H→WW→lνjj: analysis using 2 fb^{-1} data

Jake Anderson[1], Jeffery Berryhill[1], Phil Dudero[2], Ricardo Eusebi[3], Dan Green[1], Pratima Jindal[4], Kalanand Mishra[1], Ilya Osipenkov[3], Alexx Perloff[3], Andre Sznajder[5], Fan Yang[1], Francisco Yumiceva[1]

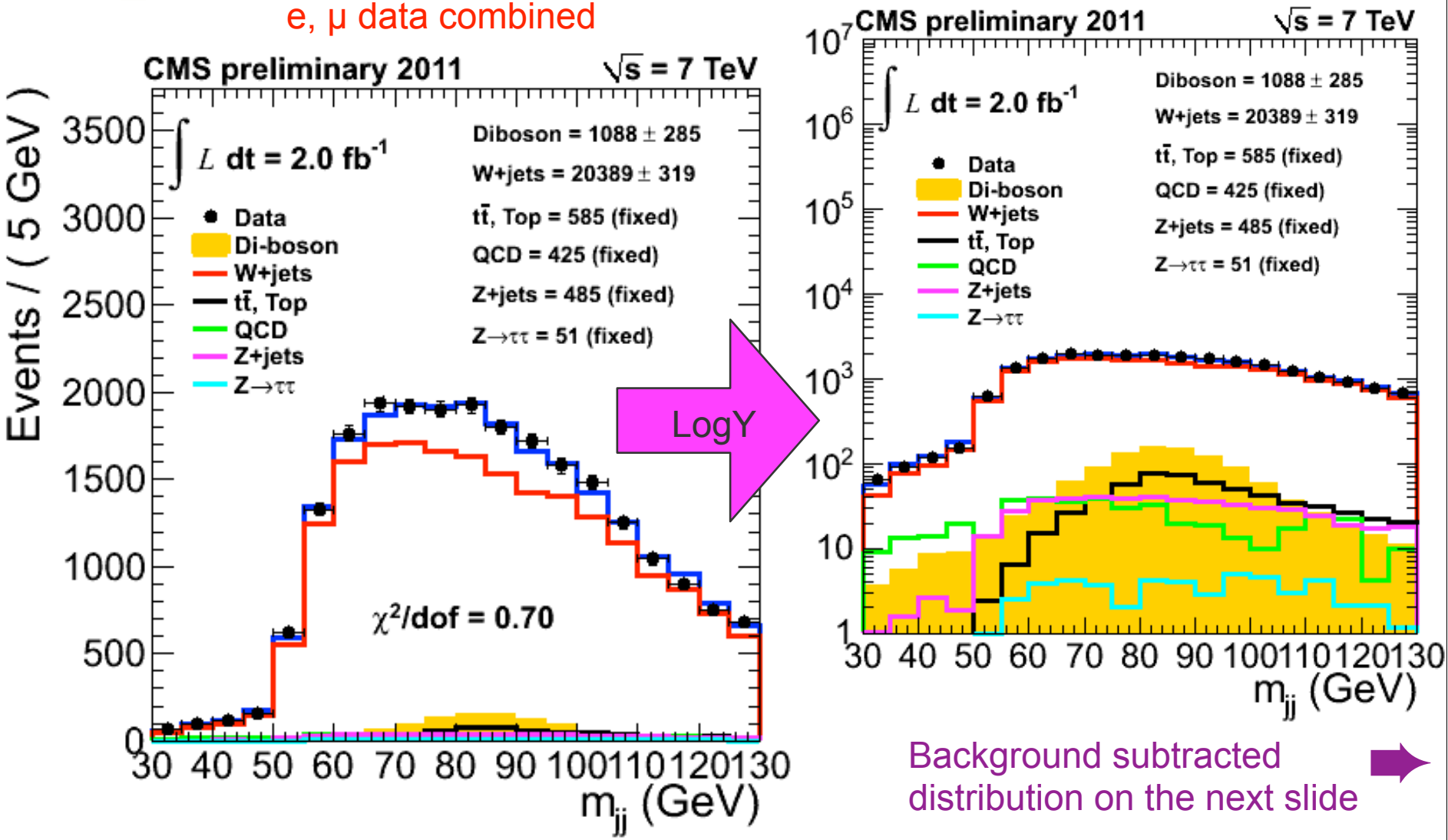
[1]Fermi National Accelerator Laboratory
[2]Texas Tech University
[3]Texas A&M University
[4]University of Nebraska at Lincoln
[5]Universidade do Estado do Rio de Janeiro (UERJ)

On behalf of H→WW (lνjj) working group

(September 7, 2011)

