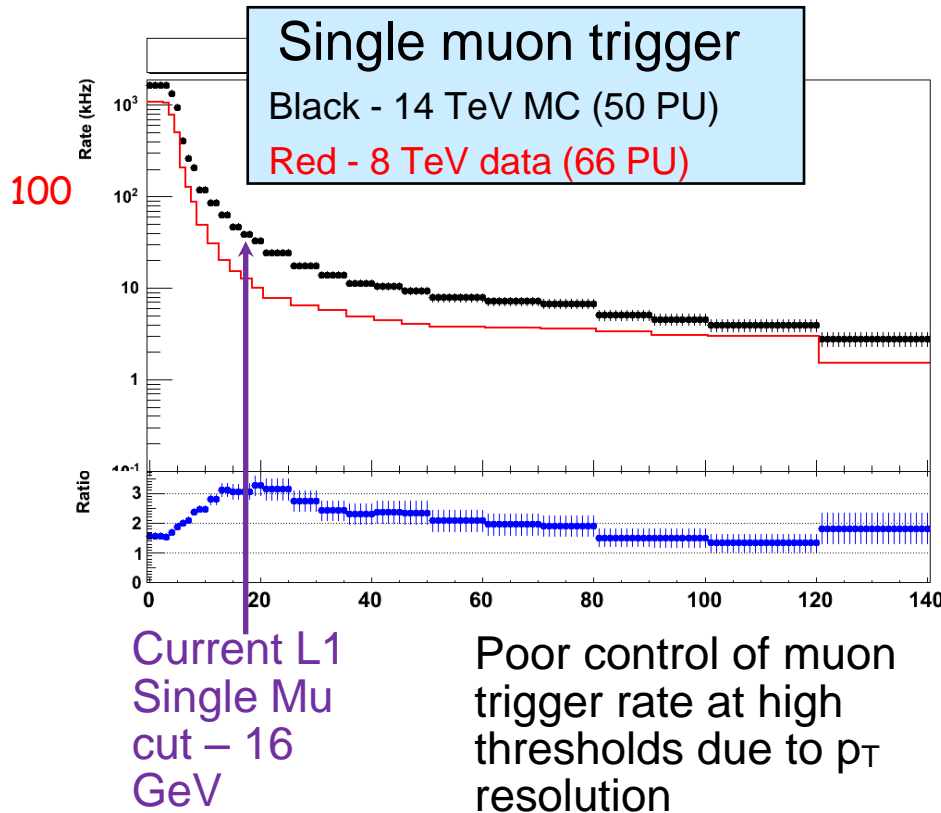




Need for the Muon Trigger Upgrade after LS1



- After LS1 the single muon rate can be up to **6 times higher** than on 2012

- 2-3 times higher rate due to 14 TeV of the collision energy
- 2-3 higher rate due to higher LHC luminosity ($2 \times 10^{34} \text{ cm}^{-2}\text{s}^{-1}$ is possible).

The Single Mu L1 cut can be increased max to ~ 20 GeV (higher cut will deteriorate the physic performance), however with this cut the rate will be reduce only by factor ~ 2 with respect to the current 16 GeV cut.

To keep current rate of the L1 Single Mu trigger (~ 10 kHz) much better performance of the Muon Trigger is needed!



Muon Trigger Upgrade – possible architecture



- **New CSC and DT Track Finders are being developed now:**
 - To achieve better performance
 - To increase hardware reliability (DTTF case)
- **μ TCA cards with modern big FPGA (Xilinx Virtex 7) and up to 80 fast (10 GB/s) optical links inputs.**
- **The links with the RPC data can be connected to these new Track Finders**
 \Rightarrow Combine all 3 muon systems in new TF layer
Potentially the p_T resolution can be improved as more measurement points available for given track.
- No ideas for the trigger algorithm yet, but the requirement is:
the performance of the new trigger on the RPC hits only (in case when the DT is off due to some problems) is at least the same as the current PAC trigger (and vice versa)
- **Switch over to new system when fully produced and commissioned**
 - Target: 2016
- See also:
 - <https://indico.cern.ch/getFile.py/access?contribId=6&resId=3&materialId=slides&confId=172469>
 - <https://indico.cern.ch/conferenceDisplay.py?confId=216219>
 - <https://indico.cern.ch/conferenceDisplay.py?confId=208762>

