**Search for scalar top quark pair production at the CMS experiment**

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**Motivation**

- The stop quark plays an essential role in understanding the SUSY models.
- Several searches with the full Run 2 dataset have been performed by the CMS Collaboration excluding stop masses up to 1.2 TeV, but most of these searches are not sensitive in the so-called "top corridor". This region requires special care because...

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**Results**

- The DNN score has different shapes due to the parametric training: there is one signal and one background distribution for each mass point.
- Full top corridor region is excluded for the first time by CMS!

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**TOP CORRIDOR ANALYSIS**

- Event selection: $t\bar{t}$, $≥ 2$ jets, $≥ 1$ b-tagged jet, $p_T^{T2} ≥ 50$ GeV, $m_{T2} ≥ 80$ GeV.
- Backgrounds: Main background is $t\bar{t}$ due to the similar kinematics with the signal process in this region. It is estimated from MC with an accurate knowledge to have sensitivity.
- Main strategy: use a parametric Deep Neural Network to separate signal from background. By introducing stop and LSP masses in the training we exploit the kinematic differences to maximize sensitivity.

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**Combination**

- Fully hadronic analysis:
  - High $Δm$: advanced jet tagging algorithms to identify hadronically decaying top quarks and W bosons.
  - Signal events can only be detected as an excess on the $r\bar{r}$ cross section.
- Combination of three searches with 0, 1 and 2 leptons in the final state is also presented in this paper:
  - Single lepton: JHEP 05 (2020) 032

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**REFERENCES**


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