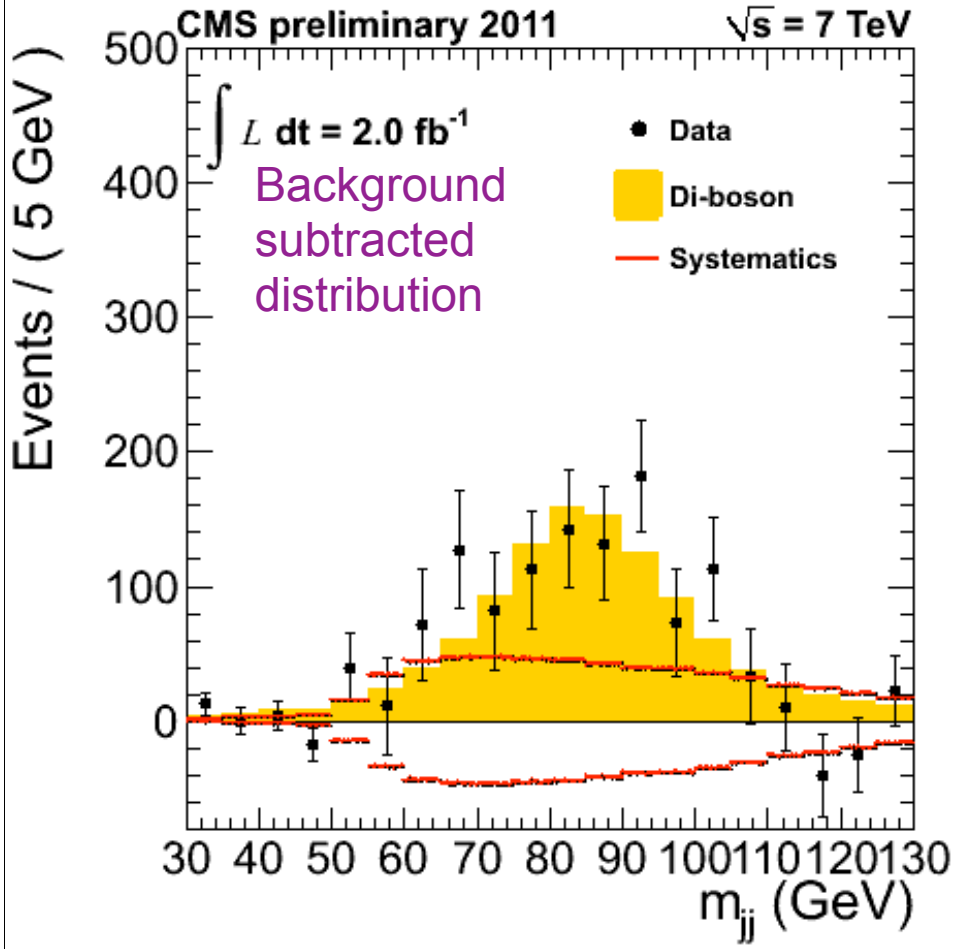
Template fit of m_{jj}

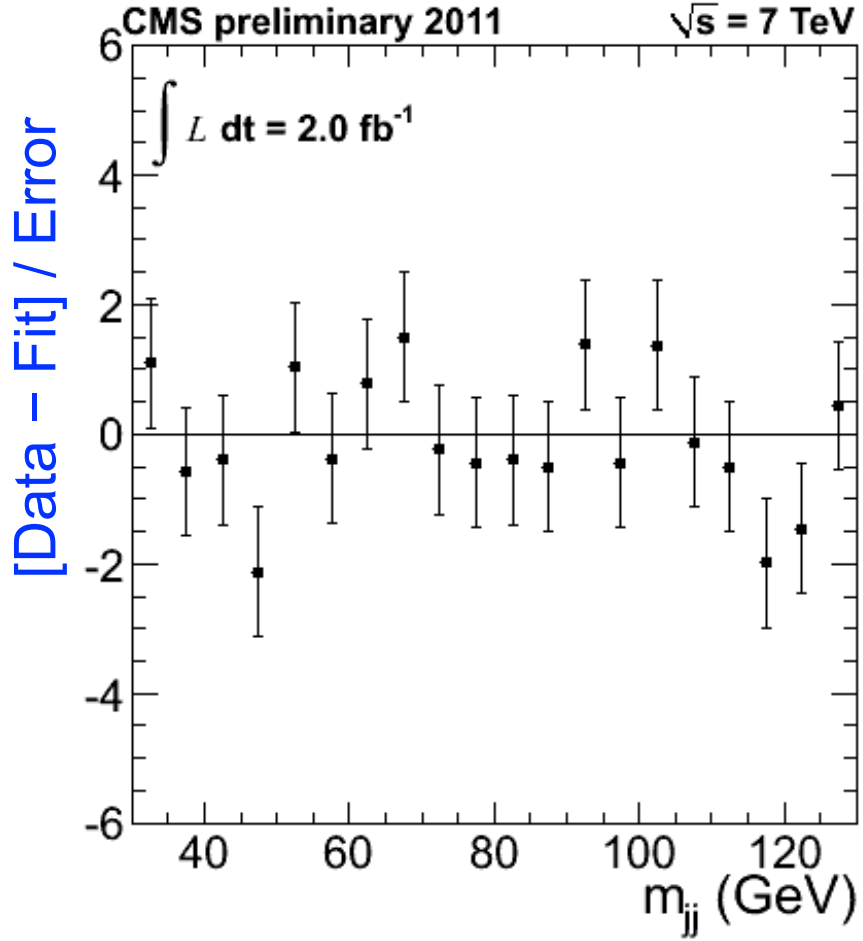
e, μ data combined



Background subtracted distribution on the next slide

