

# Charged-Higgs Analysis

## DiLepton Final State

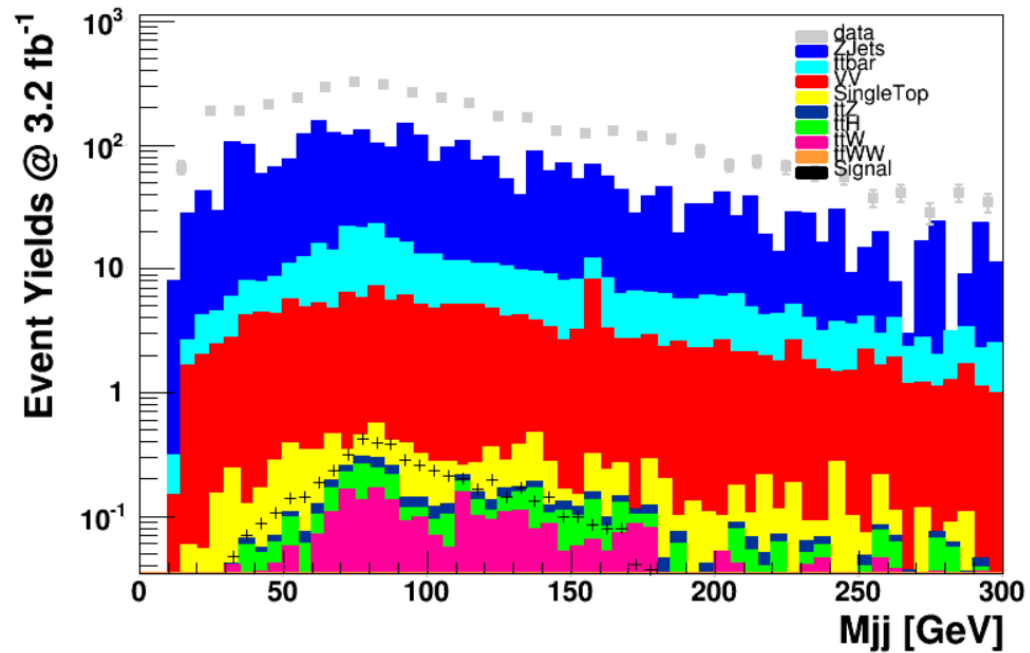
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# Introduction

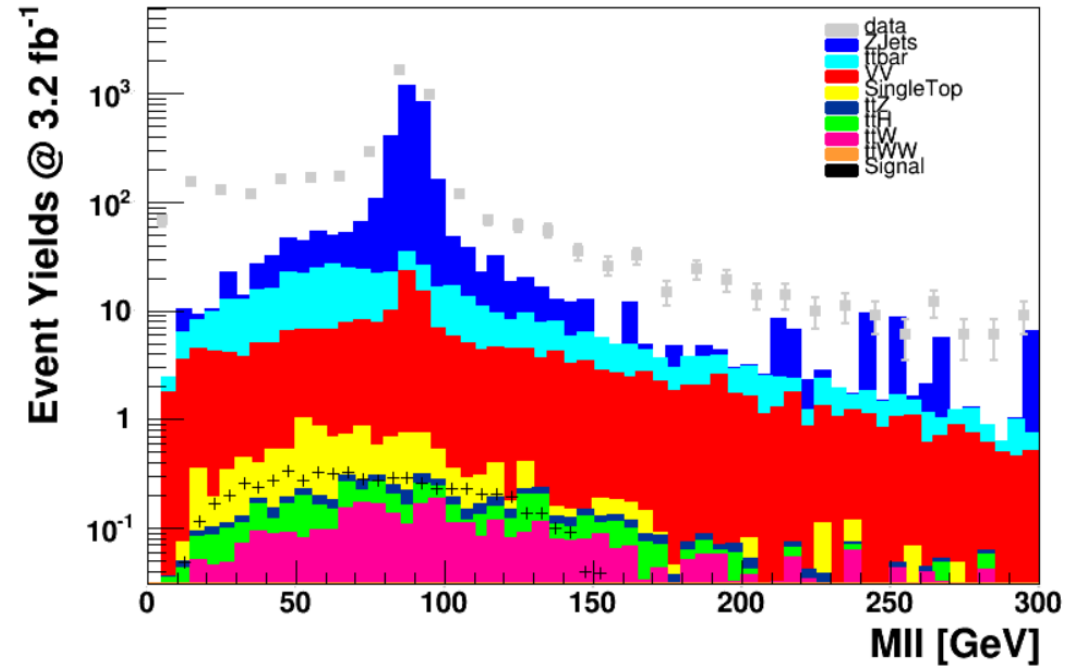
- Study signal and background distributions with two same sign lepton final state.
  - Background samples are ttH official ntuples provided by Robert(Thanks).
  - Signal sample is produced by Yanwen(Thanks) using ttH official framework.
- Backgrounds:
  - ttW, ttWW, ttH, ttZ, SingleTop, VV, ttbar and Zjets.
- Event selections:
  - Two same sign loose leptons with pt at least 20 GeV.
  - At least two jets(will update to 4 jets requirement).
  - Bjet veto, MV2c20\_77.
- Look into variable distribution at this stage to see how to apply further selections to get better sensitivity.
  - Mll, Mjj, MET, deltaR of jj
- Show preliminary plots and numbers.

