# TPrime Update

CMS Naples Meeting

16/02/2017

C. Giugliano, A.O.M. Iorio

INFN Sezione di Napoli

# Outline:

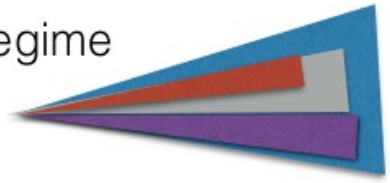
-Optimisation of control region choice for the fit

- Results with MT or MET

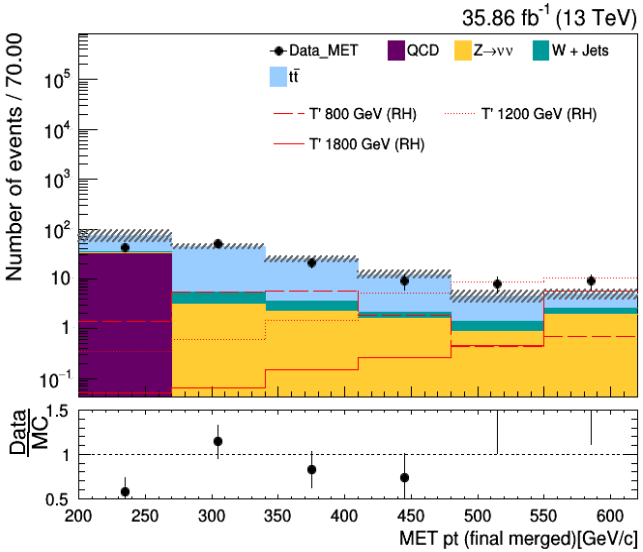
- First checks of data driven estiamte for TTbar

