

# *Comment on Single Top Production at ILC:*

$$e^- e^+ \rightarrow t \bar{q}$$

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# References for FCNC top decay $t \rightarrow q Z$

*Beyond Standard Model Top Quark Interactions*

*— Anomalous Couplings —*

*Mohammad J. Kareem*

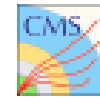
*(on behalf of the ATLAS and CMS collaborations)*

*Top Workshop 2020*

*14-18 September, Durham, UK:*

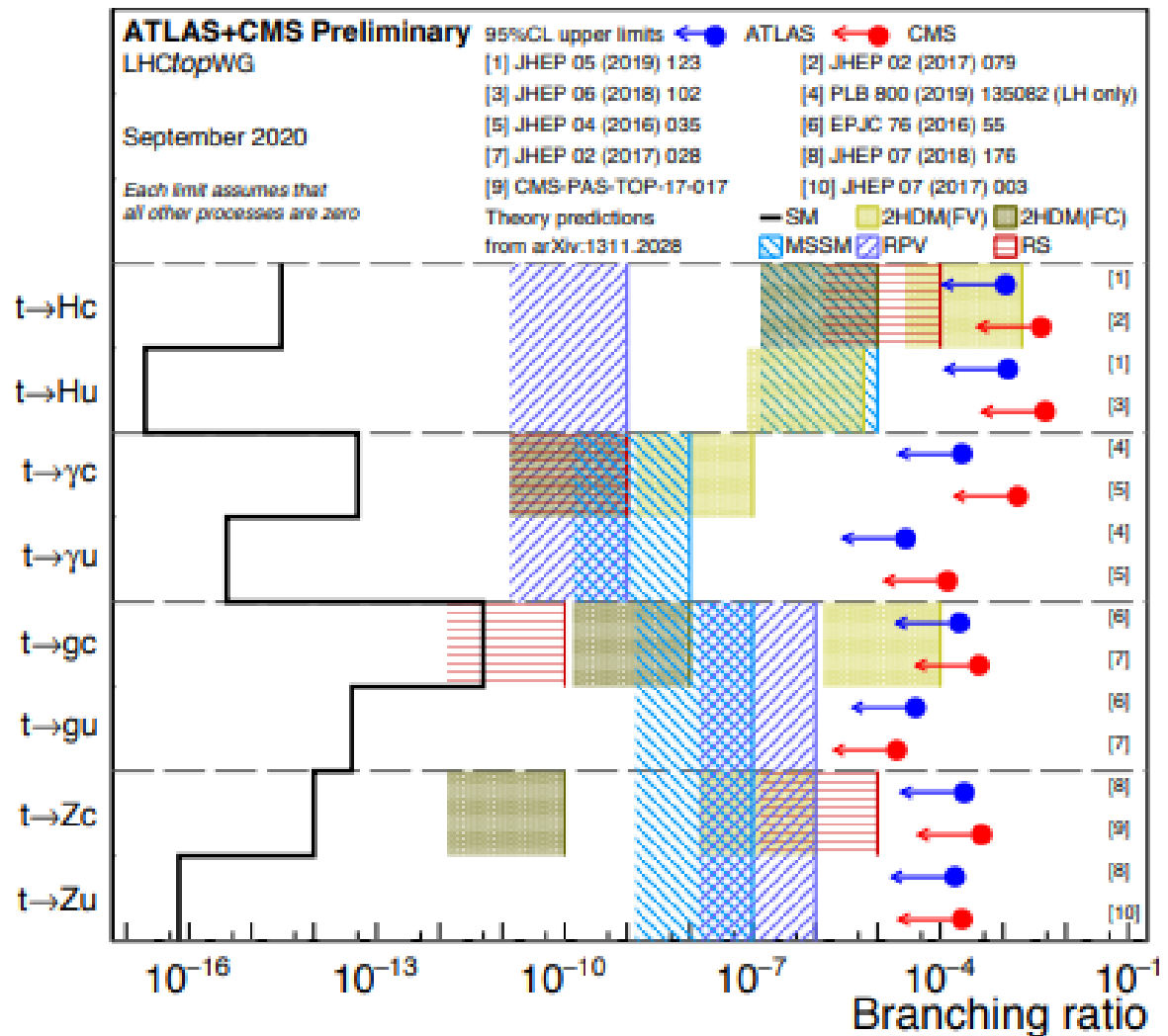
*[https://conference.ippp.dur.ac.uk/event/891/contributions/4909/attachments/4009/4634/Top2020\\_mkareem\\_v3.pdf](https://conference.ippp.dur.ac.uk/event/891/contributions/4909/attachments/4009/4634/Top2020_mkareem_v3.pdf)*

# FCNC in Top Quark



## FCNC @LHC in summary

- **ATLAS and CMS limits** on:  $t \rightarrow q(H/\gamma/g/Z)$  branching ratios comparison to **BSM** physics
- **The full Run 2 dataset is still to be analyzed**
- **More interesting results to come, stay tuned!**