# Mll & Mjj

Mjj



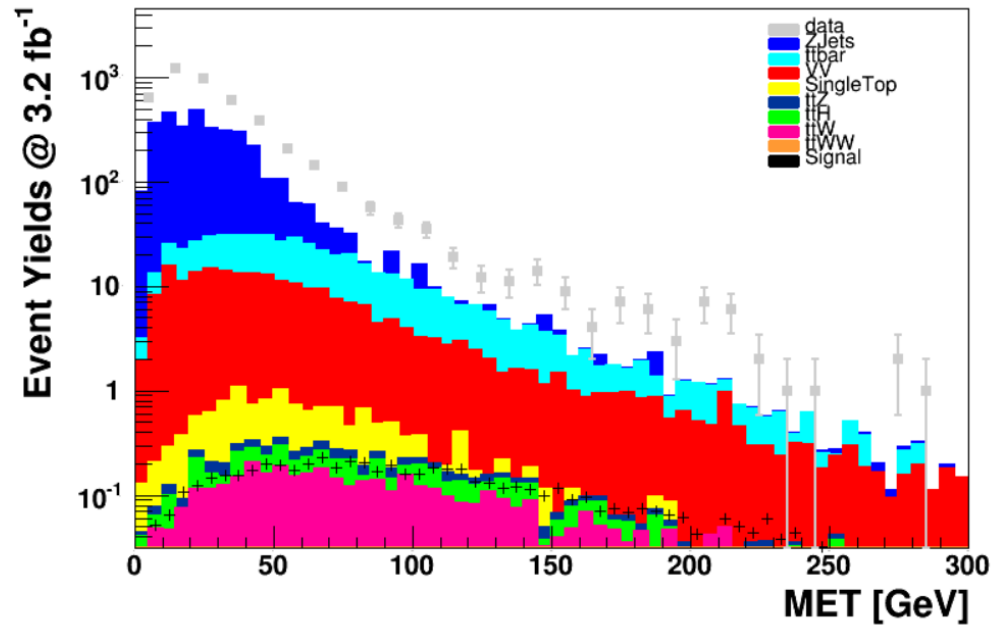
Mll



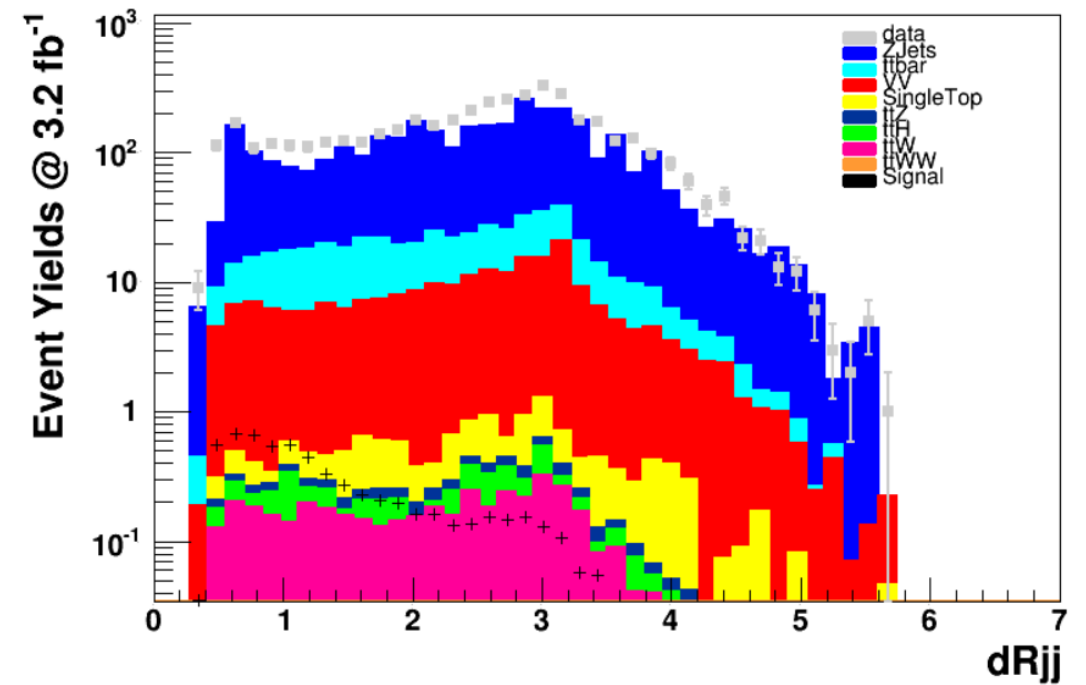
- Requirement on M<sub>jj</sub> and M<sub>ll</sub>:
  - M<sub>jj</sub> > 30 GeV
  - Veto events with M<sub>ll</sub> between Z<sub>mass</sub>+/-10 GeV

