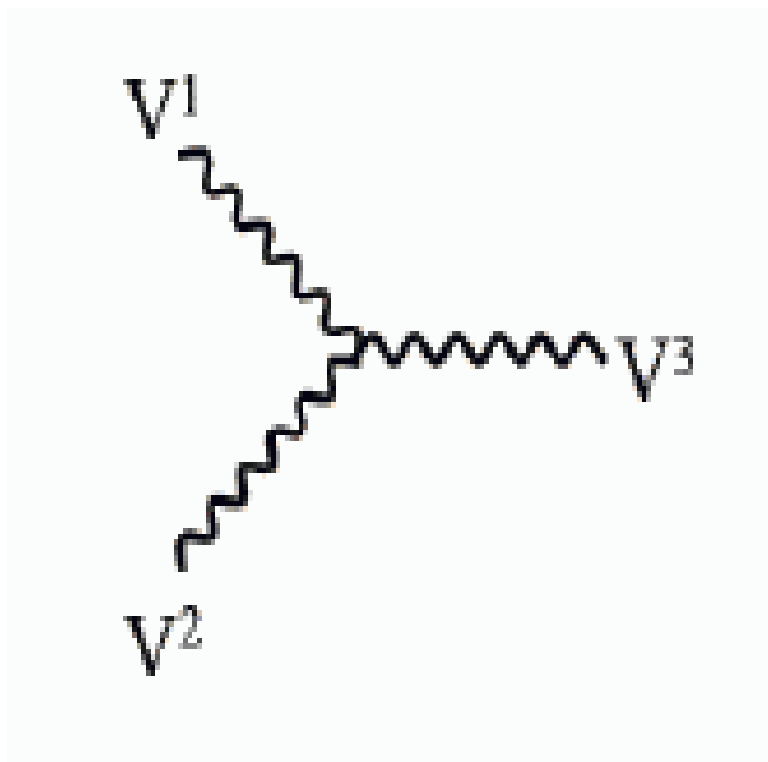




**Update on $Z(\nu\nu)\gamma$
& background channels**
Pál Hidas
György Vesztergombi



Triple Gauge Couplings (TGC)

charged (WWZ, WW γ)

exist in SM

neutral (ZZZ, ZZ γ , Z $\gamma\gamma$, $\gamma\gamma\gamma$)

does not exist in SM (“anomalous”)

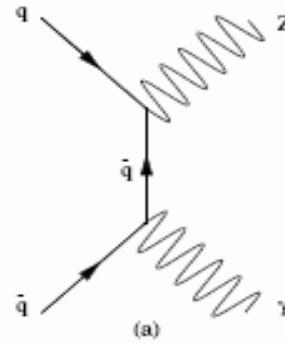
their observation indicates new physics beyond SM



