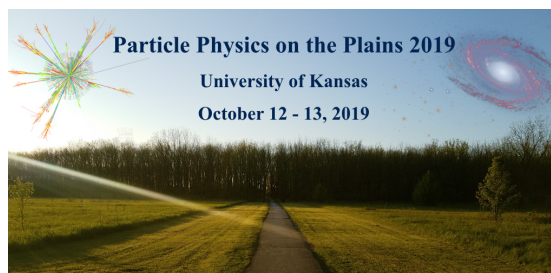


## Particle Physics on the Plains 2019



Contribution ID: 25

Type: **not specified**

# Searching for Dark Photons with Maverick Top Partners

*Saturday 12 October 2019 11:10 (20 minutes)*

In this talk, we present a model using an up-type vector like quark (VLQ) charged under an additional  $U(1)$  gauge symmetry, whose gauge boson is a dark photon and which is broken via a new dark Higgs mechanism. While this model achieves a rich decay phenomenology, it also demonstrates two important features. First, traditional searches for Vector-Like Quarks (VLQs) rely on the decay into Standard Model electroweak bosons  $W$ ,  $Z$ , or Higgs. However, in this model these traditional decays are significantly suppressed, while new maverick decays of the VLQ into dark photons or a dark Higgs, dominate. This shows the need to develop searches for other novel signatures of VLQs. Second, dark photon production through the decay of the VLQ is independent of the small mixing parameter  $\epsilon$  but instead depends on QCD gauge structure. This scenario provides a robust framework to search for a light dark sector via searches for heavy colored particles at the LHC. Furthermore with the rich phenomenology of dark photon decays, it provides a chance to explore prompt decays, displaced vertices, and long lived particles.

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**Session Classification:** LHC