# MET:

boosted regime



merged

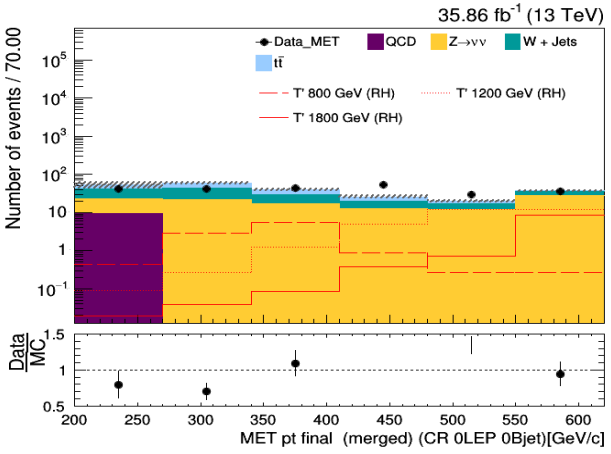



## Signal Region

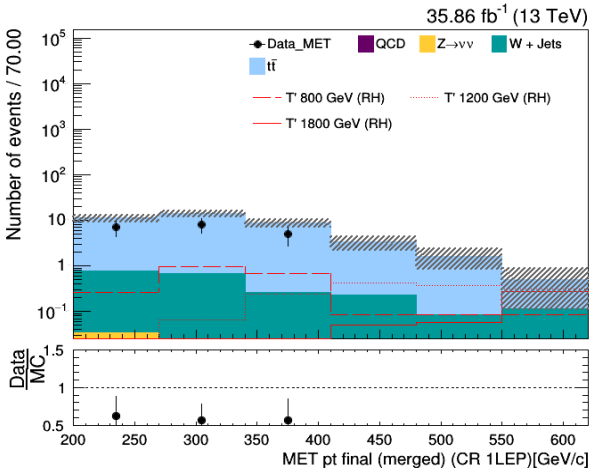
0LEP+TopTagging+
+1BJet

=0LEP 2BJet

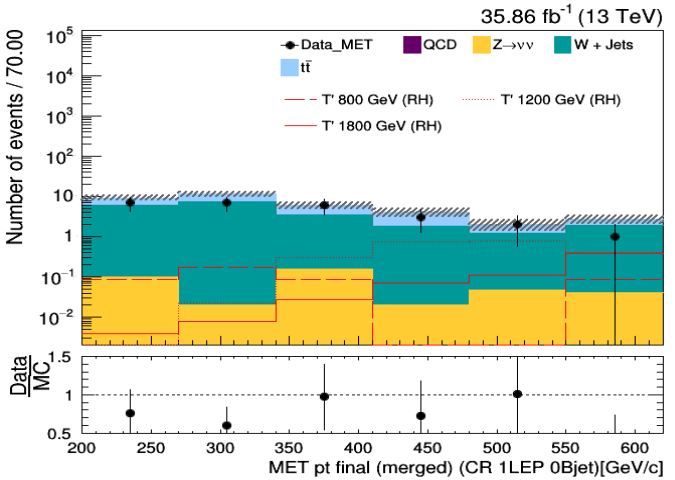
## Control Regions




0LEP 0BJet



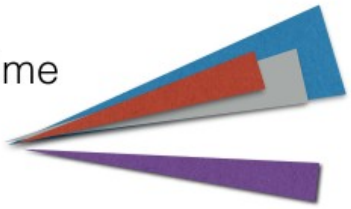

1LEP



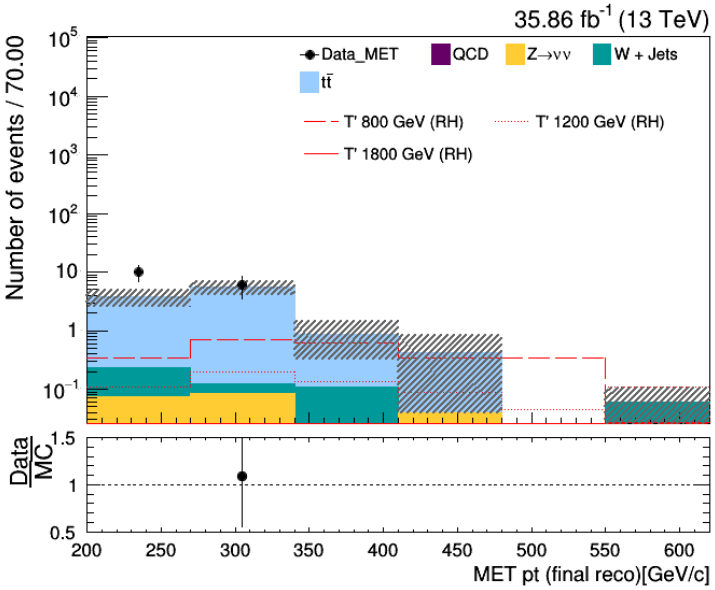

1LEP 0BJet

# MET:

semi-resolved regime



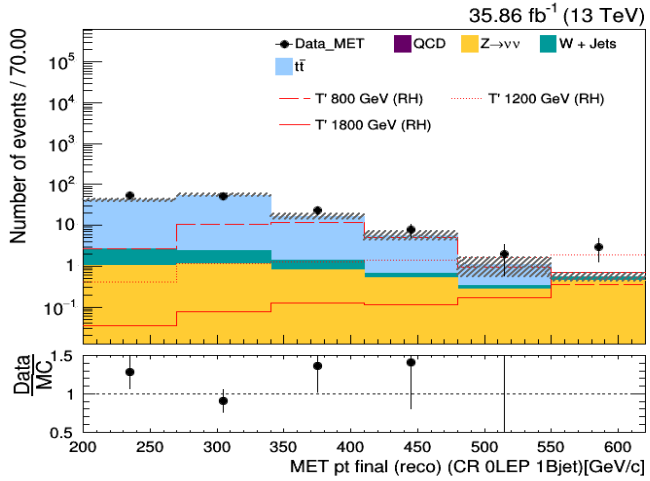

reco



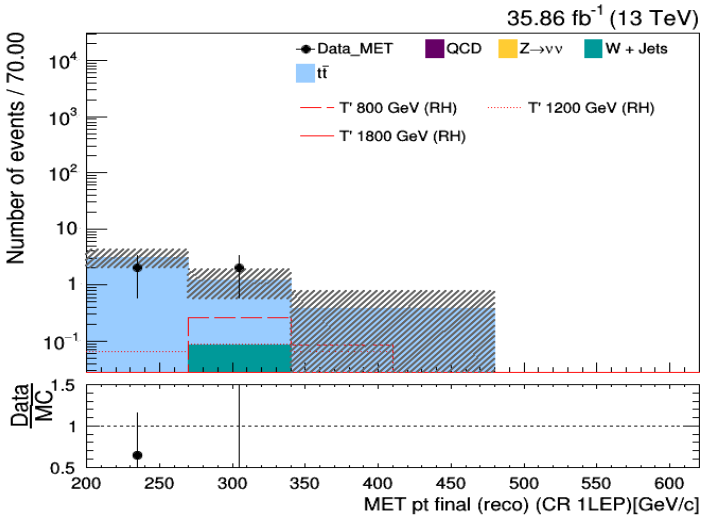

## Signal Region

0LEP +WTagging+
+1BJet
+1BJet
=0LEP 2BJet

## Control Regions



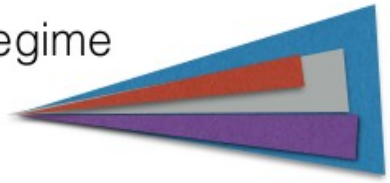