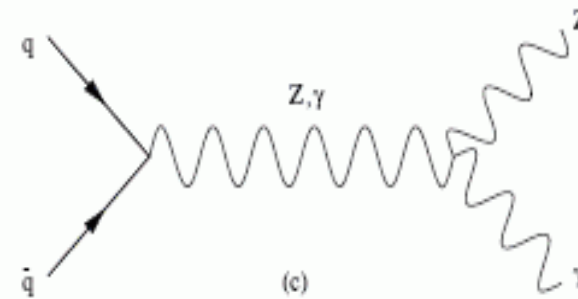
pp \rightarrow Z γ



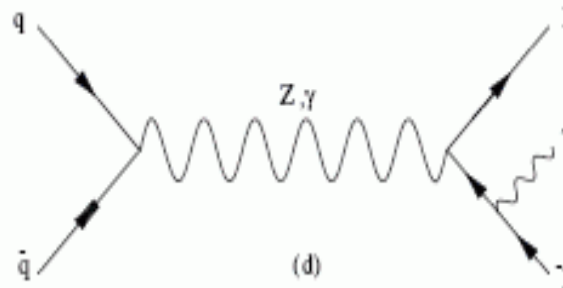
SM



anomalous

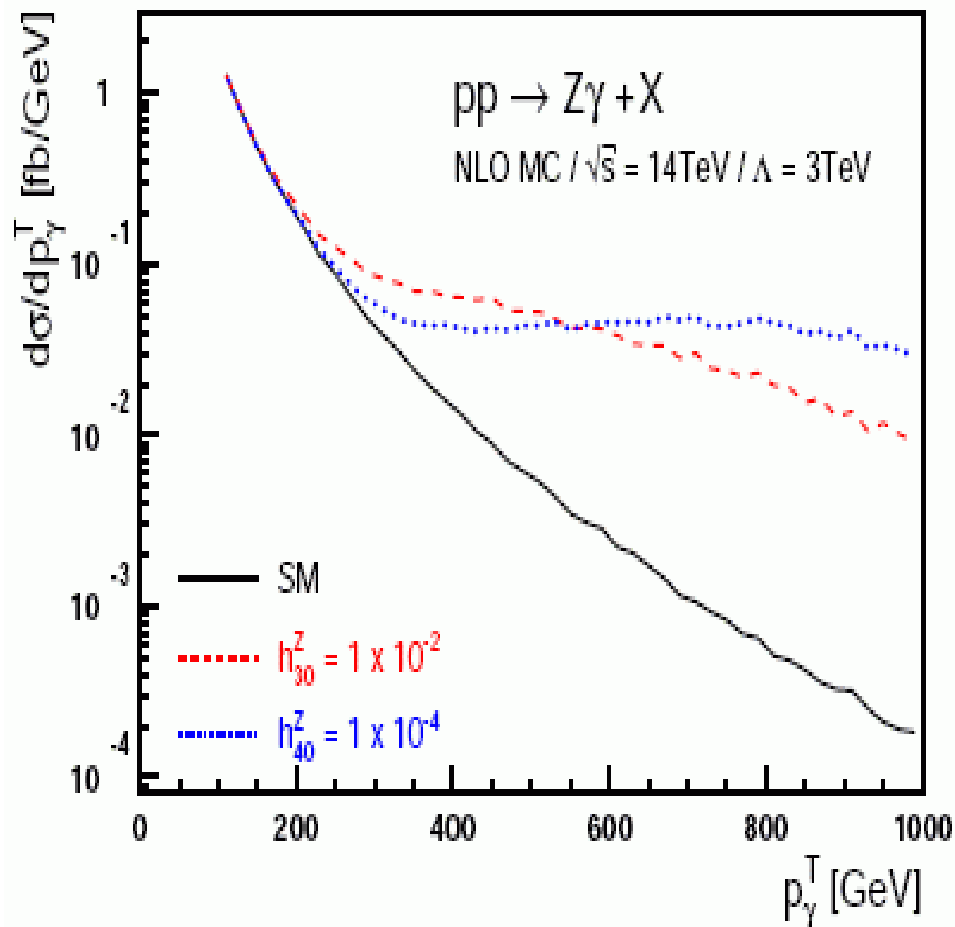


radiative BG





Anomalous $Z\gamma$



CMS NOTE 2000/017

interesting γ $p_T > 400$ GeV/c



$Z(-> \nu\nu) \gamma$ signal



Signature

high missing E_t (pt)

no reconstruction of Z

high pt isolated photon

no radiative photons \rightarrow exactly 1 photon

photon pt balanced with missing E_t

no high pt electrons, muons, tracks, jets



MC study



See for details:

http://grid.kfki.hu/twiki/pub/CMS/WeeklyBudapestDebrecenMeetings/100607_tgc.pdf

<http://indico.cern.ch/conferenceDisplay.py?confId=90714>

but using Vgamma ntuples instead of starting from RECO:

srm://cmsrm.fnal.gov/11/store/user/sushil/MonoPhoton/38X_Ntuples_V22/

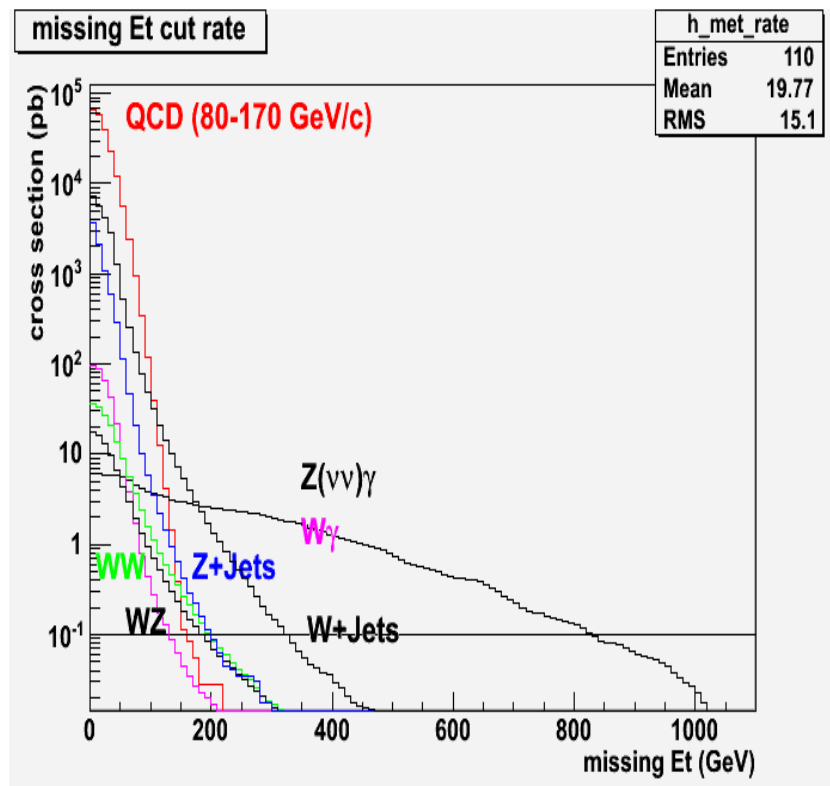
srm://cmsrm.fnal.gov/11/store/user/sushil/MonoPhoton/38X_Ntuples_V22_REDIGI38X/

Additional channels to previous study:

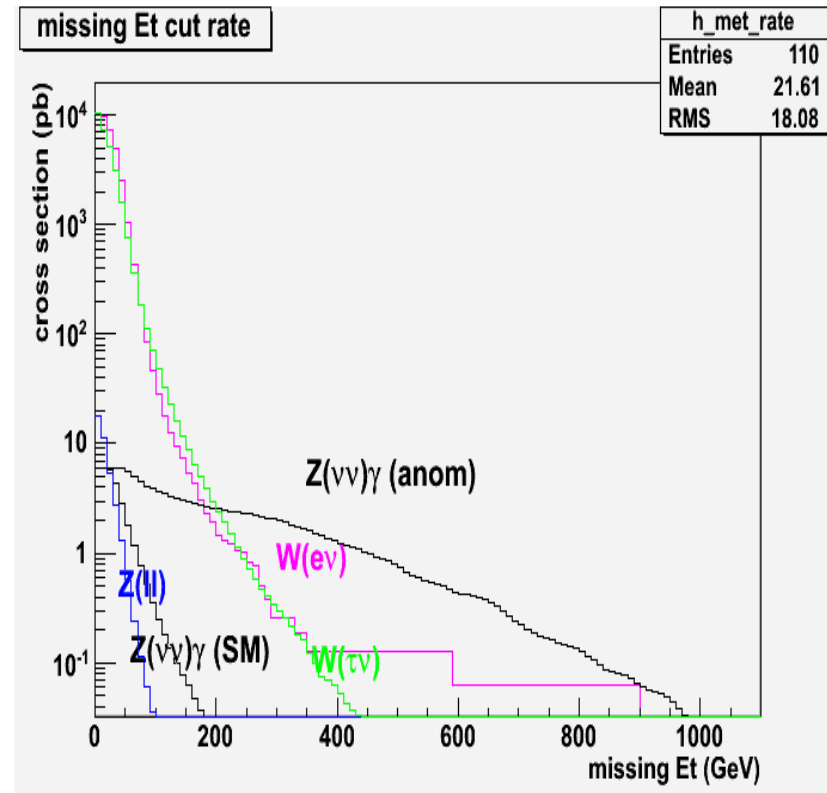
$W(e\nu)$, $W(\tau\nu)$, $Z(jj)\gamma$, $Z(\nu\nu)\gamma$ (SM)



