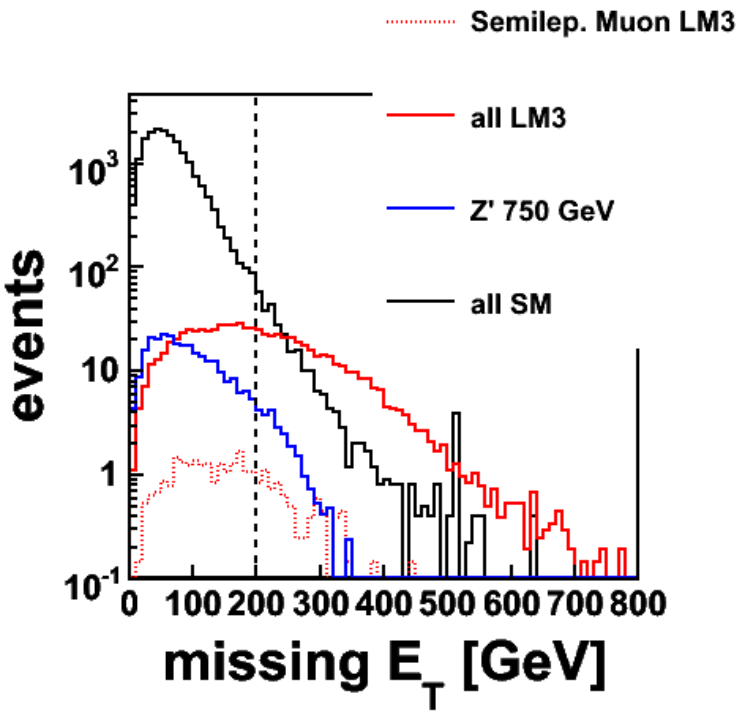
Signatures of mSUGRA

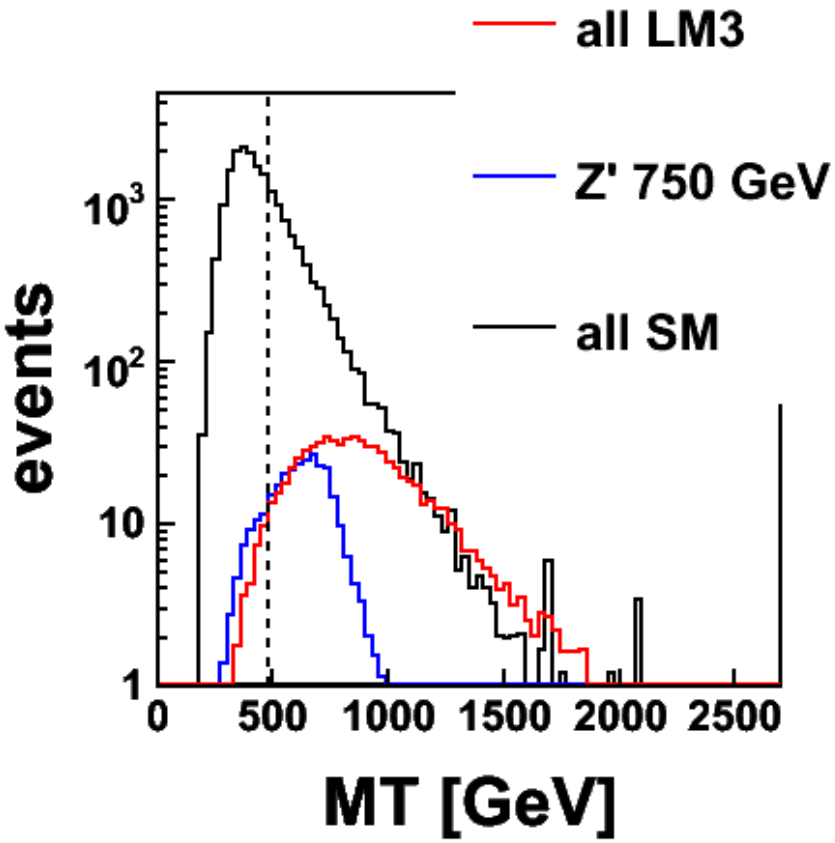


- Deviations at large values of E_T^{miss}, HT, jet-multipl., ...
- $$\frac{\text{Signal}}{\sqrt{\text{Signal+Background}}} = 13.8$$ for $E_T^{miss} > 200$ GeV
- Hardly any semilep. $t\bar{t}$ decays with muons in mSUGRA LM3
- But almost in every event (at least) one top quark

- Outlook: Consider SUSY-models with extended particle content, e.g. MRSSM[2], or reconstruct single top quarks

