



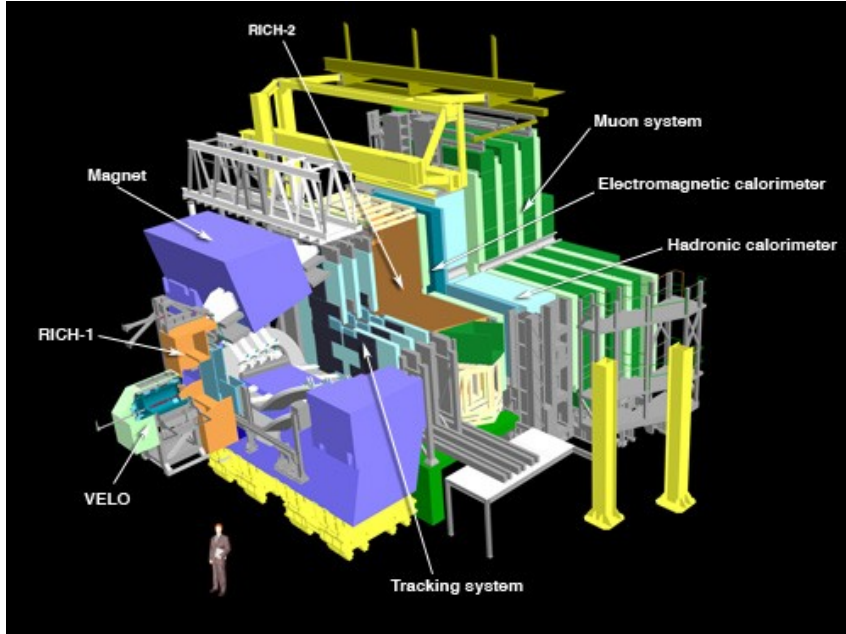
Searching for Lepton Flavor Violation at LHCb

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The LHCb Experiment



- 700 scientists from 52 institutions

- Indirect search for new physics
 - Matter/antimatter asymmetry
 - Measurement of rare decays

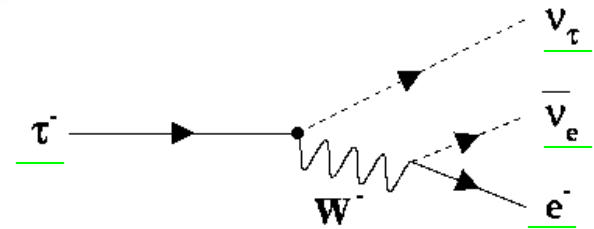
• **Lepton Flavor Violating Decays**



Lepton Flavor Violation



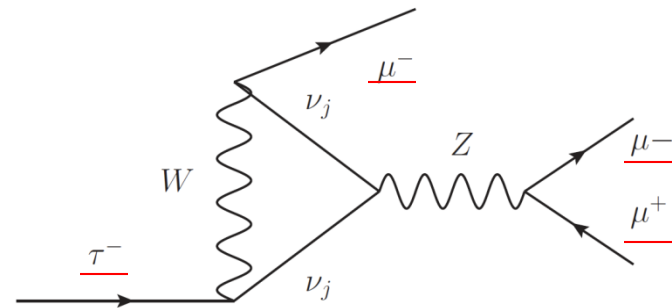
$< 2.2 \text{ eV}$ $0 \nu_{\frac{1}{2}} \nu_e$ electron neutrino	$< 0.17 \text{ MeV}$ $0 \nu_{\frac{1}{2}} \nu_{\mu}$ muon neutrino	$< 15.5 \text{ MeV}$ $0 \nu_{\frac{1}{2}} \nu_{\tau}$ tau neutrino
0.511 MeV $-1 \nu_{\frac{1}{2}} e$ electron	105.7 MeV $-1 \nu_{\frac{1}{2}} \mu$ muon	1.777 GeV $-1 \nu_{\frac{1}{2}} \tau$ tau



(?)

Electron #:	+1	0	0
Muon #:	0	+1	0
Tau #:	0	0	+1

And negative for corresponding anti particles





$\tau \rightarrow \mu \mu \mu$ Decay

- Standard Model Branching Ratio: $\sim 10^{-54}$
- Branching ratio in some New Physics models:

$10^{-8} - 10^{-10}$!

- SM + Heavy Majorana ν_r
- SUSY SO(10)
- mSUGRA + seesaw



OR



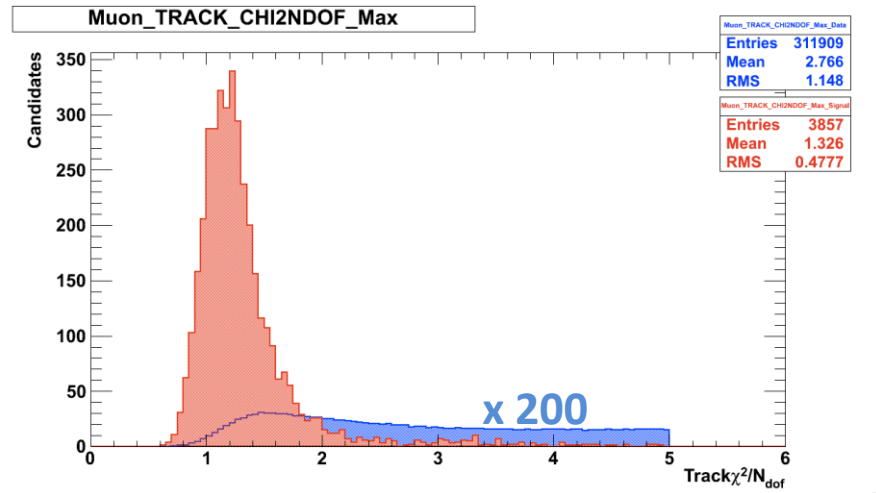
(more likely)



Selection Cuts

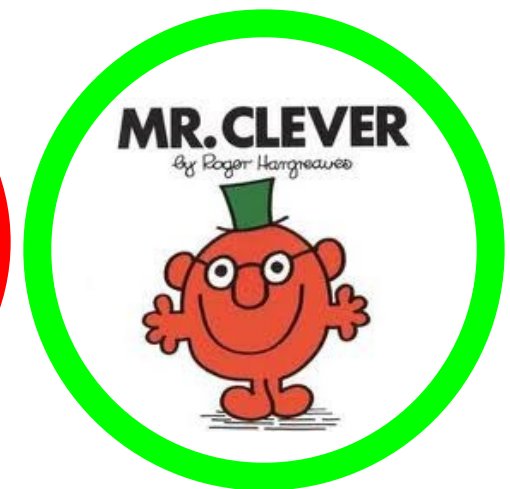
Goals

- Eliminate all background events
- Maximize $\tau \rightarrow \mu \mu \mu$ efficiency
- Select appropriate control channels



How

- Throw out a huge majority of the data - intelligently!





Swiss Ultimate Nationals!