Missing E_T rate



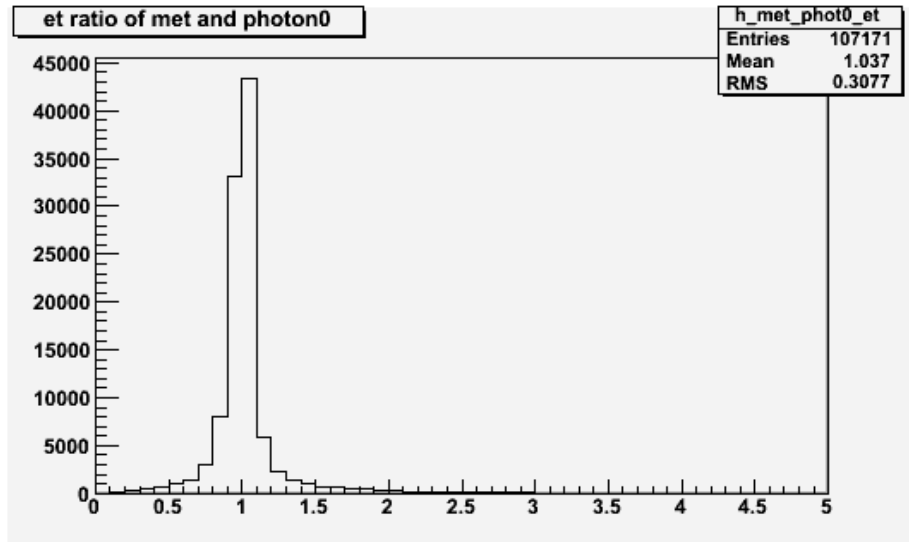
previous channels



additional channels

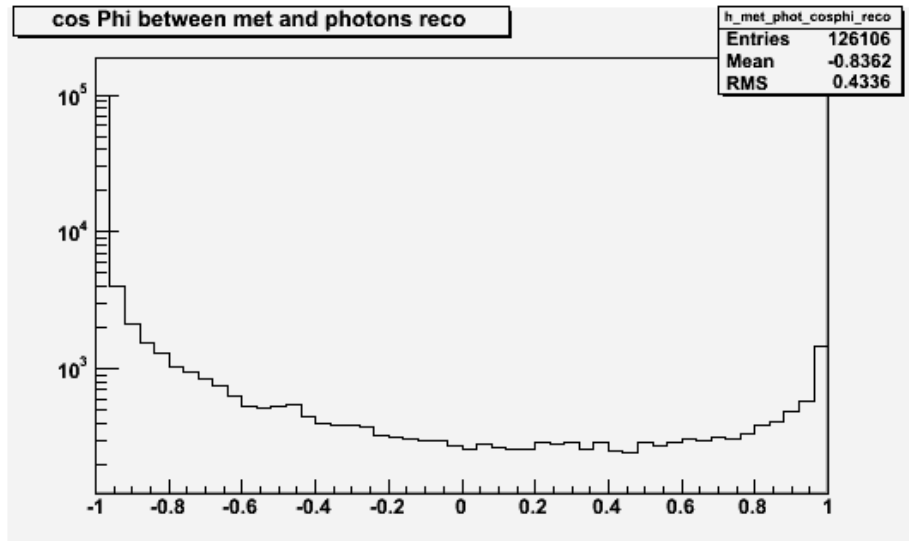


MET γ correlation



The signal has strong correlation between the missing Et and pt of the photon.