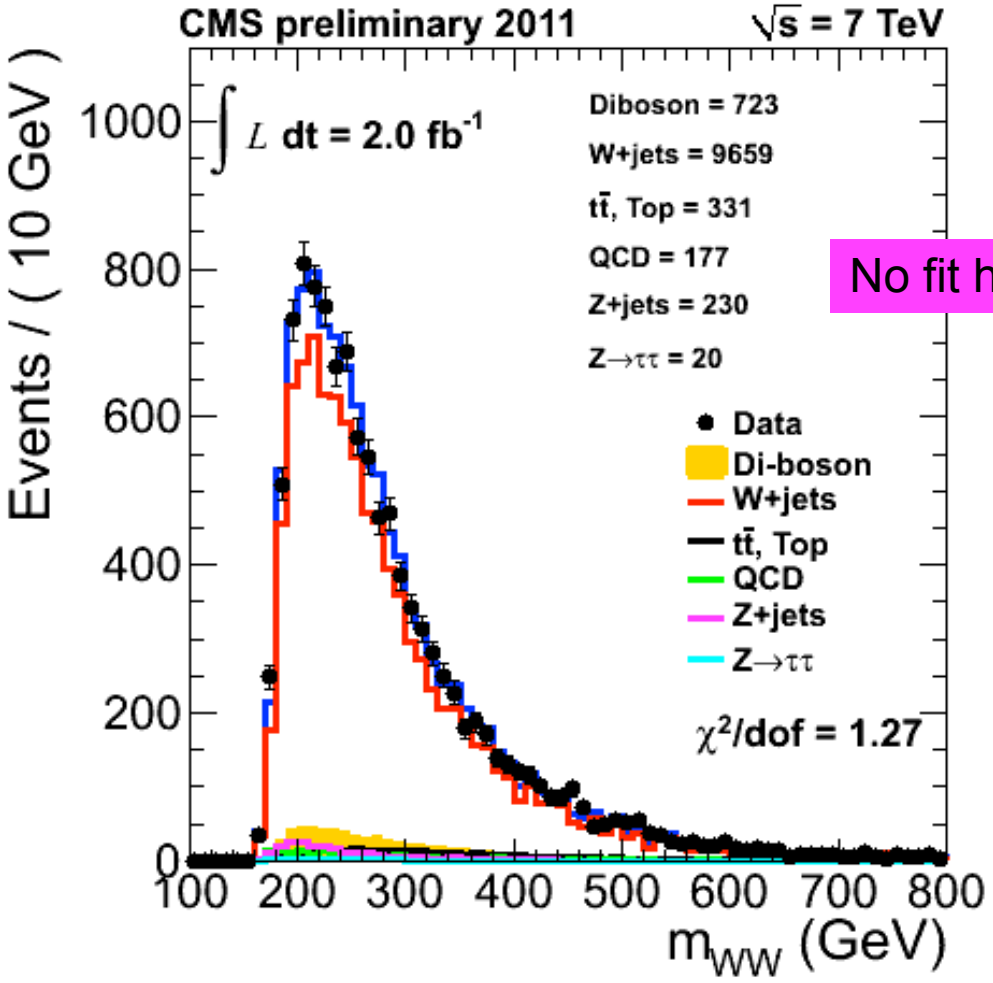
m_{jj} in W+2 jet events after bkg subtraction



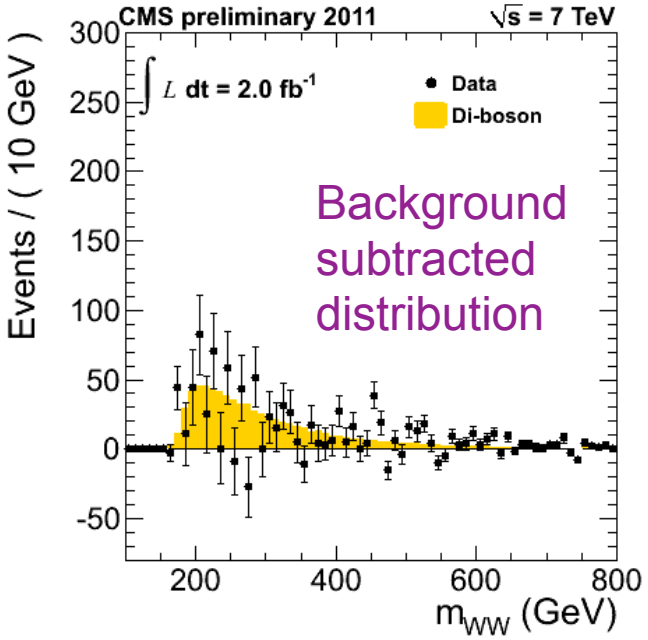


Currently working on updating the systematics.
Expected to improve significantly.