# References for FCNC top decays (continued)

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*arXiv:2008.06303*

*Date: Fri, 14 Aug 2020 11:50:45 GMT (176kb)*

*Title: Search for new phenomena in top quark interactions*

*Authors: Kirill Skovpen (on behalf of the ATLAS and CMS Collaborations)*

*Categories: hep-ex hep-ph*

*Comments: Presented at the Eighth Annual Conference on Large Hadron Collider Physics (LHCP) 2020, Paris, France*

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*The study of the processes with the production of top quarks represents a unique possibility to test the standard model (SM) predictions and probe the new physics effects. Potential deviations from the SM expectations are parametrized within the framework of the Effective Field Theory (EFT). The latest EFT results from ATLAS and CMS experiments are presented. Dedicated studies of processes with flavour-changing neutral currents are also discussed.*

¥¥ ( <https://arxiv.org/abs/2008.06303> , 176kb)

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*arXiv:1808.09915*

*Date: Wed, 29 Aug 2018 16:30:53 GMT (132kb,D)*

*Title: Top FCNC searches at HL-LHC with the CMS experiment*

*Authors: Petr Mandrik (for the CMS Collaboration)*

*Categories: hep-ex hep-ph*

*Comments: Presented at Quarks-2018 XXth International Seminar on High Energy Physics*

*Report-no: CMS CR -2018/094*

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*The Large Hadron Collider is the world's largest and highest center-of-mass energy particle accelerator. During the Phase I operation it is expected that the LHC operated at a centre-of-mass energy of 13 TeV will deliver to the CMS experiment total integrated luminosity of  $\sim 300 \text{ fb}^{-1}$  till 2023. The High Luminosity LHC upgrade is expected to run at a centre-of-mass energy of 14 TeV and will allow ATLAS and CMS to collect integrated luminosities of the order of  $300 \text{ fb}^{-1}$  per year, and up to  $3000 \text{ fb}^{-1}$  during the HL-LHC projected lifetime of ten years. The large expected integrated luminosity enables the exploration of the multi-TeV scale by searches for particles with high masses as well as by investigation of processes with very low cross sections such as Flavor-Change Neutral Current interactions in top quark sector. In this report we present a proposal for the top quark FCNC searches at HL-LHC based on Monte-Carlo simulation of the upgraded CMS detector.*

¥ ( <https://arxiv.org/abs/1808.09915> , 132kb)

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arXiv:1803.09923

Date: Tue, 27 Mar 2018 06:59:54 GMT (989kb,D)

*Title: Search for flavour-changing neutral current top-quark decays  $t \rightarrow qZ$  in proton-proton collisions at  $\sqrt{s}=13$  TeV with the ATLAS detector*

*Authors: ATLAS Collaboration*

*Categories: hep-ex*

*Comments: 42 pages in total, author list starting page 26, 4 figures, 11 tables, submitted to JHEP. All figures including auxiliary figures are available at*

*<https://atlas.web.cern.ch/Atlas/GROUPS/PHYSICS/PAPERS/TOPO-2017-06>*

*Report-no: CERN-EP-2018-018*

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*A search for flavour-changing neutral-current processes in top-quark decays is presented. Data collected with the ATLAS detector from proton-proton collisions at the Large Hadron Collider at a centre-of-mass energy of  $\sqrt{s}=13$  TeV, corresponding to an integrated luminosity of  $36.1 \text{ fb}^{-1}$ , are analysed. The search is performed using top-quark pair events, with one top quark decaying through the  $t \rightarrow qZ$  ( $q = u, c$ ) flavour-changing neutral-current channel, and the other through the dominant Standard Model mode  $t \rightarrow bW$ . Only  $Z$  boson decays into charged leptons and leptonic  $W$  boson decays are considered as signal. Consequently, the final-state topology is characterized by the presence of three isolated charged leptons (electrons or muons) and at least two jets, one of the jets originating from a  $b$ -quark. The data are consistent with Standard Model background contributions, and at 95% confidence level the search sets observed (expected) upper limits of  $1.7 \times 10^{-4}$  ( $2.4 \times 10^{-4}$ ) on the  $t \rightarrow uZ$  branching ratio and  $2.4 \times 10^{-4}$  ( $3.2 \times 10^{-4}$ ) on the  $t \rightarrow cZ$  branching ratio, constituting the most stringent limits to date.*

¥¥ ( <https://arxiv.org/abs/1803.09923> , 989kb)

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*arXiv:1801.02395*

*Date: Mon, 8 Jan 2018 11:57:37 GMT (166kb)*

*Title: Measurements of the top quark properties at decay with CMS*

*Authors: Andrea Castro (on behalf of the CMS Collaboration)*

*Categories: hep-ex*

*Comments: Presented at the EPS Conference on High Energy Physics, Venice, Italy, 5-12 July 2017*

*Report-no: CMS-CR-2017/252*

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*CMS measurements of properties related to top quark decays are discussed. The results presented regard the measurement of the  $W$  boson helicity, the investigation of anomalous couplings in the  $Wtb$  vertex, and the search for very rare decays, such as  $t \rightarrow Zq$  and  $t \rightarrow Hq$ , which are associated to flavor-changing neutral currents.*

¥¥ ( <https://arxiv.org/abs/1801.02395> , 166kb)

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