$$0.9 < \text{ratio} < 1.1$$

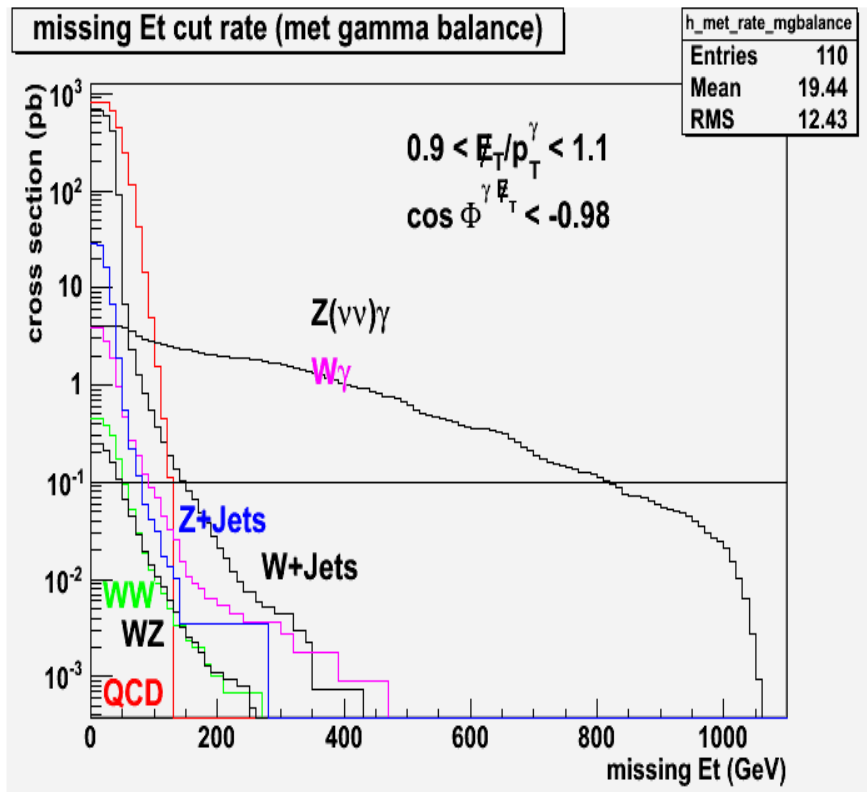


$$\cos \Phi < -0.98$$

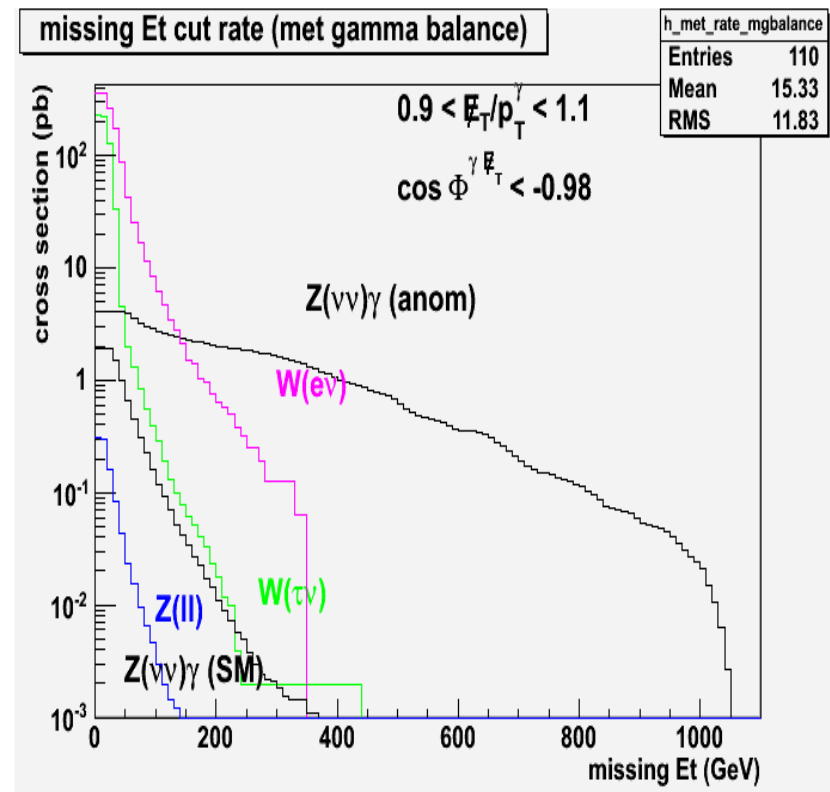
MC



Missing E_T rate



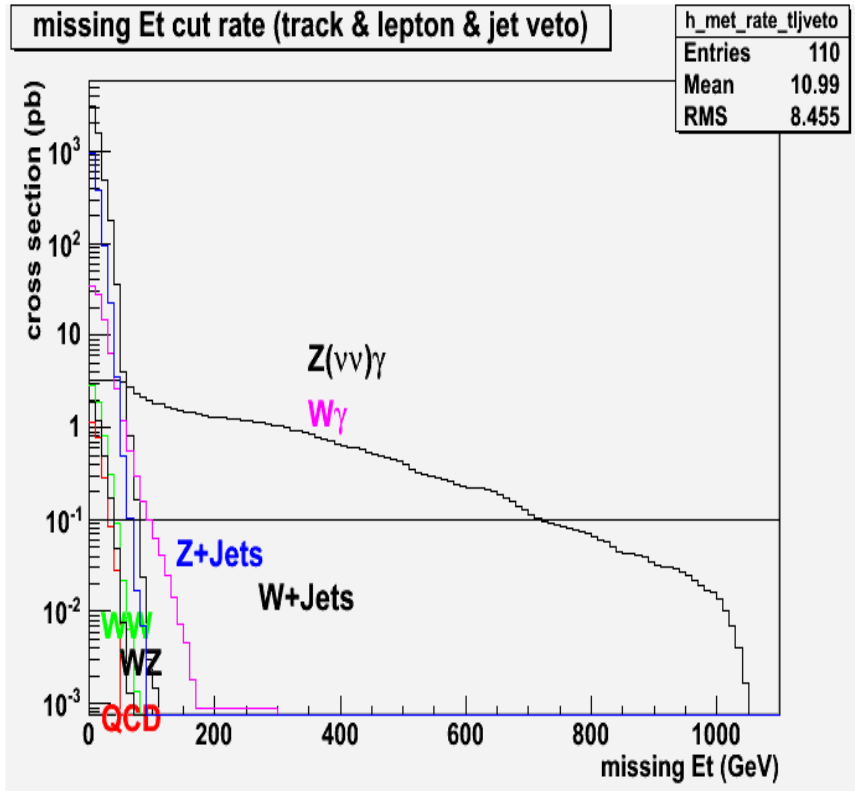