# MET and deltaR\_jj

MET



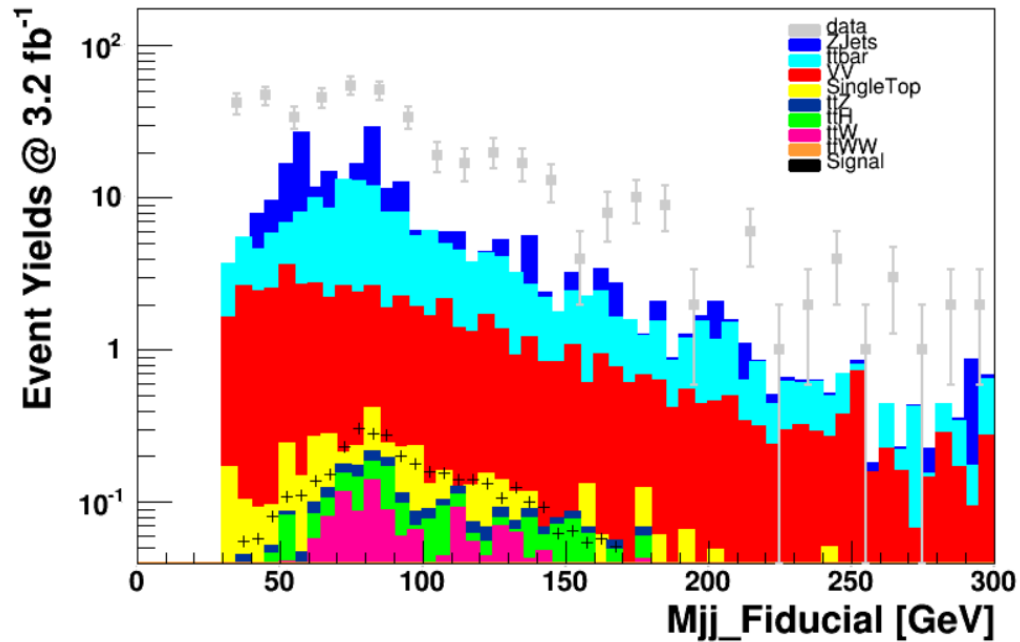
dRjj



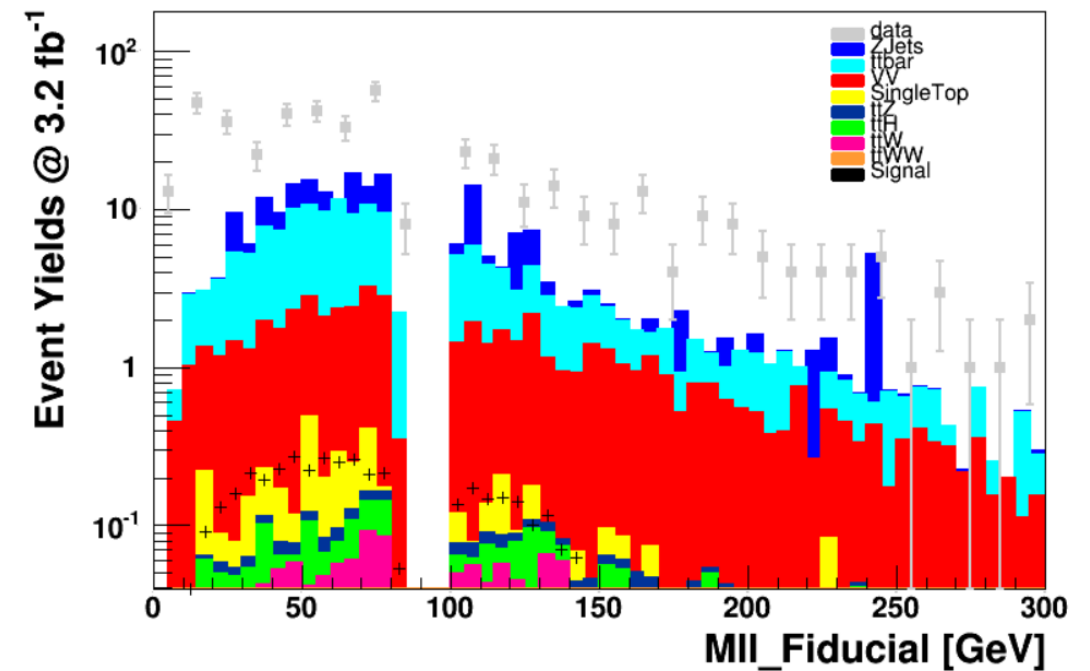
- Requirement on MET and dRjj:
  - MET > 30 GeV
  - dRjj < 2.5

