Studies on interference effects of flavor changing neutral currents in the top sector ($tu\gamma$,$tc\gamma$ couplings)

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Content

- Flavor changing neutral currents
- Production and decay channel
- Brief (current) outline of the thesis
- First steps
- Following steps

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FCNCs ($tu\gamma$-Vertex)

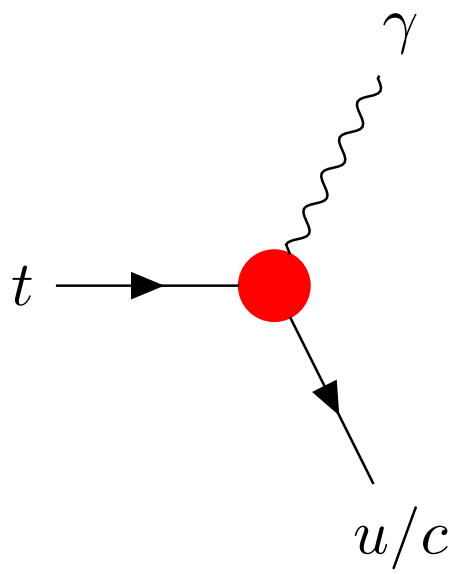

Figure: FCNC Vertex, changing the top quark flavor with a photon to another up type quark.

- Forbidden processes in the SM due to flavor conservation in QED/QCD and neutral current weak interactions
- FCNCs as possible extension of the SM
- Supported by several theories such as effective field theories etc.

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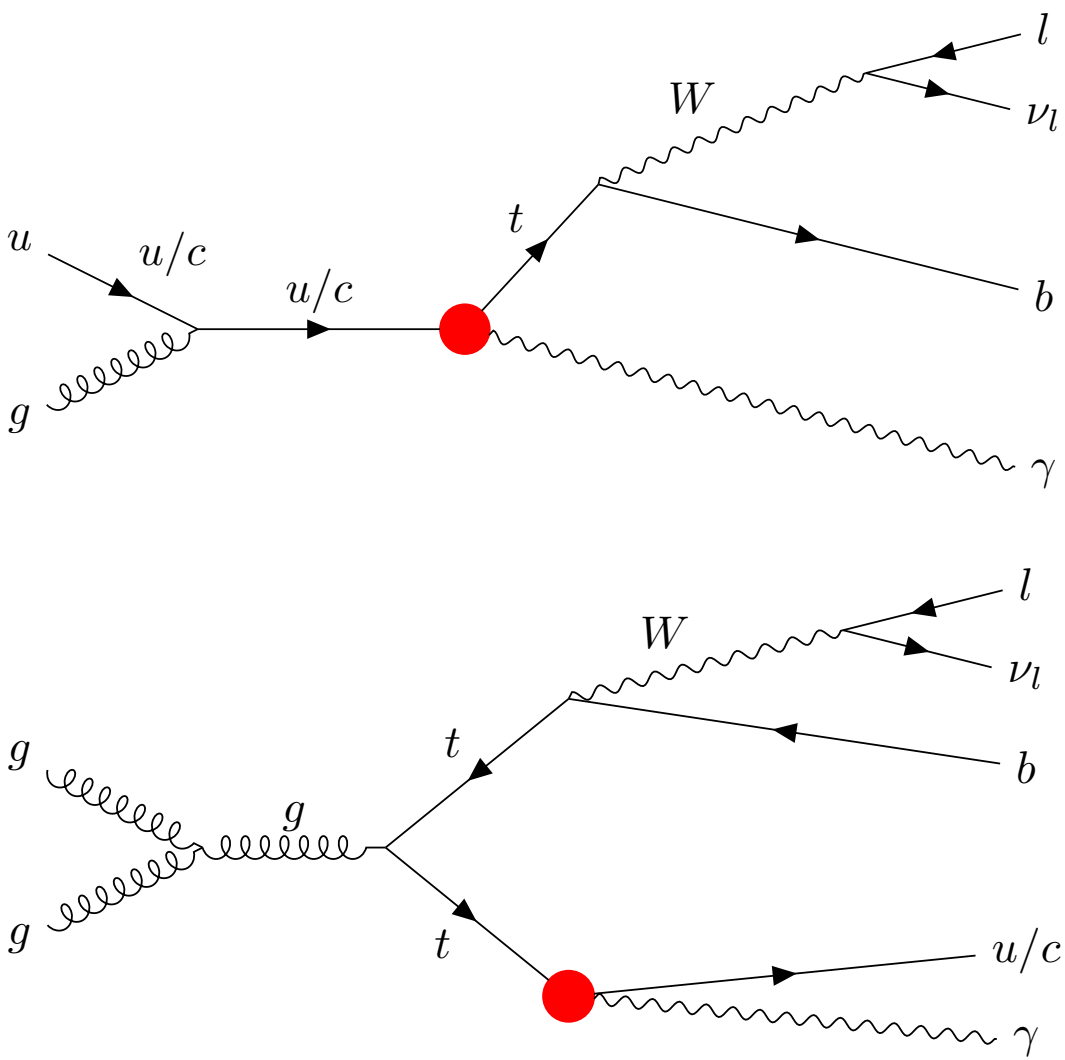
Production and decay channels



Separation of two different modes for the FCNC process with $tu\gamma$-Vertex

- Production Channel (on top)
- Decay Channel (on bottom)
- Main difference: one additional light quark jet in decay channel

Interference

- Until now production and decay mode are shown in LO
- Including NLO interference between the diagrams can occur
- Possible influence in several distributions
- Search for interference as a search for FCNC

First (comlpeted) steps

- Set up MadGraph, Pythia and a basic detector simulation (DELPHES)
- This is done standalone without ATLAS internal software to keep it more general
- First generated processes ($pp \to t\bar{t} \to l^+ l'^- \bar{\nu}_l \nu_{l'} b\bar{b}$)
- First completed showering and detector simulation runs
- Plots are following

First Plot

Hier sollte ein hoffentlich krasser Plot sein :)

Next steps

- MadGraph NLO testing
- Include UFO model (TopFCNC) for FCNC processes
- Reproduce production and decay channel analysis
- Get samples with both processes in NLO and hope MadGraph calculates possible interference
- Hope for progress and quick update, thanks for your attention