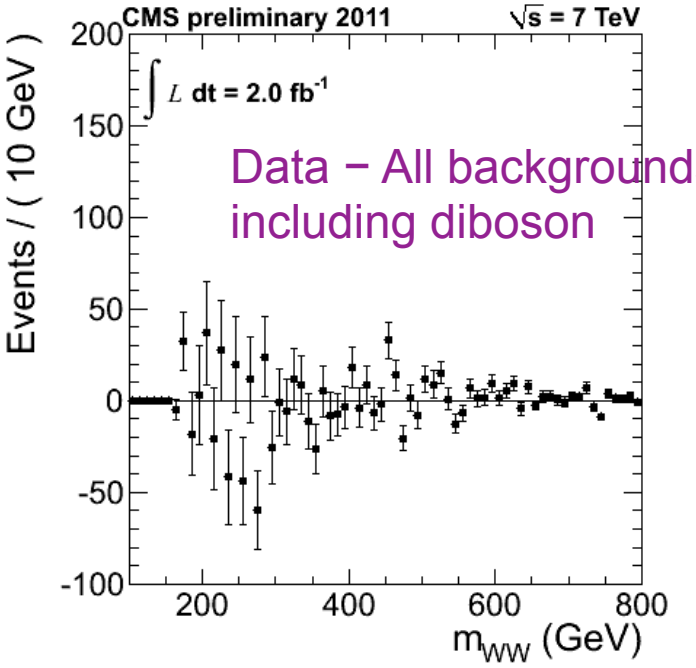
$m_{l\nu jj}$ distribution



No fit here

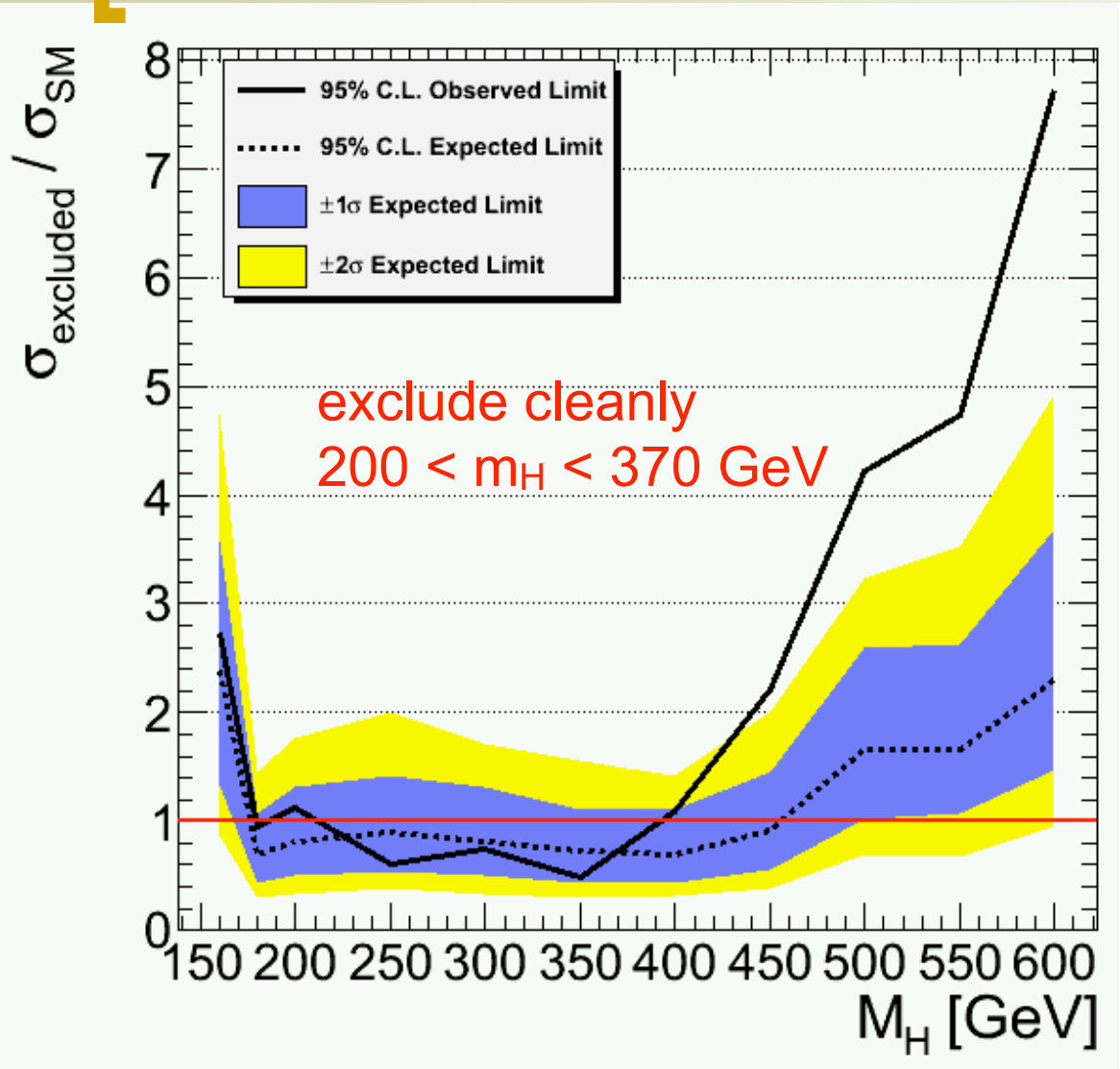


Background subtracted distribution



Data − All backgrounds including diboson

Higgs limit



Investigating the worse than expected observed limit at high mass

Working on propagating systematic uncertainty to the limit plot

Other progress: Try different ways of KinFit

Dan's suggestion

Total Try different kinematic fit methods

1

Our current kin fit

Normal Fit : Constrain on M_{lv} & M_{jj} & MET Balance

- TFitConstraintEp *pxCons = new TFitConstraintEp("PxConstraint", "Px-Constraint", 0, TFitConstraintEp::pX , (nvp+ajp+bjp).Px());
- TFitConstraintEp *pyCons = new TFitConstraintEp("PyConstraint", "Py-Constraint", 0, TFitConstraintEp::pY , (nvp+ajp+bjp).Py());
- TFitConstraintM *mCons1 = new TFitConstraintM("WMassConstrainta", "WMass-Constrainta", 0, 0 , 80.4);
- TFitConstraintM *mCons2 = new TFitConstraintM("WMassConstraintb", "WMass-Constraintb", 0, 0 , 80.4);

2

Constrain on M_{lv} ONLY

- TFitConstraintM *mCons1 = new TFitConstraintM("WMassConstrainta", "WMass-Constrainta", 0, 0 , 80.4);