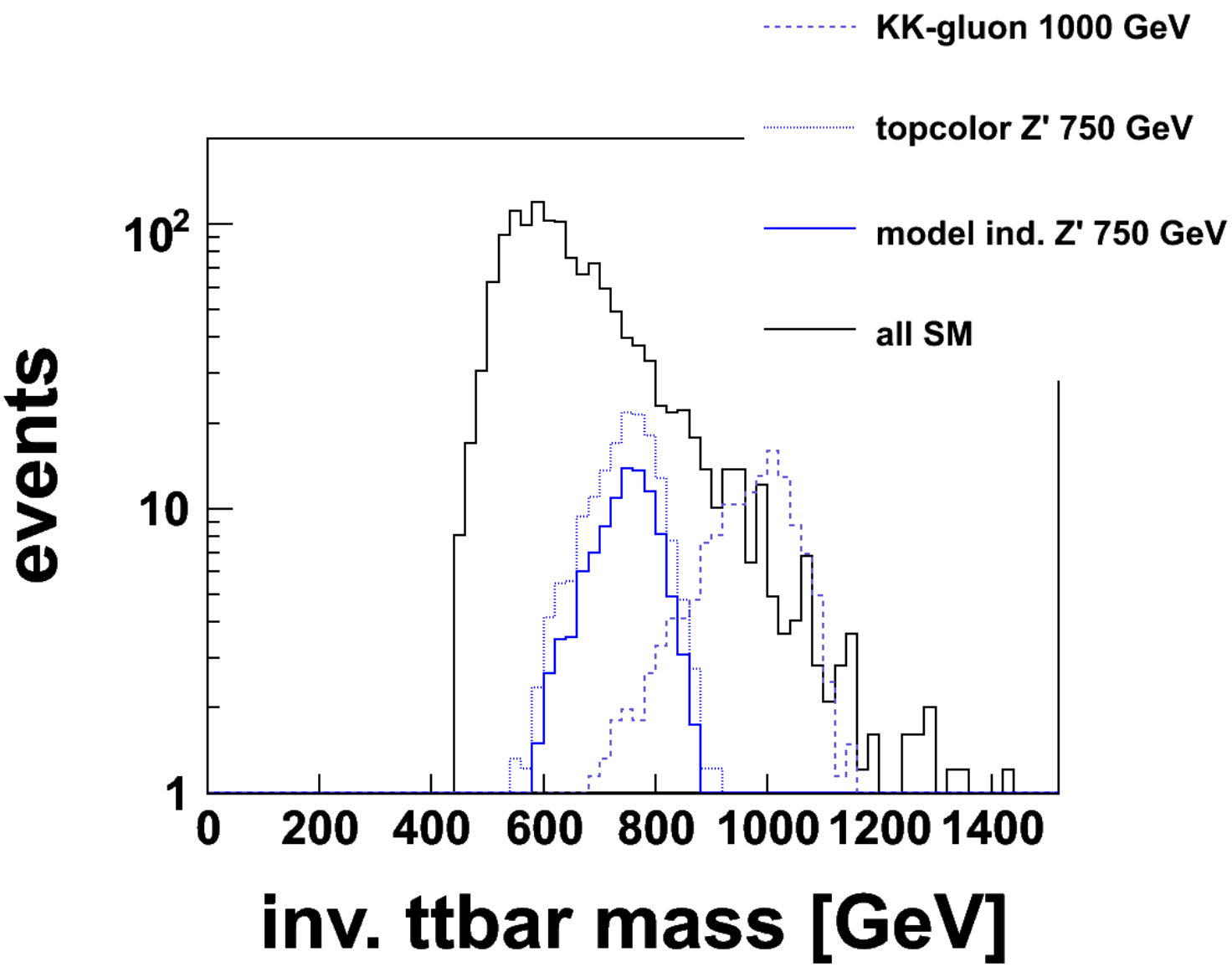
[2] Tilman Plehn, Tim M. P. Tait. Seeking Sgluons. J. Phys., G36:075001, 2009.