# Fiducial region(Mll and Mjj)

Mjj\_Fiducial

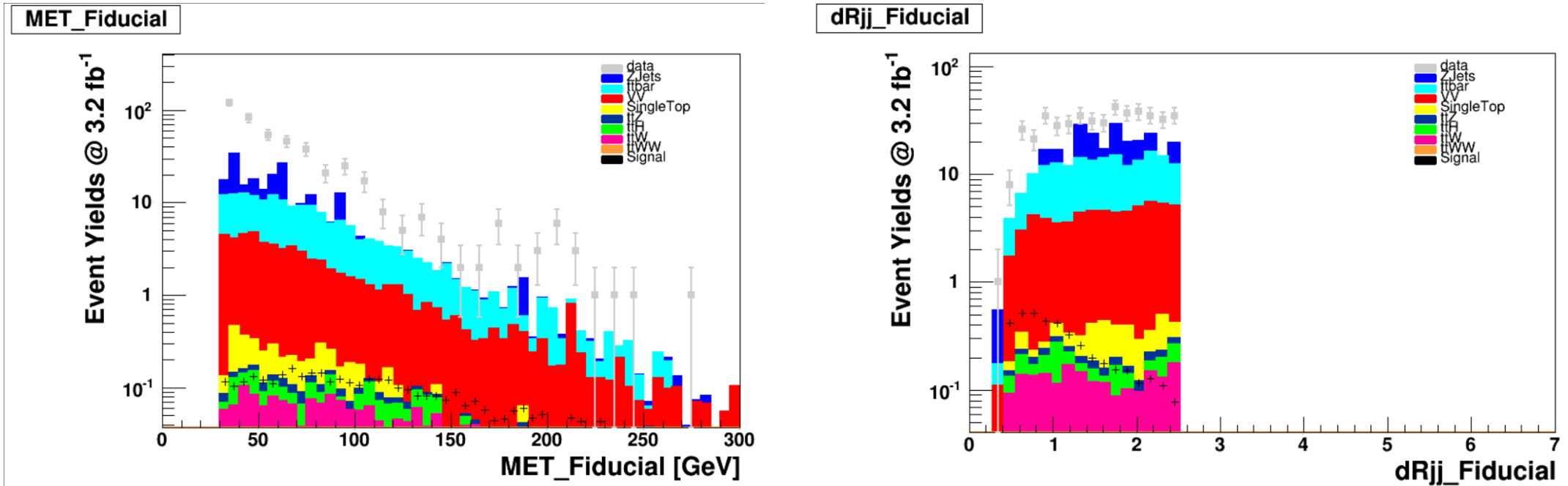


Mll\_Fiducial



- Mjj and Mll distribution after all event selections applied.

# Fiducial region(MET and deltaR\_jj)



- Mjj and Mll distribution after all event selections applied.

# CutFlow

Event Yields @  $3.2 \text{ fb}^{-1}$

Raw	59.0	4.0	132.3	92.7	118.4	1450.4	25321.0	91385.0	4672327.0
NLep	8.5	1.0	32.4	12.8	9.1	68.2	797.6	1471.0	36762.6
NJet	6.2	0.1	4.2	1.9	1.2	7.9	217.3	297.1	2943.6
Mll	5.2	0.1	3.6	1.7	1.0	6.3	165.2	254.4	496.3
Mjj	5.1	0.1	3.6	1.7	1.0	6.1	160.9	249.7	466.6
MET	4.7	0.1	3.2	1.5	0.8	4.9	123.1	207.0	160.4
dPhi_jj	4.0	0.1	1.9	0.8	0.5	2.1	58.0	118.7	65.6
	Signal	ttWW	ttW	ttH	ttZ	SingleTop	VV	ttbar	ZJets

- Background yield is much larger than signal.
  - Due to coarser event selection used for now.
- Expect improvement with fine study on signal/background.

# To do

- More study needs to be done on event selection.
  - Look for other potential variables with strong ability to distinguish signal/background.
  - Seek best cut values for better sensitivity.