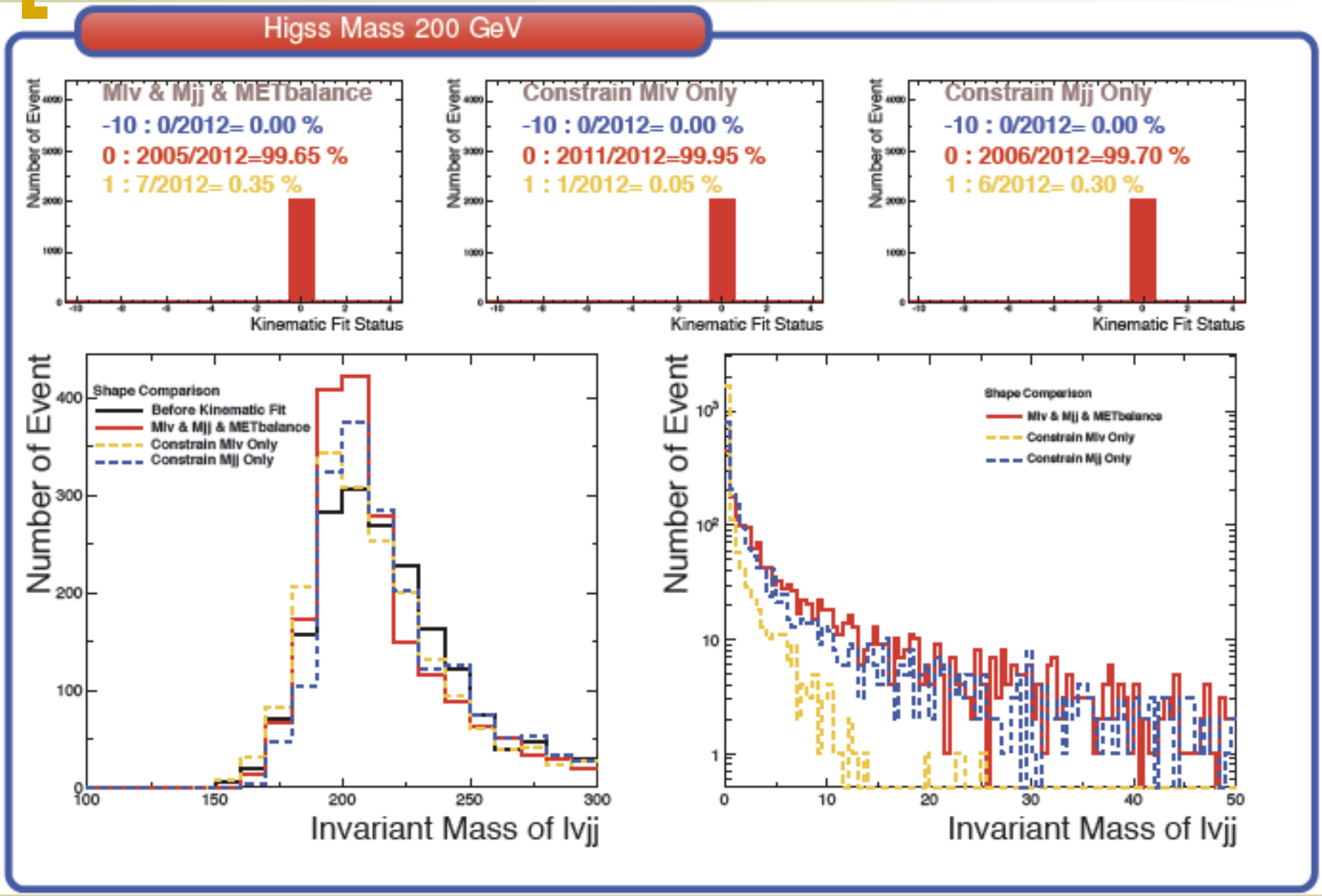
Constrain on M_{jj} ONLY

- TFitConstraintM *mCons2 = new TFitConstraintM("WMassConstraintb", "WMass-Constrainta", 0, 0 , 80.4);
- After the kinematic fit, re-calculate MET according to the fitted jet p_T.

3

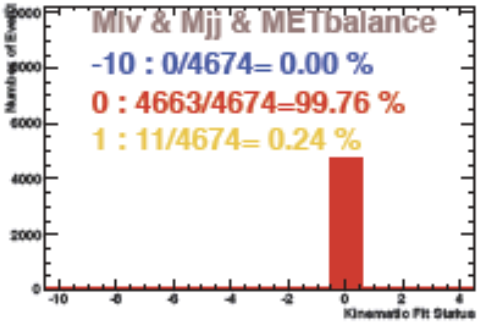
- $p_{\nu X} = MET_X + p_{j1X}^{unfitted} + p_{j2X}^{unfitted} - p_{j1X}^{fitted} - p_{j2X}^{fitted}$
- $p_{\nu Y} = MET_Y + p_{j1Y}^{unfitted} + p_{j2Y}^{unfitted} - p_{j1Y}^{fitted} - p_{j2Y}^{fitted}$
- Solve neutrino p_Z using the new MET.