**0LEP 1BJet**



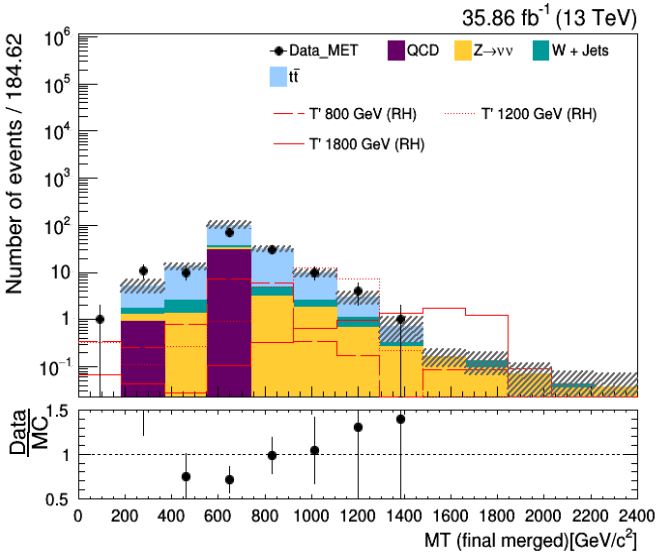

**1LEP**

# MT:

boosted regime



merged

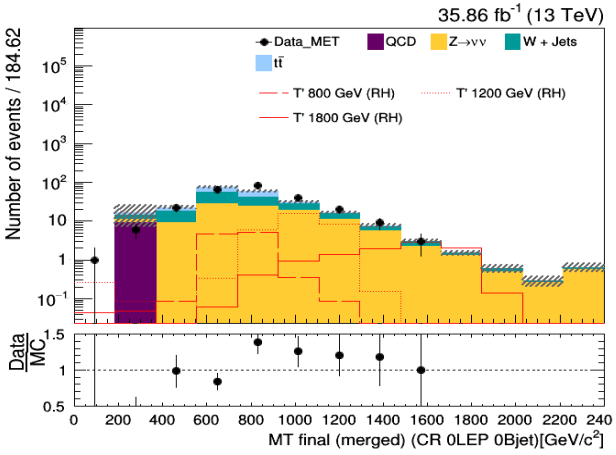



## Signal Region

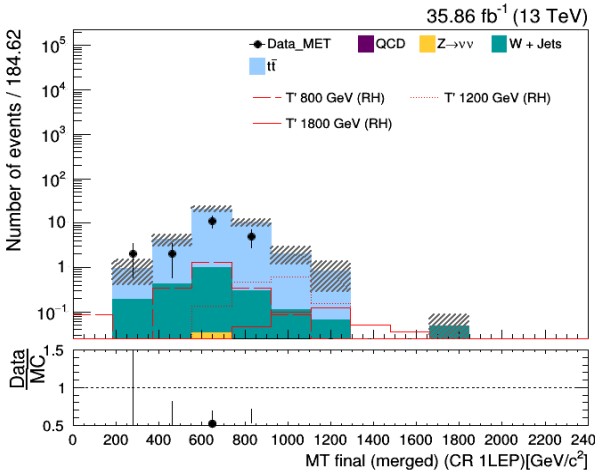
0LEP+TopTagging+
+1BJet

=0LEP 2BJet

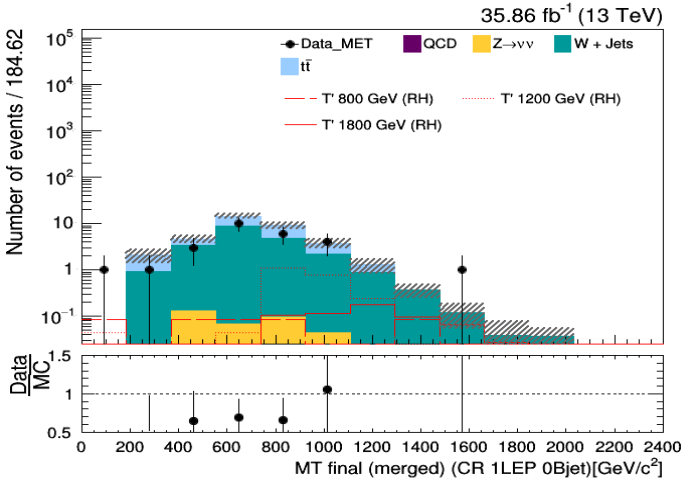
## Control Regions




0LEP 0BJet



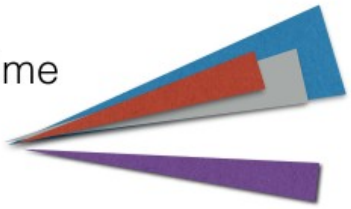

1LEP



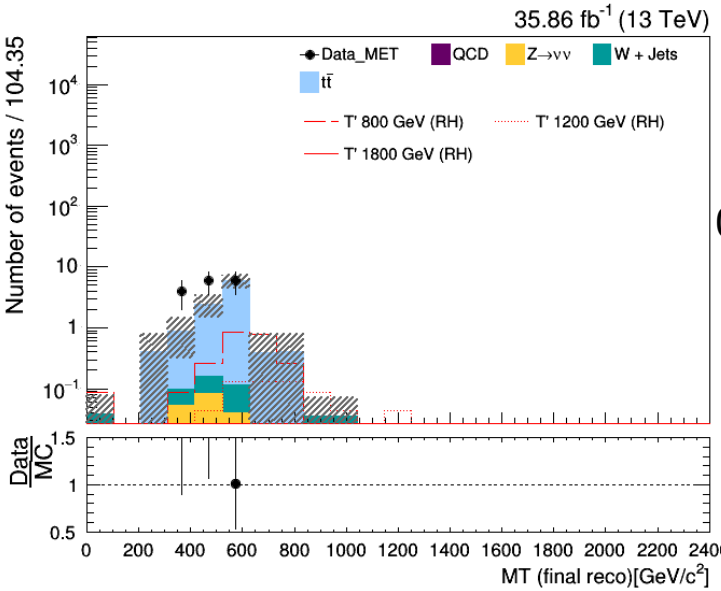

1LEP 0BJet

# MT:

semi-resolved regime



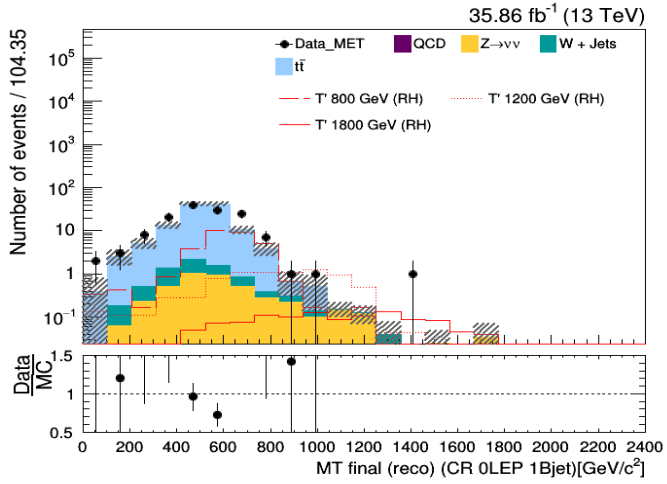

reco



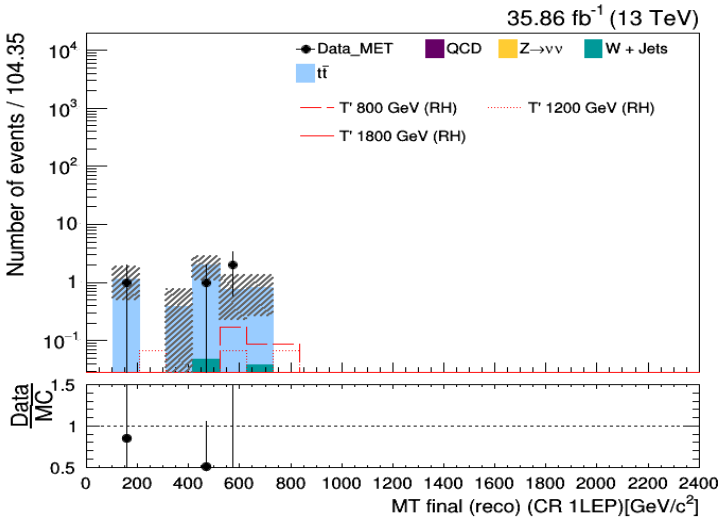

## Signal Region

0LEP +WTagging+
+1BJet
+1BJet
=0LEP 2BJet

