Search for new physics in top quark production in dilepton final states using the EFT approach

EFT round table
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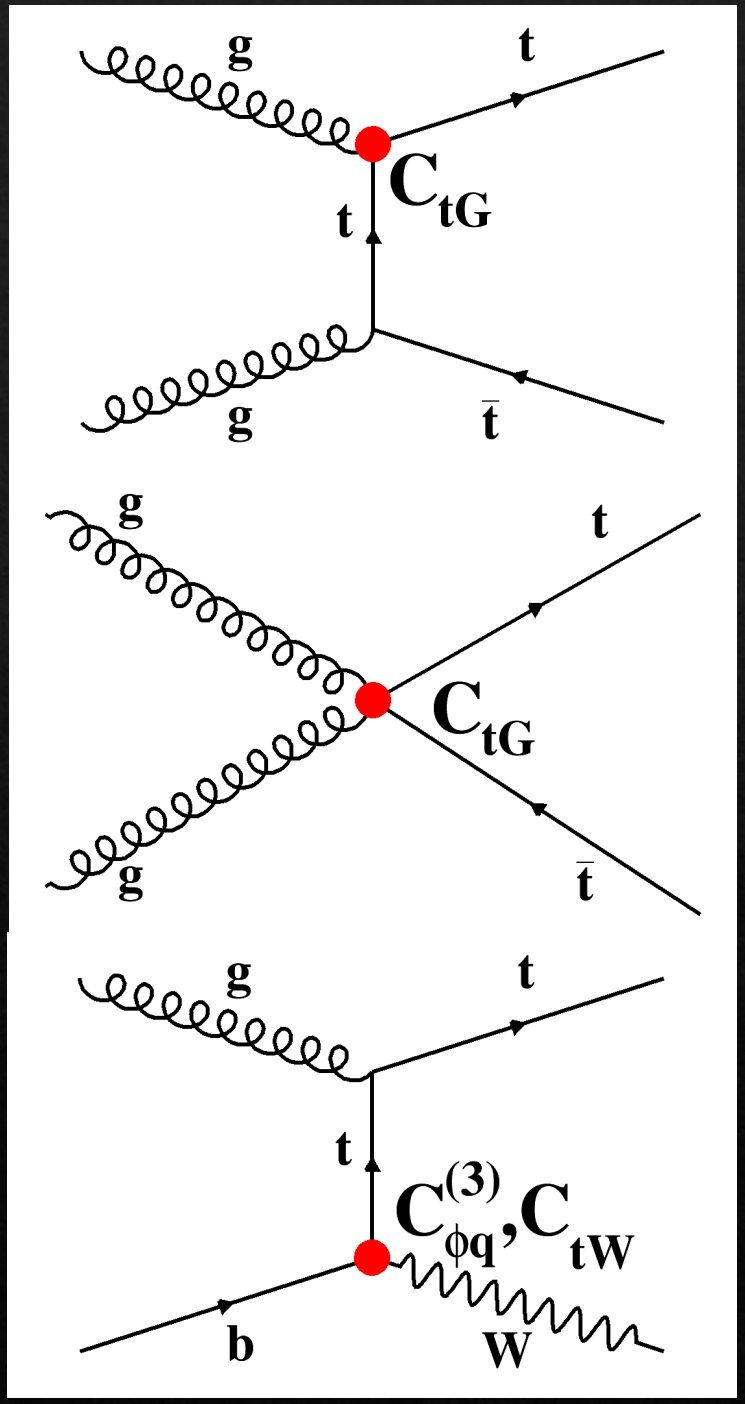
Introduction

- Search for new physics in ttbar/tW events using the EFT framework
- Previous analysis (2016 data): TOP-17-020
- Updates /plans
  - Full run II analysis
  - Estimation of the EFT contribution at reco-level using weights
  - Including 4-fermi operators
  - Using MVA approach for separating SM events from the new physics like events
  - Performing both individual and global fit

- We would like to perform this analysis in the EFT group



Final states, processes and operators

- Final states: dilepton (first focus on emu final state)
- Processes
  - Ttbar + tW

Person power

- Reza Goldouzian and Mike Hildreth

Timeline

- Moriond 2022

MC sample

- We are now generating private samples and will ask for full production after performing the validation tests

$$
\begin{aligned}
O_{qq}^{1(ijkl)} &= (\bar{q}_i\gamma^\mu q_j)(\bar{q}_k\gamma_\mu q_l),\\
O_{qq}^{3(ijkl)} &= (\bar{q}_i\gamma^\mu \tau^I q_j)(\bar{q}_k\gamma_\mu \tau^I q_l),\\
O_{qu}^{1(ijkl)} &= (\bar{q}_i\gamma^\mu q_j)(\bar{u}_k\gamma_\mu u_l),\\
O_{qu}^{8(ijkl)} &= (\bar{q}_i\gamma^\mu T^A q_j)(\bar{u}_k\gamma_\mu T^A u_l),\\
O_{qd}^{1(ijkl)} &= (\bar{q}_i\gamma^\mu q_j)(\bar{d}_k\gamma_\mu d_l),\\
O_{qd}^{8(ijkl)} &= (\bar{q}_i\gamma^\mu T^A q_j)(\bar{d}_k\gamma_\mu T^A d_l),\\
O_{uu}^{(ijkl)} &= (\bar{u}_i\gamma^\mu u_j)(\bar{u}_k\gamma_\mu u_l),\\
O_{ud}^{1(ijkl)} &= (\bar{u}_i\gamma^\mu u_j)(\bar{d}_k\gamma_\mu d_l),\\
O_{ud}^{8(ijkl)} &= (\bar{u}_i\gamma^\mu T^A u_j)(\bar{d}_k\gamma_\mu T^A d_l),\\
{}^\ddagger O_{quqd}^{1(ijkl)} &= (\bar{q}_i u_j)\,\varepsilon\,(\bar{q}_k d_l),\\
{}^\ddagger O_{quqd}^{8(ijkl)} &= (\bar{q}_i T^A u_j)\,\varepsilon\,(\bar{q}_k T^A d_l),
\end{aligned}
$$

$$
{}^\ddagger O_{uG}^{(ij)} = (\bar{q}_i\sigma^{\mu\nu} T^A u_j)\,\tilde{\varphi} G^A_{\mu\nu},
$$

$$
{}^\ddagger O_{uW}^{(ij)} = (\bar{q}_i\sigma^{\mu\nu} \tau^I u_j)\,\tilde{\varphi} W^I_{\mu\nu},
$$

$$
O_{\varphi q}^{3(ij)} = (\varphi^\dagger i\overleftrightarrow{D}^I_\mu \varphi)(\bar{q}_i\gamma^\mu \tau^I q_j),
$$