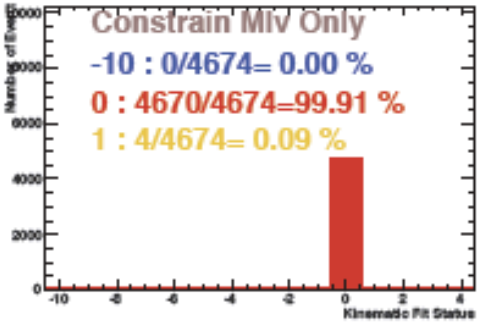
Comparison of KinFits: m_H = 200 GeV

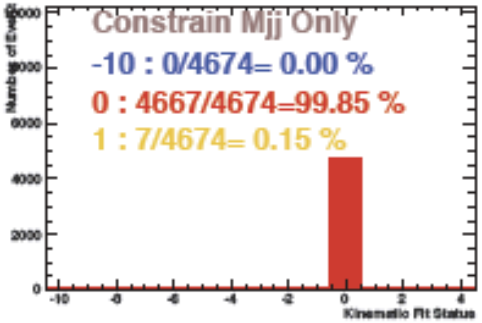


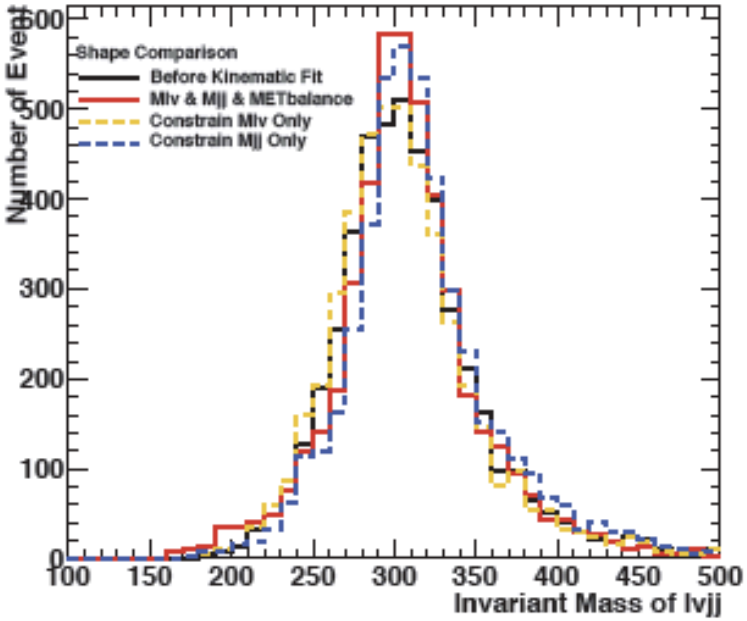
Comparison of KinFits: m_H = 300 GeV

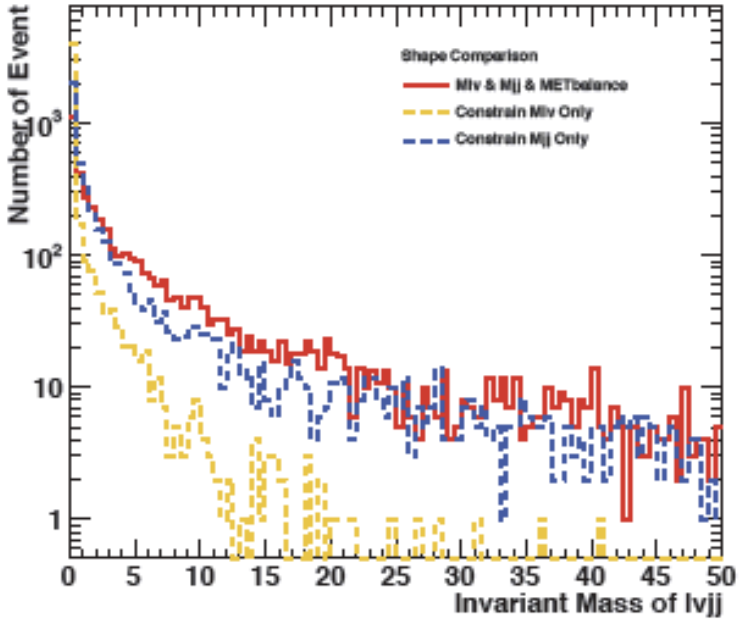