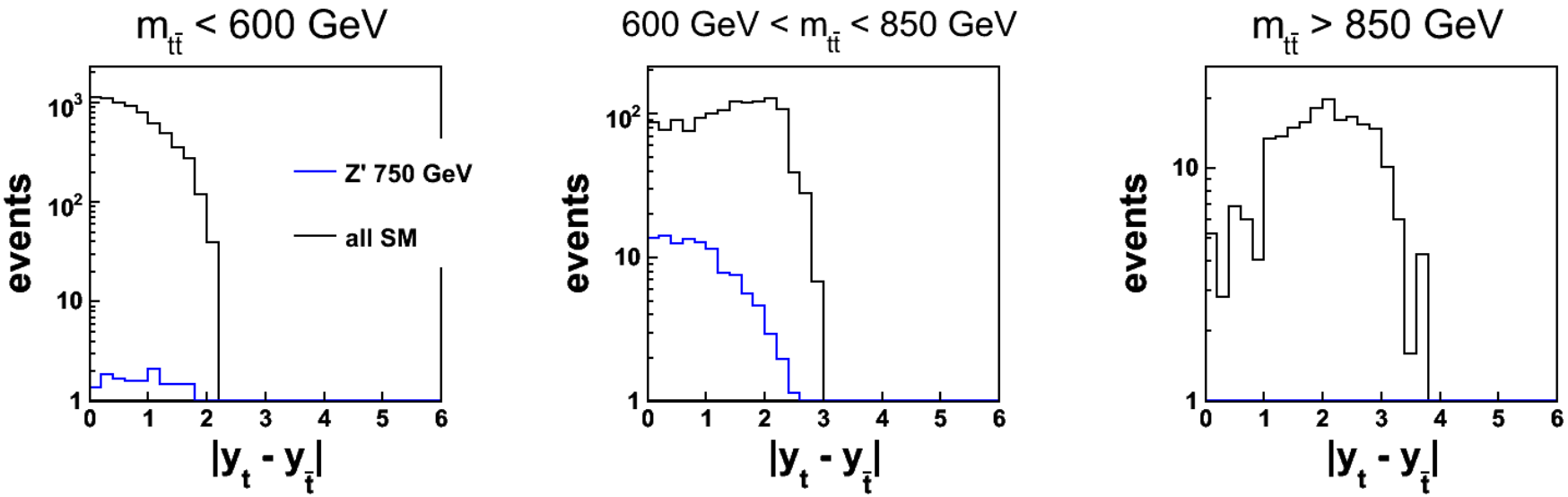
Background reduction



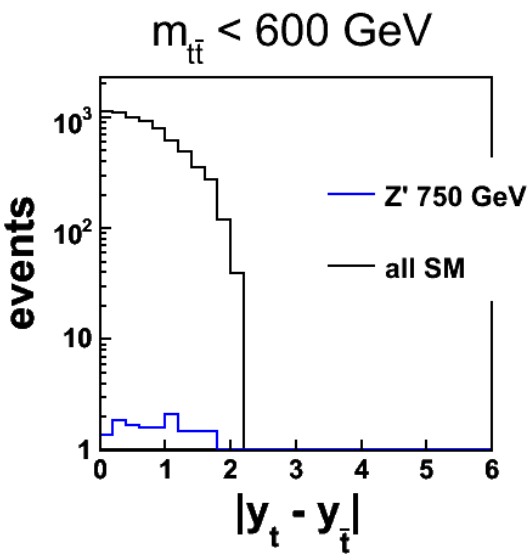
- To reduce SM background apply a cut on
  $\mathrm{MT} = \sum_{i=1}^{4} E_T(\text{jet i}) + E_T^{miss} + E_T\ (\text{leading muon}) > 480$ GeV.

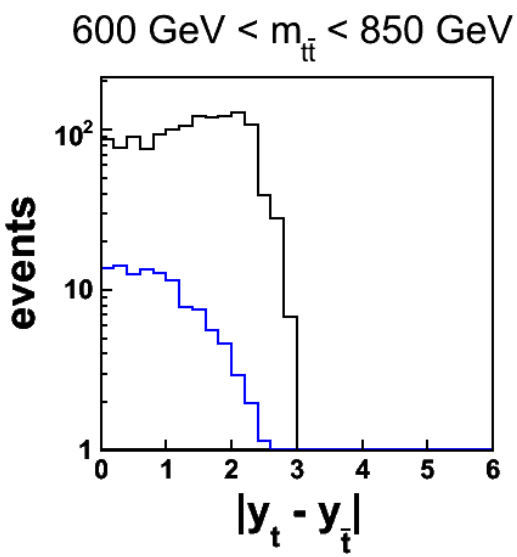
Reconstruction of Z'

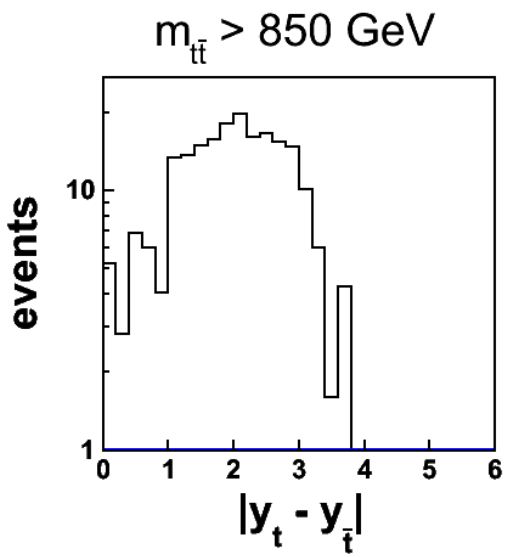




- Aim: "Date-driven" search for Z'.
  Estimate SM background for $y_t + y_{\bar{t}}$ and $y_t - y_{\bar{t}}$ in region II by data of region I and III. Search for deviations in region II.


$m_{t\bar{t}}$ < 600 GeV
events
10^3
10^2
10
1
0 1 2 3 4 5 6
$|y_t - y_{\bar{t}}|$
Z' 750 GeV
all SM


600 GeV < $m_{t\bar{t}}$ < 850 GeV
events
10^2
10
1
0 1 2 3 4 5 6
$|y_t - y_{\bar{t}}|$


$m_{t\bar{t}}$ > 850 GeV
events
10
1
0 1 2 3 4 5 6
$|y_t - y_{\bar{t}}|$