

RA2 activities in Hamburg

CMS SUSY hadronic working group meeting

Matthias Schröder
on behalf of the Hamburg RA2 group

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Overview: RA2 activities in Hamburg

(RA2 signature: inclusive ≥ 3 jets + $\cancel{E}_T$)

- $t\bar{t}$ and W+jet background determination [1]
 - ▶ Inversion of cuts for direct lepton veto: Jan, Julia (50%)
- QCD background determination [2, 3]
 - ▶ ABCD method: Torben (75%)
 - ▶ Fit of dijet response as input for smearing method: Matthias (75%)
- Background combination [4]
 - ▶ Tool to combine background estimations and uncertainties: Christian

All studies expected to be completed before or by summer



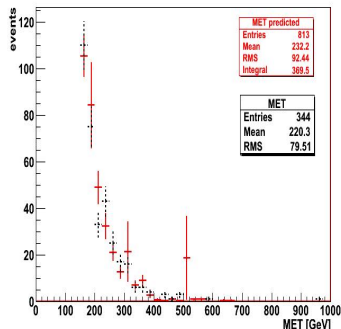
Status of Top and W+Jet background



Method in a nutshell:

Cut-inversion of direct Lepton veto using:

- Isolation Efficiencies
- Reconstruction Efficiencies
- Acceptance (P_T -spectrum of Leptons)



Recent developements:

- Estimator rewritten to make it work within Christians tool
- Use of new Samples (SUSYPAT V6 – Summer09-MC_31X_V3-v2)
- Started writing the note (first draft soon available at:
UserCode/thomsen/TopAsBackground/paper/



RA2: QCD estimation with ABCD

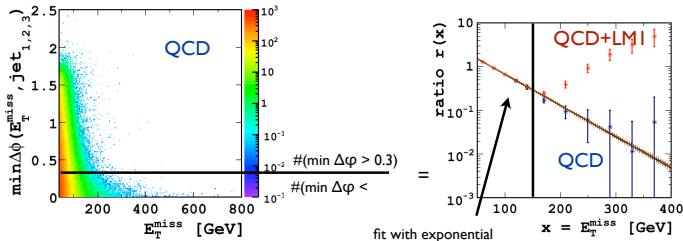


- Data-driven QCD estimation, sensitive to pure-hadronic background (jet-mismeasurement)
- Extended ABCD method, can be applied to correlated variables.
(implemented: *QCDAbcdProd* in *SusyAnalysis* package)
- Done: Closure test with the variables

MET > 150 GeV

min $\Delta\phi$ (jet 1-3, MET) > 0.3

→ high QCD separation power in RA2

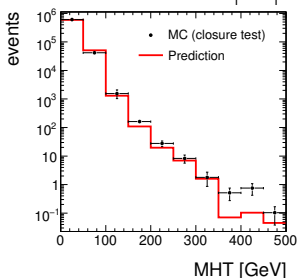
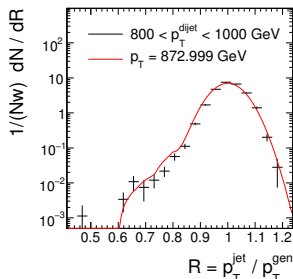


•Systematic uncertainties:

- Effects of the selection cuts and control region definition on the extrapolation: investigated with variations ($\text{JES} \pm 5\%$)
- Deviation of the assumed functional form of the ratio from the truth: variation of jet resolution (MC so far)
- Contamination from $T\bar{T}$, W jets, Z toInvisible backgrounds: found to be quite small (10%) in MC

torben.schum@desy.de

Determination of the dijet response



- Probability of dijet configuration

$$\propto \int_0^\infty dp_T^{\text{true}} f_b(p_T^{\text{true}}) \cdot r_b\left(\frac{p_T^1}{p_T^{\text{true}}}\right) \cdot r_b\left(\frac{p_T^2}{p_T^{\text{true}}}\right)$$

- Maximum likelihood fit of response

Status & next steps

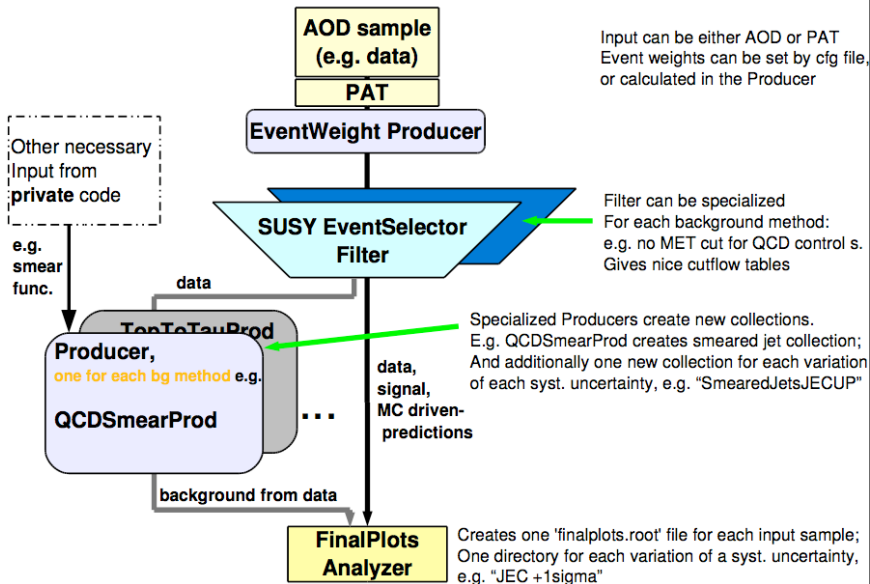
- ✓ Determined response for Summer08 samples in different p_T bins
- ✓ Closure done with genjet smearing
- ✓ Draft section in RA2 note
- Next: response from Summer09 samples, evaluation of uncertainties



Scheme to combine the RA2 background predictions

Christian Autermann

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Recent presentations in the hadronic SUSY meeting



Jan Thomsen, 2009/10/29

<http://indico.cern.ch/conferenceDisplay.py?confId=71809>



Torben Schum, 2009/11/26

<http://indico.cern.ch/conferenceDisplay.py?confId=73843>



Matthias Schröder, 2009/11/26

<http://indico.cern.ch/conferenceDisplay.py?confId=73843>



Christian Auterman, 2009/11/12

<http://indico.cern.ch/conferenceDisplay.py?confId=73510>