Higss Mass 300 GeV



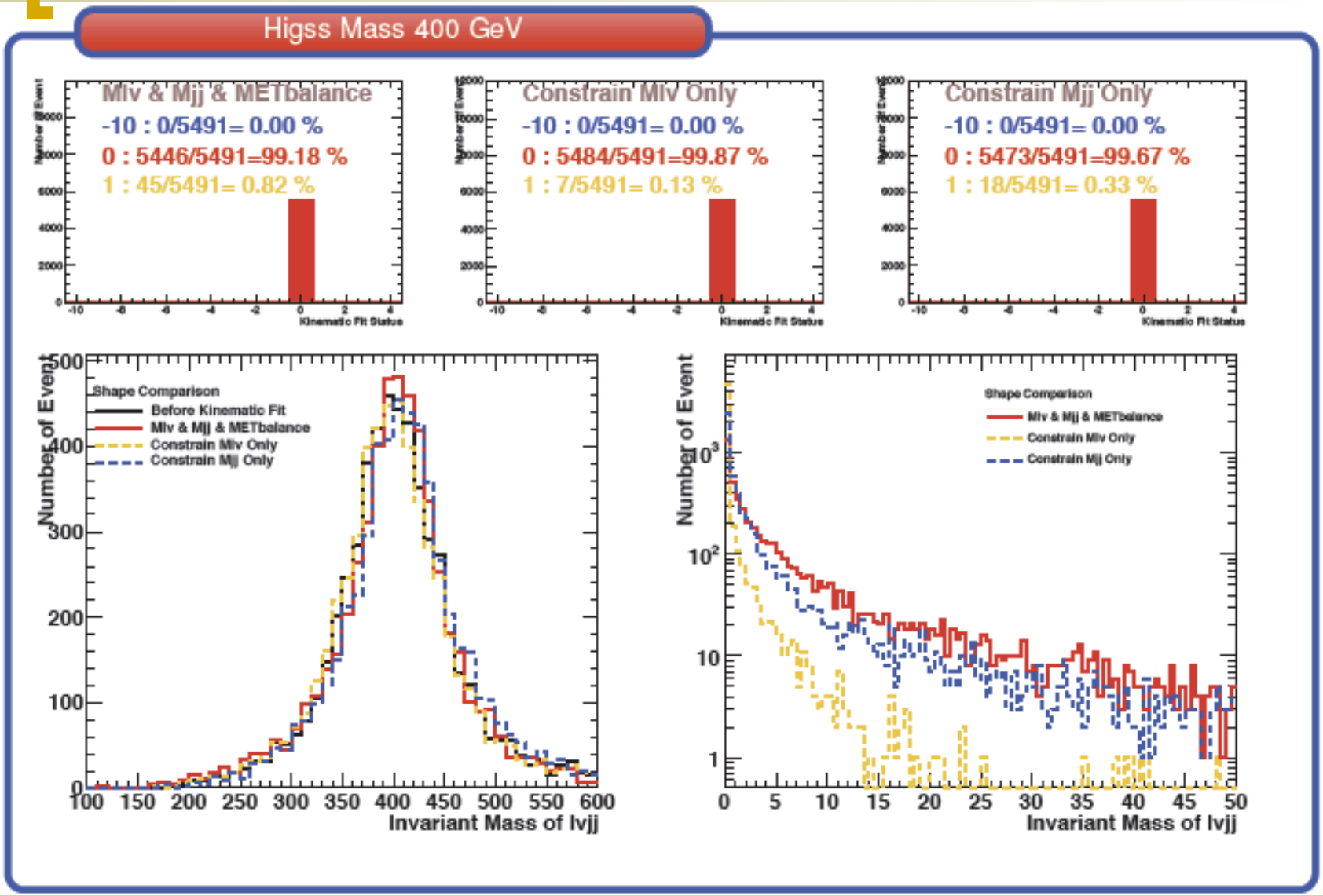








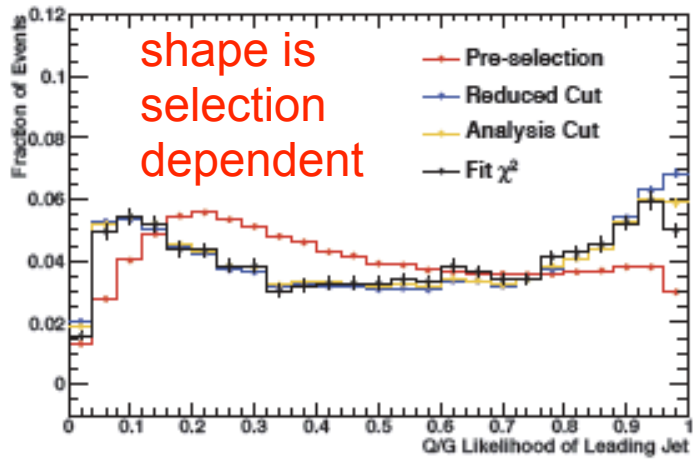
Comparison of KinFits: m_H = 400 GeV



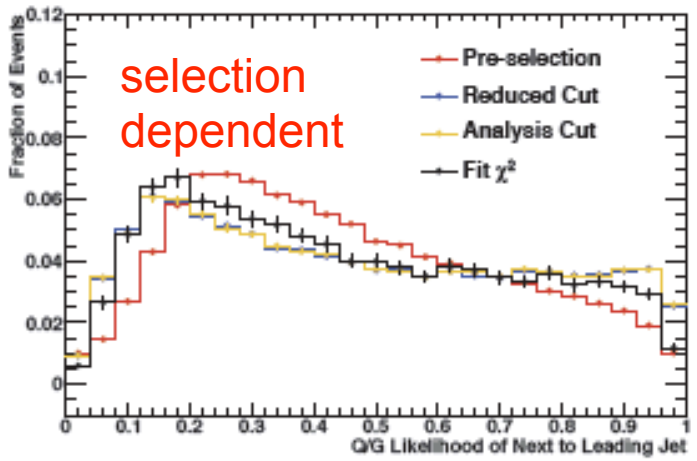
Comparison of QG LH for various selections