## Control Regions




**0LEP 1BJet**




**1LEP**

# FIT:

- Removing CRs with very low statistics (i.e. the CR1LEP reco)
- Use of different binning for the CR with low statistic, e.g. CR1LEP 0BJet merged and CR1LEP merged

→ *NotAllCR*

maximum likelihood fit and limit for all the mass samples
800
1200
1800
and for the Two variables MET and MT

→ *CR_Best*

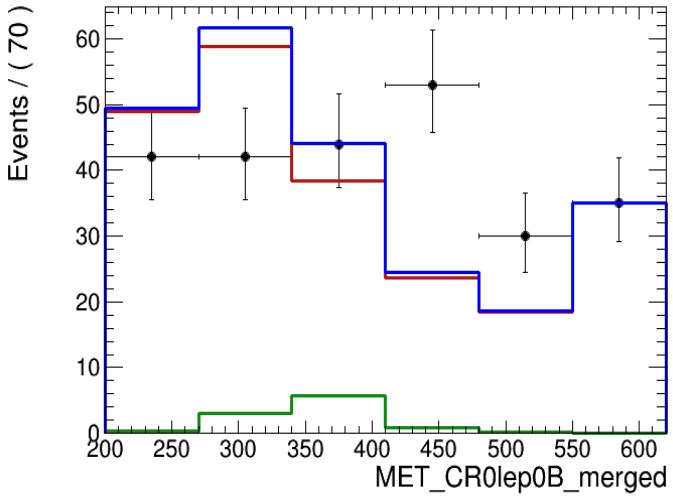
maximum likelihood fit and limit for all the mass samples
800
1200
1800
and for the Two variables MET and MT with
only two CR: CR0LEP1BJet reco and 0LEP0BJet Merged

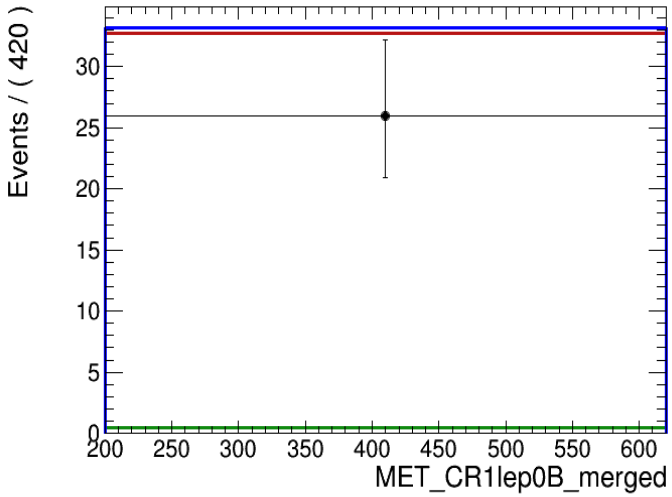
# FIT:

**MET** **Control Regions** PreFit **Mass sample 800**

*NotAllCR*

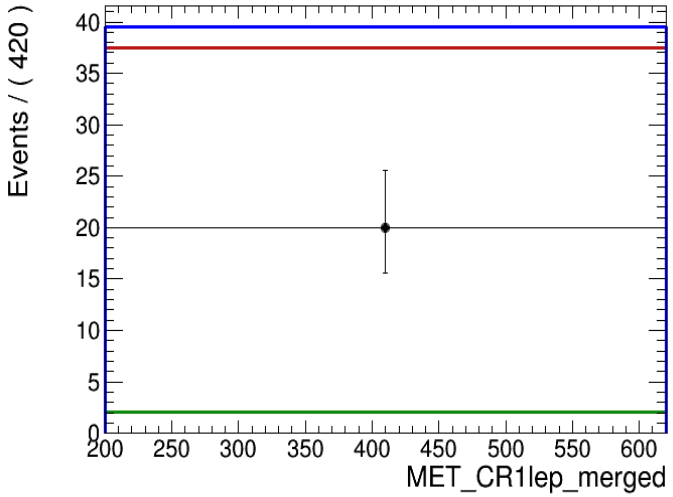
0LEP 0BJet merged

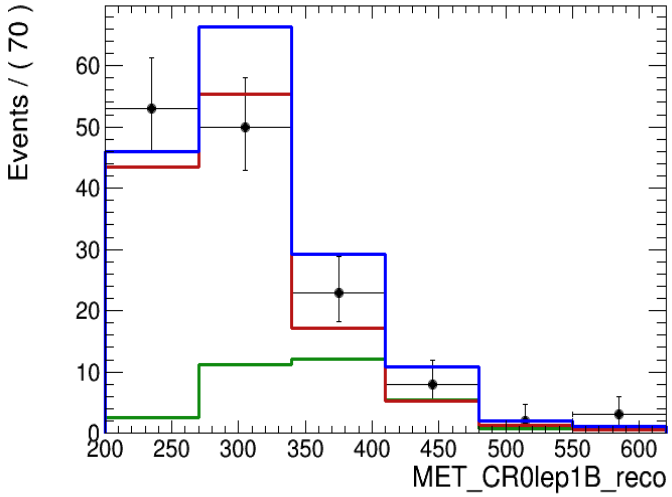



1LEP 0BJet merged

1LEP merged



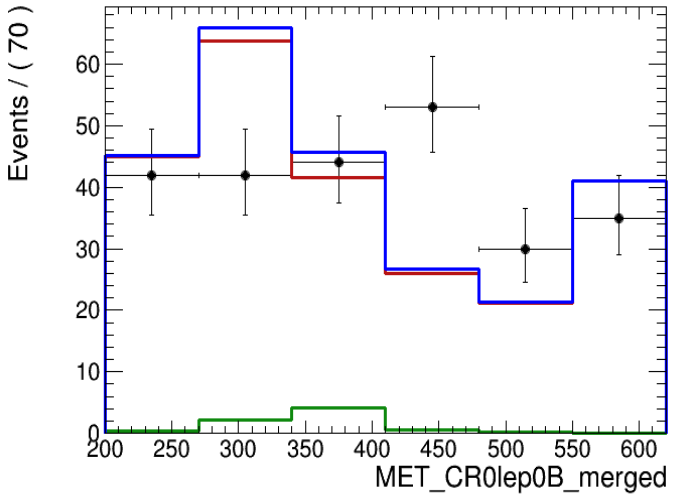

0LEP 1BJet reco

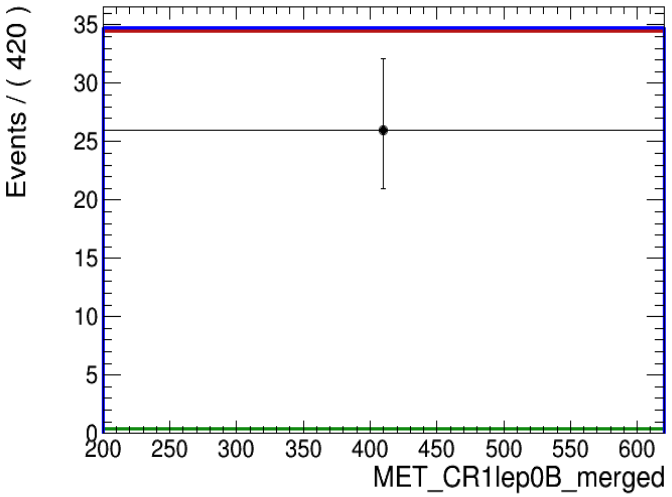
# FIT:

*NotAllCR*

**MET** **Control Regions** PostFit **Mass sample 800**

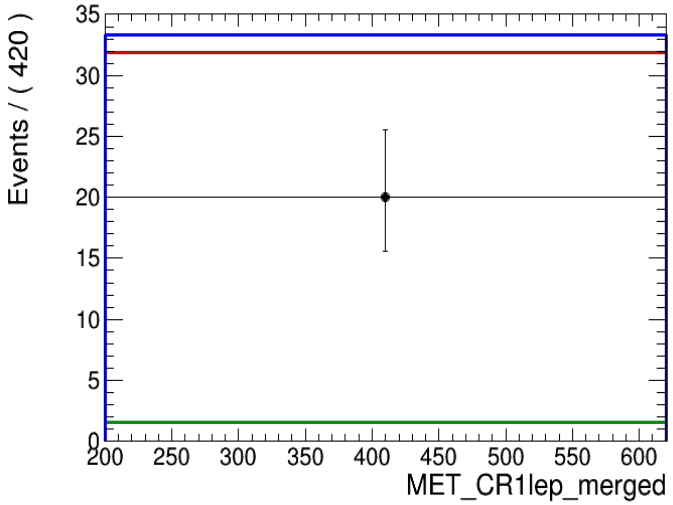
0LEP 0BJet merged

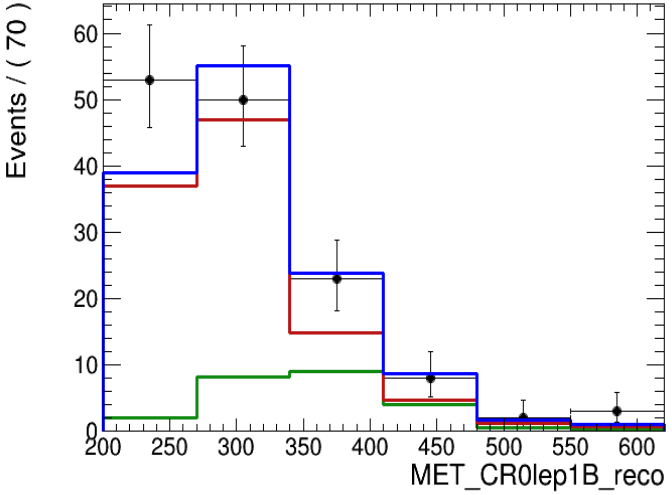



1LEP 0BJet merged

1LEP merged




0LEP 1BJet reco

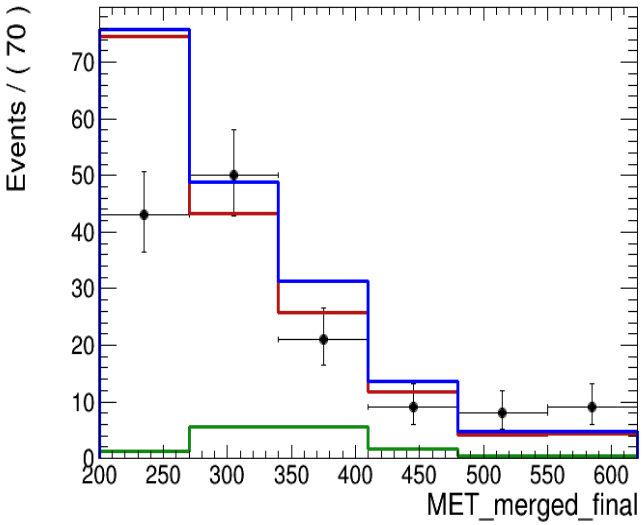
# FIT:

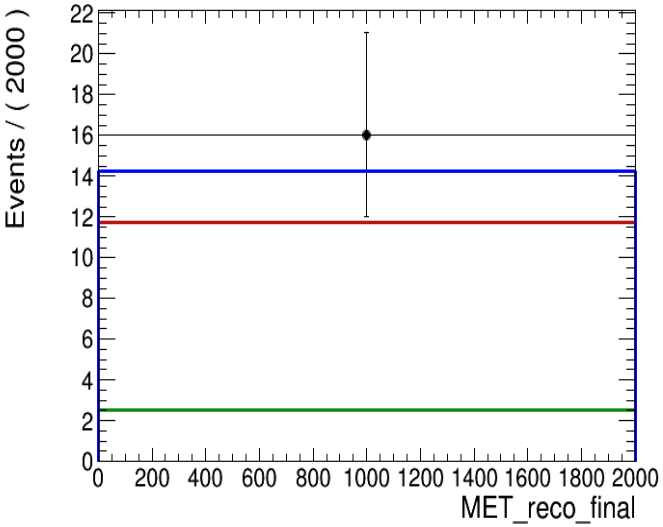
*NotAllCR*

**MET** **Signal Regions** **Mass sample 800**

PreFit

merged

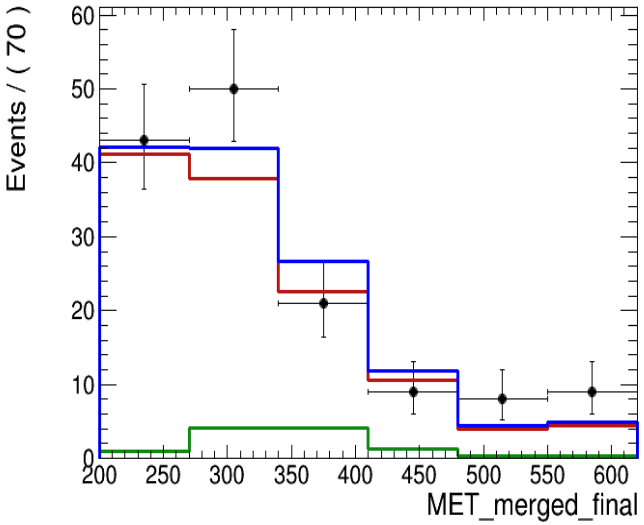


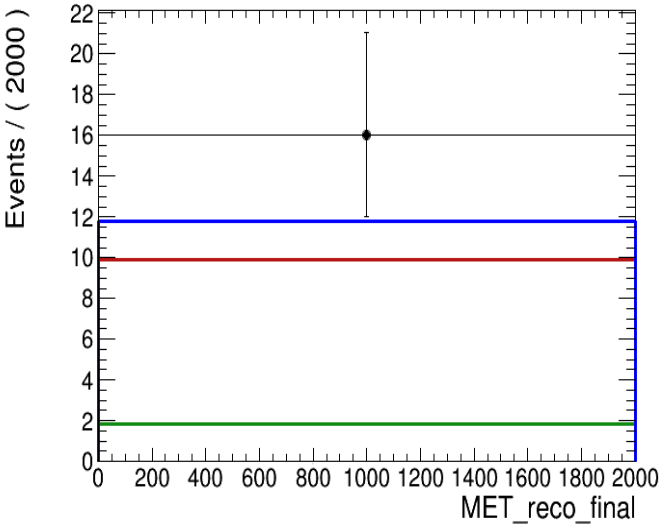




reco

PostFit

merged




reco

# FIT:

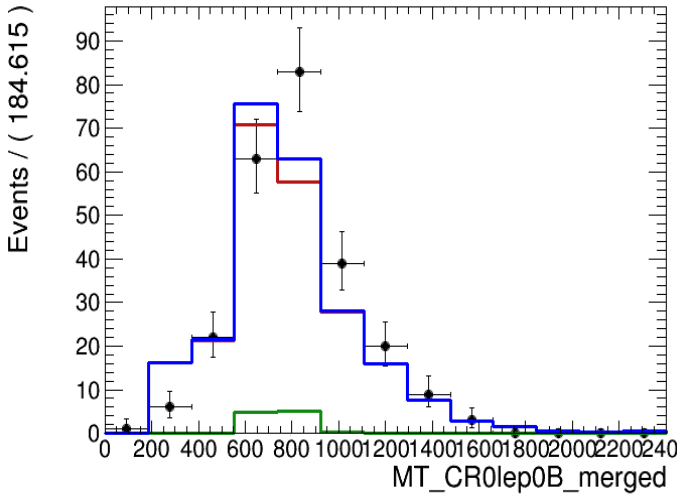
**MT**

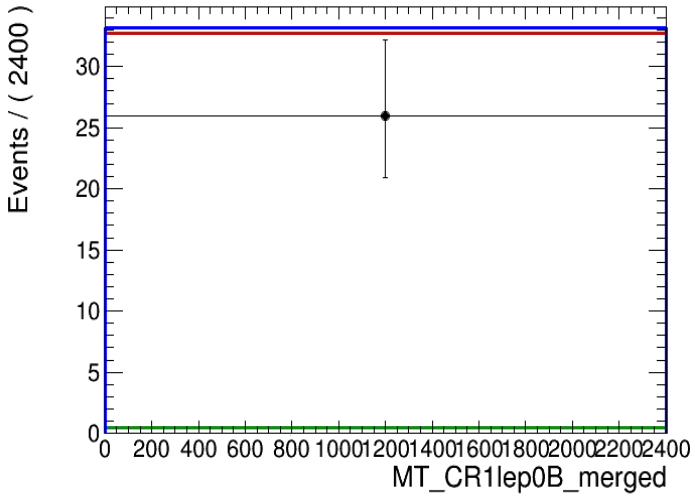
**Control Regions**
PreFit

**Mass sample 800**

*NotAllCR*

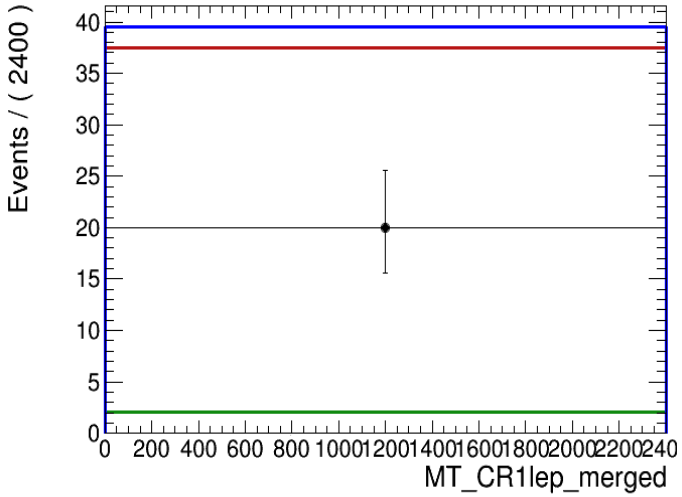
0LEP 0BJet merged

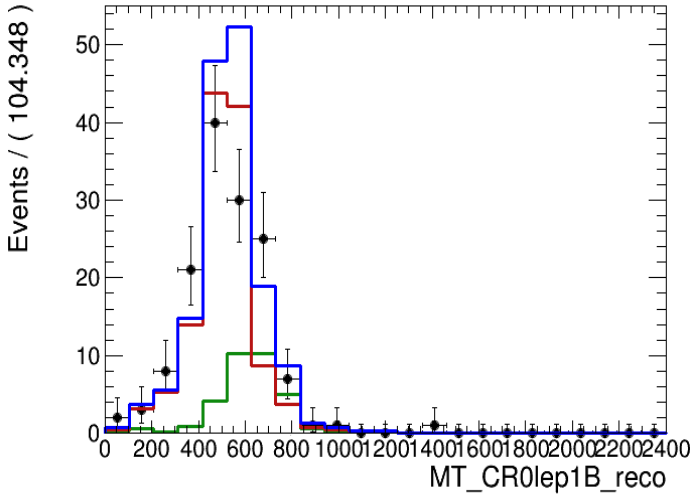



1LEP 0BJet merged

1LEP merged




0LEP 1BJet reco

# FIT:

## Fit results:

Expected 50.0%

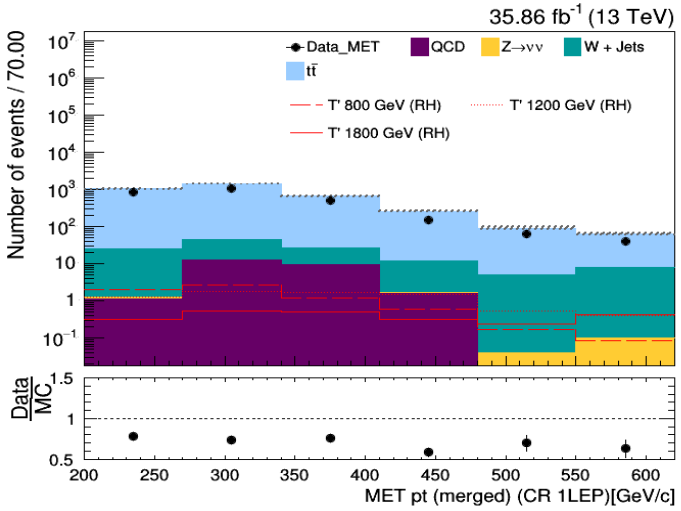
| MET | 800 | 1200 | 1800 |
|---|---|---|---|
| notAllCR | r<0.6387 | r < 0.3076 | r < 0.8008 |
| CR_Best | r < 0.5527 | r < 0.3096 | r < 0.8008 |

| MT | 800 | 1200 | 1800 |
|---|---|---|---|
| notAllCR | r < 0.5527 | r < 0.3076 | r < 0.5488 |
| CR_Best | r < 0.5723 | r < 0.3096 | r < 0.5488 |