previous channels



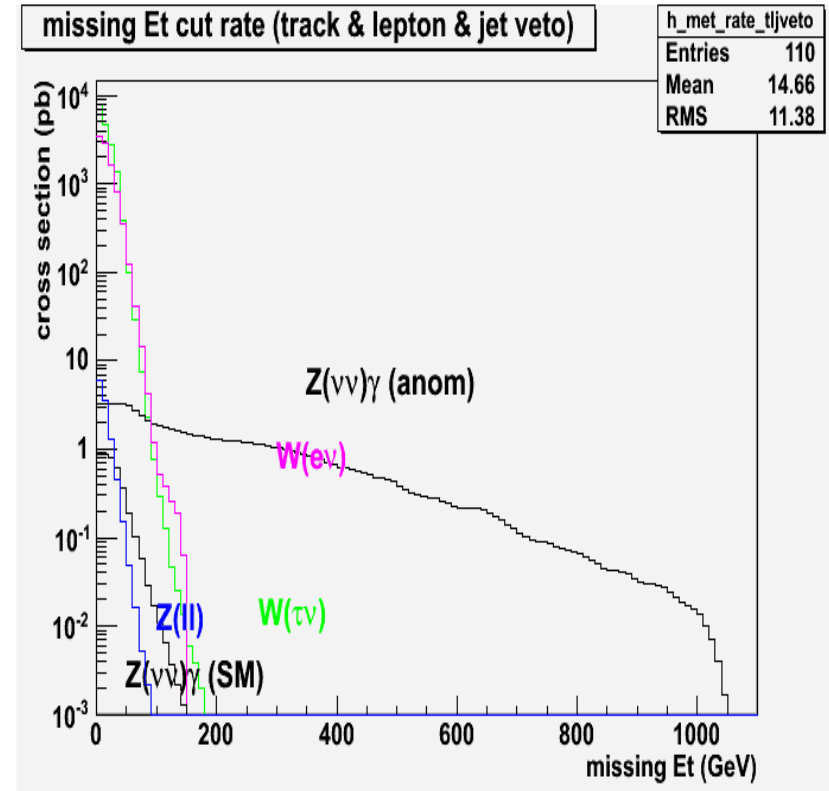
additional channels



Missing E_T rate



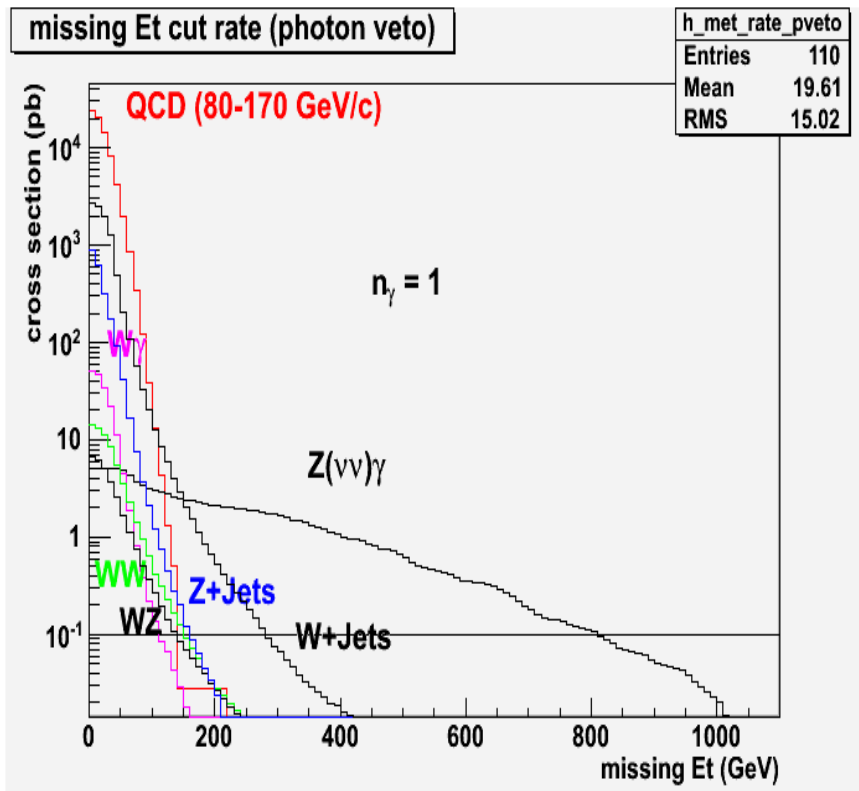
previous channels



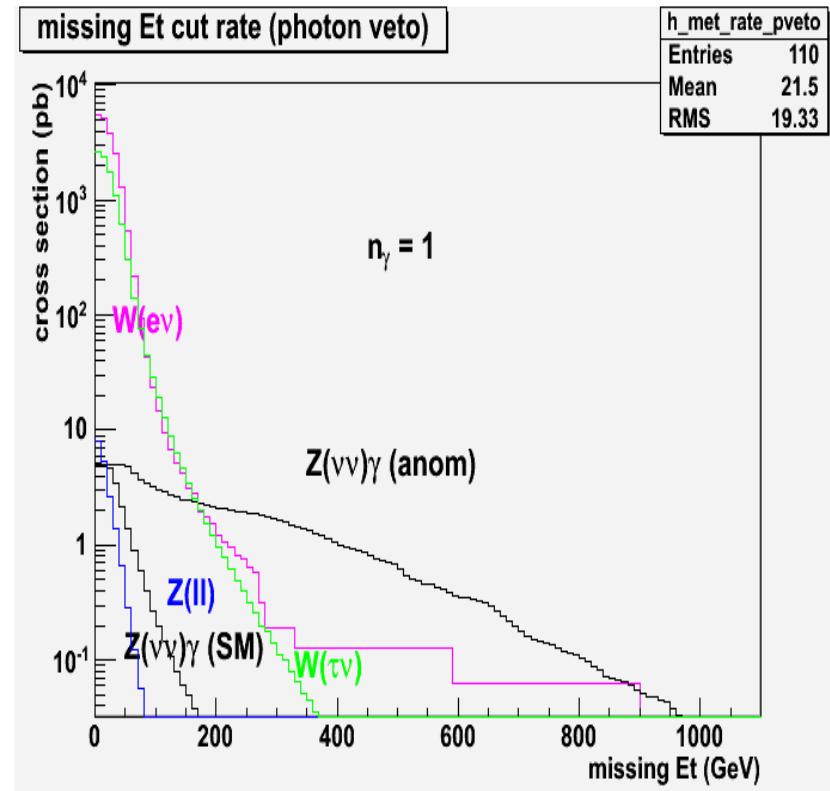
additional channels



