Prospects in the search for top partners

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Goal statement.

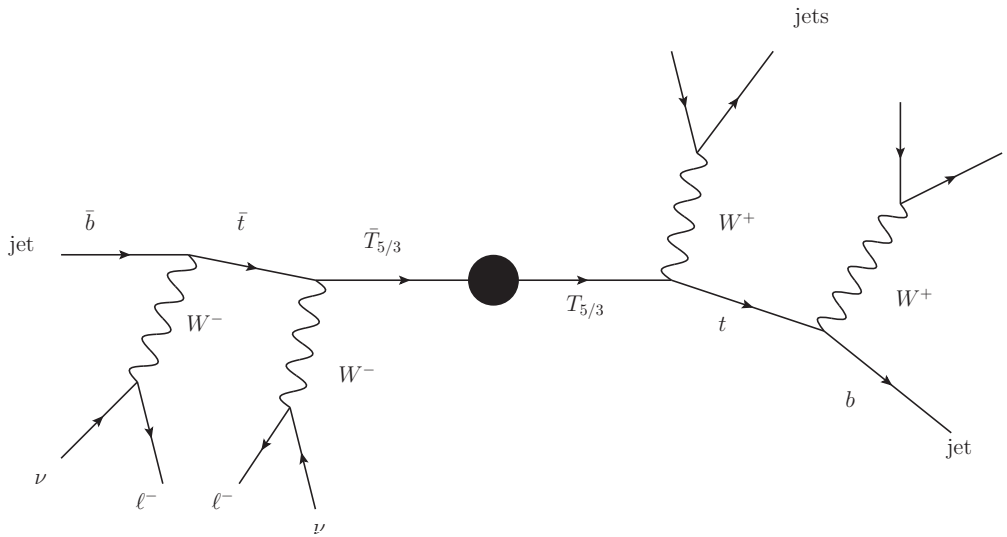
Conclusion and refinement of the analysis of top partner events. $T\bar{T} \longrightarrow \ell\ell + n$ jets.

- validate the MC samples;
- import the existing analysis into the CMGTools framework;
- refine the analysis with razor-like variables.

Validation of the MC samples.

Signal

two same sign leptons, many jets.



Cross section, LHC 14 TeV

$\sigma = 104\,\mathrm{fb}$ $(M = 500\,\mathrm{GeV})$

$\sigma = 1.6\,\mathrm{fb}$ $(M = 1\,\mathrm{TeV})$

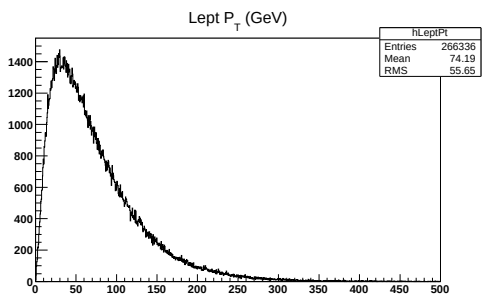
Validation of the MC samples.

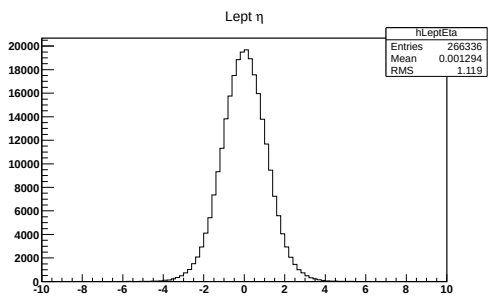
- bugs in the older samples;
- independent crosscheck of LHE files;
- thank you Aram for the new samples and validation;
- fast or full simulation at some point.

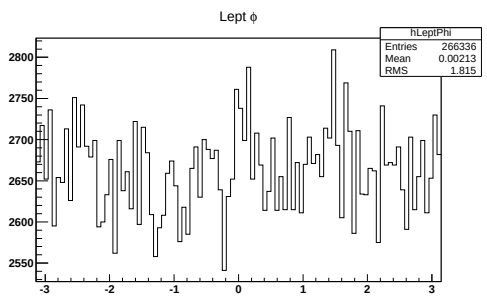
Validation of the MC samples.

Work in progress. This is happening as we speak.

`/castor/cern.ch/user/a/avetisya/TopPartners`
`/NewSampleTest/PostProc_T53_PairProd_400.lhe.gz`







Importing the analysis into the CMGTools framework.

- work done by Massimo Nespolo with his own framework;
- reconsider and refine cuts, particle identification.
  - using standard collections `cmg::Electrons`, `Muons`...;
  - MET?
  - *b* tagging?

Future enhancements: razor variables.

Razor variables

A set of variables, dimensionless or with dimensions of a mass, whose distributions contain information about the masses of pair-produced particles.

- already employed in the search for supersymmetric particles;
- asymmetric nature of the event!

Razor variable example: M_R, M_Δ

- M_R peaks near M_Δ for signal events;
- falls as $\sqrt{\hat{s}}$ for QCD background.

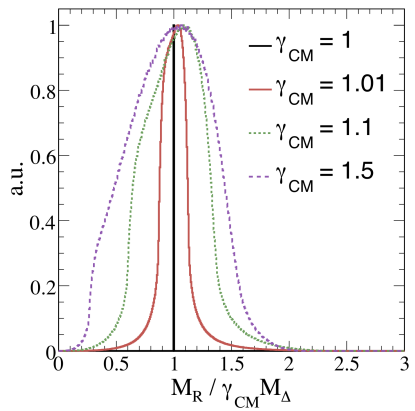


Figure: from C. Rogan, *Kinematical variables towards new dynamics at the LHC. 2011.*