Background

MC Wjet Leading Jet

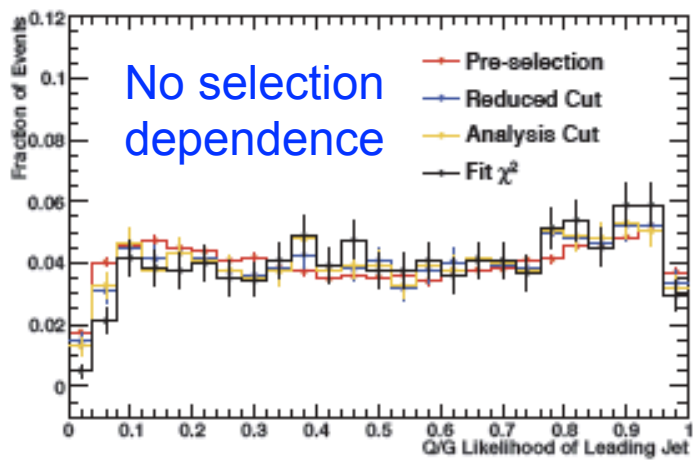


MC Wjet Next to Leading Jet

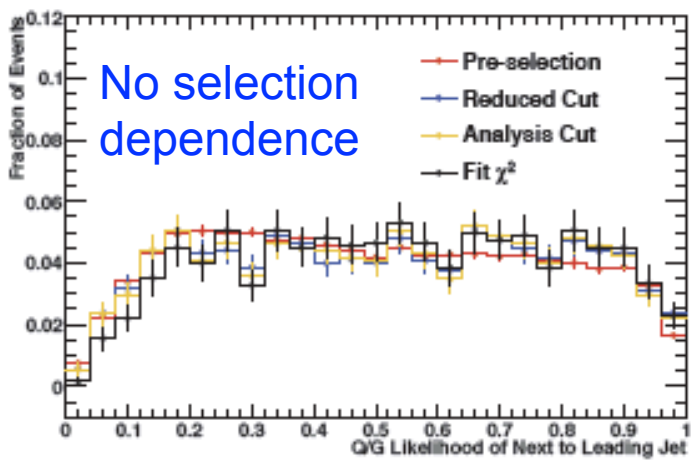


Signal

MC Hww Leading Jet



MC Hww Next to Leading Jet



backup slides