Missing E_T rate



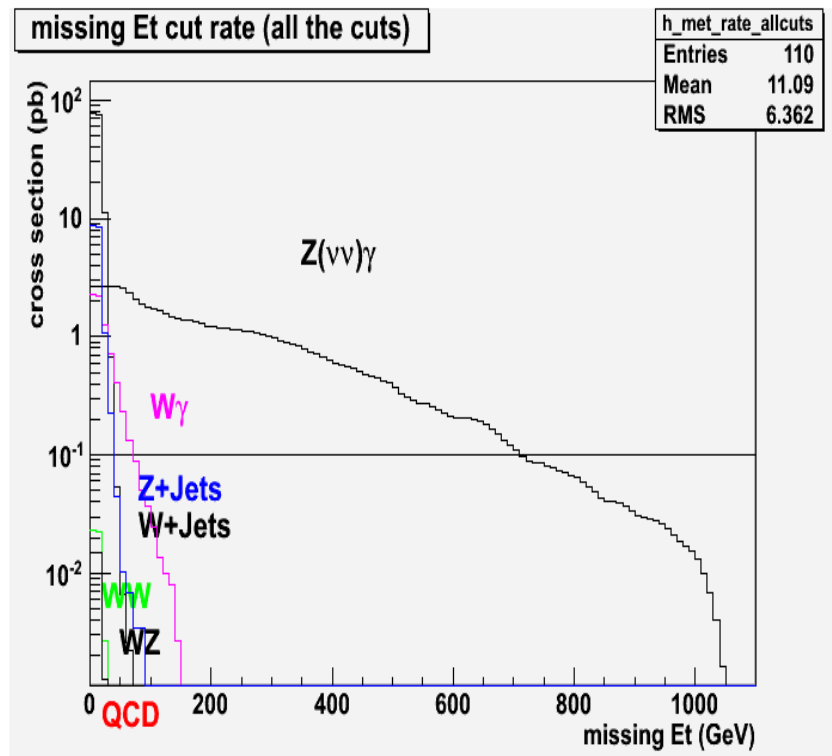
previous channels



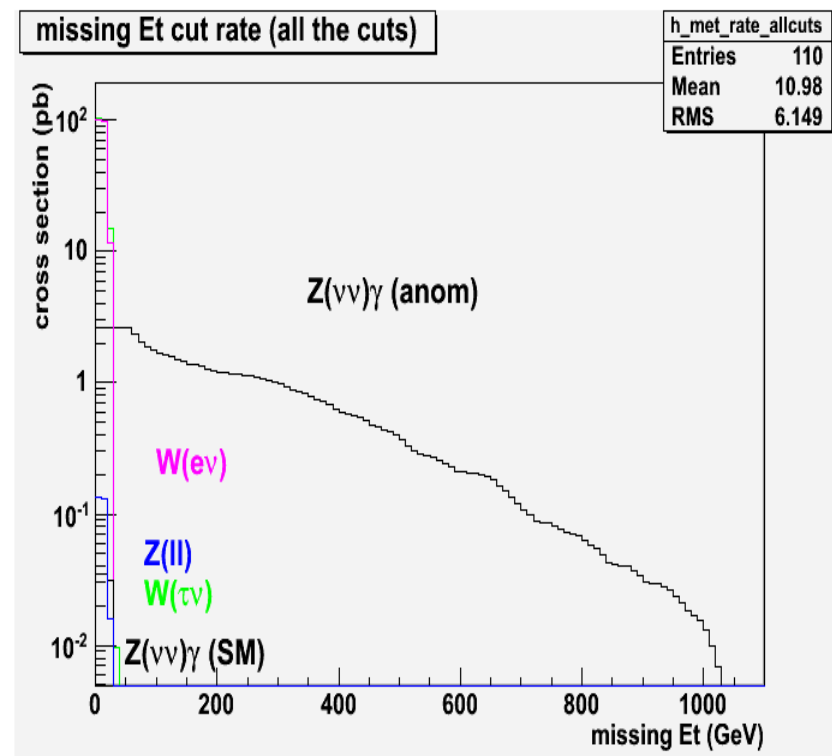
additional channels



Missing E_T rate



previous channels



additional channels



To do



Use TCMet instead of CaloMet

to reduce jet background?

demonstrate $\Delta\phi(\text{photon, Met})$

what it does

(reduces QCD, $W\gamma$, $Z\gamma$ (SM))

need for

anomalous (nonSM) $Z\gamma$ ntuples