Cross Check Analysis - QCD Regions

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Status and Plans

Status

- QCD Region studies with data finished (for now)
- Synchronisation between main analysis and cross check analysis better than 2%

Plans

- Writing current data results (all regions) in the cross check AN
- Write corresponding thesis chapter
- Implement MC weight and redo all studies in all regions

QCD Region: Event Yields

Up to the MET cut all regions used on this analysis have the same cuts.

Status

	DATA MET 2012A	DATA MET 2012B	DATA MET 2012C	DATA MET 2012D	DATA VBF Parked 2012B	DATA VBF Parked 2012C	DATA VBF Parked 2012D
Vertex Filter	3606391	15076553	21570165	59027309	132346320	228049748	308041846
Event Quality Filters	2658960	10926634	15555671	44411435	131554431	226680352	305918529
ECAL Laser Filter	2634271	10796003	15555671	44411435	131543040	226680352	305918529
HCAL Laser Filter	2634080	10796000	15554899	44411435	131543040	226679741	305918529
L1T ETM>= 40	2461217	9316076	13668424	37528140	88174347	160560859	227801622
HLT Path	97522	633305	1154795	2222706	75100422	137527238	152041761
$N(Electrons_{Veto}) = 0$	96600	627254	1143298	2203960	74947192	137241812	151725585
$N(Muon_{Loose}) = 0$	94864	619954	1129380	2187440	74913002	137179173	151652654
Dijet cuts	18338	120564	231884	404128	13678405	25090291	24082304
$MET >= 90$	4167	21119	37848	47094	38178	68047	79723

As it can be seen a significant amount of events is available at this level of selection.

Regions Definition

Five regions are defined over 2 variables: $MET_{significance}$ and $Min(\Delta\phi(MET, j_1 j_2)$ and those regions get split into 10 with the variable $Min(\Delta\phi(MET, jets)$ at value 1.

Regions

- QCD Shape
  - Signal Like: $MET_{sig} > 4$, $Min(\Delta\phi(MET, j_1 j_2) < 1$, $Min(\Delta\phi(MET, jets) > 1$
  - QCD Like : $MET_{sig} > 4$, $Min(\Delta\phi(MET, j_1 j_2) < 1$, $Min(\Delta\phi(MET, jets) < 1$
- Norm1
  - Signal Like: $3 < MET_{sig} < 4$, $1 < Min(\Delta\phi(MET, j_1 j_2) < 2$, $Min(\Delta\phi(MET, jets) > 1$
  - QCD Like : $3 < MET_{sig} < 4$, $1 < Min(\Delta\phi(MET, j_1 j_2) < 2$, $Min(\Delta\phi(MET, jets) < 1$
- Norm2
  - Signal Like: $3 < MET_{sig} < 4$, $Min(\Delta\phi(MET, j_1 j_2) > 2$, $Min(\Delta\phi(MET, jets) > 1$
  - QCD Like : $3 < MET_{sig} < 4$, $Min(\Delta\phi(MET, j_1 j_2) > 2$, $Min(\Delta\phi(MET, jets) < 1$
- Norm3
  - Signal Like: $MET_{sig} > 4$, $1 < Min(\Delta\phi(MET, j_1 j_2) < 2$, $Min(\Delta\phi(MET, jets) > 1$
  - QCD Like : $MET_{sig} > 4$, $1 < Min(\Delta\phi(MET, j_1 j_2) < 2$, $Min(\Delta\phi(MET, jets) < 1$
- Signal
  - Signal Like: $MET_{sig} > 4$, $Min(\Delta\phi(MET, j_1 j_2) > 2.3$, $Min(\Delta\phi(MET, jets) > 1$
  - QCD Like : $MET_{sig} > 4$, $Min(\Delta\phi(MET, j_1 j_2) > 2.3$, $Min(\Delta\phi(MET, jets) < 1$

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Region Yields

Here are the results for data for each of the defined regions.

$Min(\Delta\phi(MET, jets) < 1$

Region	C.C.	Main	$\frac{CC}{Main} - 1$
QCD shape	13102	NA	NA
Norm1	2772	2741	+1.1%
Norm2	2110	NA	NA
Norm3	791	787	0.5%
Signal	797	NA	NA

$Min(\Delta\phi(MET, jets) > 1$

Region	C.C.	Main	$\frac{CC}{Main} - 1$
QCD shape	2635	NA	NA
Norm1	1603	1586	+1.1%
Norm2	412	411	+0.2%
Norm3	1523	1517	+0.4%
Signal	652	NA	NA

Notes:

- The maximum observe yield disagreement is of the order of 1.1% which is acceptable.
- All values from the cross check analysis are bigger than the values of the main analysis (missing something?).
- Also note that five value were not available from the main analysis because they are not in the note (QCD shape yields), still blinded (Signal region) or not available at this moment.

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Summary

Conclusions and plans

- QCD value now can be considered synchronised at the data level.
- TWiki will be update shortly.
- I am not on the process of writing all data region results into the cross check analysis note (and respective thesis chapter).

https://twiki.cern.ch/twiki/bin/viewauth/CMS/VBFHInvParkedDataCrossCheck