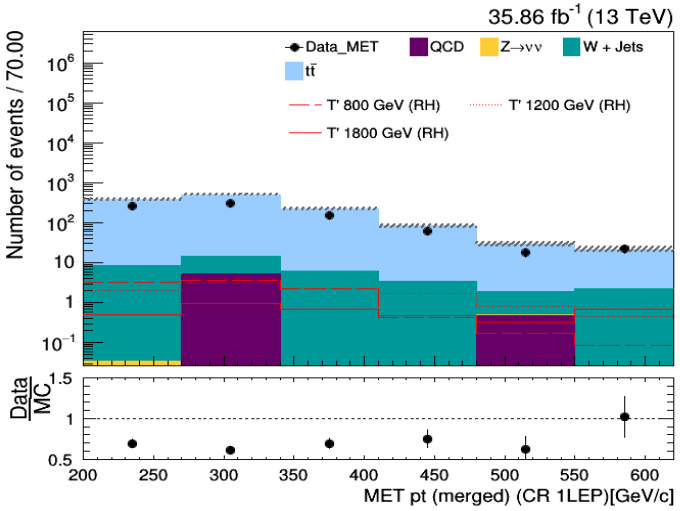
The limit improves because the shape has better discrimination power but then get worse because the cross section is lower at higher masses.
M800 actually has lower acceptance as well because of kinematic cuts, hence the worse limit with respect to 1200

# CR1LEP:

A control region (CR) enriched in TT+Jets is defined using the same selection as for the Signal Region (SR), apart from requiring exactly 1 lepton in the final state and removing the request on Δφ to increase the statistics



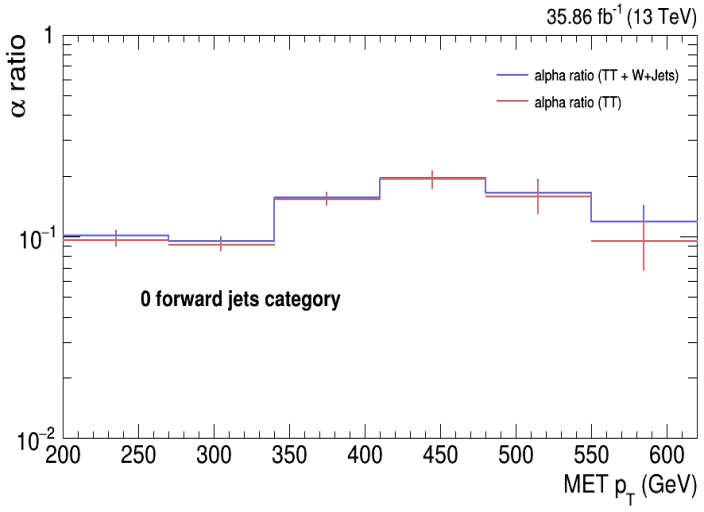

Category 0 forward jets

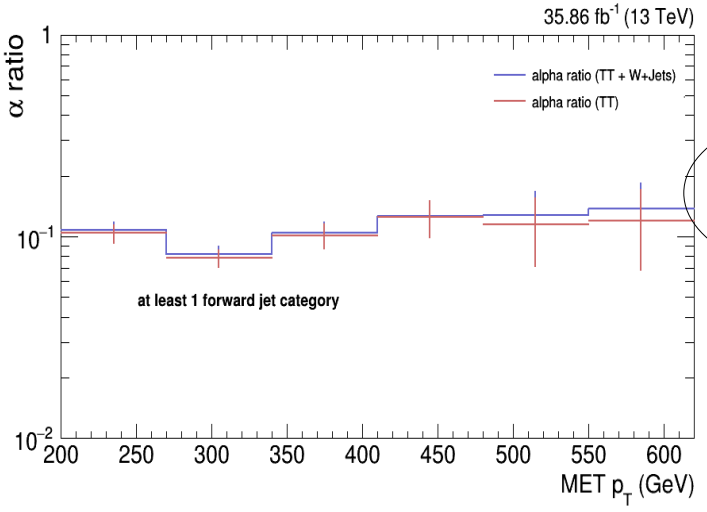



Category at least 1 forward jets

# Background estimation:

In order to rely as little as possible on the simulation, the dominant irreducible background is partially estimated from data using the "**alpha ratio method**".




**MET**
merged
CR1LEP

The good agreement justifies estimating both samples with the same Control Region.

# To Do:

- To obtain the TTW data-driven shape for both MT and MET in the 4 categories of fit.
- Validate the shape on the MC first.
- Try to use the TTW data-driven shape for MT / MET fit
- If we can, identify a strategy to cross-check this on the data.
- Add any corrections from the cross-checks on the data if necessary or possible for the extraction of TTW.
- Add the various systematics.
- Add 2017 data