

## Proposal of Two HLT Control Paths

TSG meeting

May 16, 2018

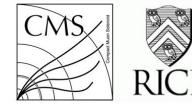
Wei Shi on behalf of the

TAMU-RICE analysis group



#### Motivation

- Evaluate signal efficiency (scale factor)
  - HLT signal path already in menu
  - "HLT\_TrkMu16\_DoubleTrkMu6NoFiltersNoVtx\_v\*"
    - L1\_DoubleMu\_12\_5 OR L1\_DoubleMu\_15\_5\_SQ OR L1\_DoubleMu\_15\_7 OR L1\_TripleMu\_5\_3\_3
- In analysis [1] of 2016 data, used orthogonal method
  - MET dataset (MET > 100 GeV), WZ MC
  - Cons:
    - pT range/cuts not ideal for the analysis
    - Low statistics (backup slide)



### **Proposal**

- Decompose signal path into two control paths
  - /users/wshi/HLT TrkMu16 NoFiltersNoVtx/V3
    - "HLT\_TrkMu16\_NoFiltersNoVtx": Use L1 Seed "L1\_SingleMu7"
    - Desired HLT prescale: 1 (see rate result later)
  - /users/wshi/HLT TrkMu6 NoFiltersNoVtx/V4
    - "HLT\_TrkMu6NoFiltersNoVtx": Use L1 Seed "L1\_SingleMu3"
    - Desired HLT prescale: 1 (see rate result later)
  - Min # of events estimated
    - Want rate for control HLT similar to signal HLT
    - To reach 1% uncertainty/bin, need 10k events; if use 25 bins, need 250k events
    - Recent run 326217 (92 pb<sup>-1</sup>): 6301 events passed signal HLT
    - Need (250k/6.3k) \* 92 pb<sup>-1</sup>  $\approx 3.6 \text{ fb}^{-1}$



#### Integration test

- /users/wshi/HLT\_TrkMu16\_NoFiltersNoVtx/V3
  - Output
    - https://raw.githubusercontent.com/weishi10141993/DarkSector/master/HLTIntegrationTest
      HLT TrkMu16 NoFiltersNoVtx.txt
  - hlt.log
    - https://raw.githubusercontent.com/weishi10141993/DarkSector/master/hlt HLT TrkMu16N oFiltersNoVtx.log
- /users/wshi/HLT\_TrkMu6\_NoFiltersNoVtx/V4
  - Output
    - https://raw.githubusercontent.com/weishi10141993/DarkSector/master/HLTIntegrationTest
      HLT TrkMu6 NoFiltersNoVtx.txt
  - hlt.log
    - https://raw.githubusercontent.com/weishi10141993/DarkSector/master/hlt HLT TrkMu6No FiltersNoVtx.log





### Rate study

- Use run 315188 [2]
  - /HLTPhysics{1-4}/Commissioning2018-v1/RAW
  - PU: 52-65
  - L1 menu v1\_0\_0, switchL1PS=False
  - HLT Prescale column: 600b + HLT Physics 3
    - Use HLT PS value = 50 (could be wrong)
  - Initial lumi 0.537e34; Ending lumi 0.458e34
    - Use 0.5e34 to scale to 2.0e34 lumi

Ĺ



#### Rate result

- Control HLTs
  - /users/wshi/HLT\_TrkMu16\_NoFiltersNoVtx/V3: 10.86 Hz @2.0e34
    - L1\_SingleMu7: 72 Hz (prescale 670)
  - /users/wshi/HLT\_TrkMu6\_NoFiltersNoVtx/V4: 9.28 Hz @2.0e34
    - L1 SingleMu3: 17 Hz (prescale 22000)
- Signal HLT
  - HLT\_TrkMu16\_DoubleTrkMu6NoFiltersNoVtx\_v12: 9.48 Hz @2.0e34
    - In recent run 316217 (fill 6677, 2556b), rate is 1.06 Hz
    - https://cmswbm.cern.ch/rateplots/6677/MoreTriggers/png/HLT TrkMu16 DoubleTrkMu6NoFiltersNoVtx.png

# Back Up



### Efficiency using 2016 MET

