

Comments by Rainer

General comments:

- ordering of presentation needs to be revised. In particular, Section 5 should come before discussing any results as in Sec. 4. Important concepts like trigger primitives should be defined before they are used.
- add a glossary of acronyms
- be careful with terminology and do not mix up “menu”, “algorithm”, “seed”, “prescale column”
- avoid introducing the reader to CMS jargon, unless absolutely necessary
- an undefined term does not become clearer by putting it in quotes

Type B comments:

- L 27: that typically occur in
- L 37-39: “In 2015” and “throughout Run 2” appear to be in conflict
- L 53: “Phase 1 upgraded Level-1 trigger” is jargon
- L 56: “menu”: why in quotes?
- L 57: “interesting events” sounds unscientific
- L 129: If “seed” is an algorithm, how can an event “satisfy” it?
- L 160: define “proportional rate” before you use it. Do you need the term at all?
- “Full rate” not defined
- L 167: delete “unbiased” and “presence of a”
- L 173: define what you mean by “objects”
- L 173-177: You should discuss this behavior after showing the plots, not before. Try to explain why single-object triggers are linear and multi-object triggers are not
- L 181: which is not available at the Level-1 trigger
- L 183ff: explain that a prescale of N means that only every Nth event satisfying the condition is accepted
- L 198-199: these are surely not all unprescaled paths?

- Sec 5: Why not start with this?
- Fig. 2: it is strange to have a table in a caption. Do you really need to show the trigger names?
- Fig. 3 caption: “algorithms” and “trigger columns” are surely not synonyms, which the text seems to suggest
- “ : ... respectively...
- page 8: much slang, like “Not BPTX OR 3BX”. Use logical AND symbol
- Tab 2 caption: rephrase
- L 214: “trigger primitive” was not defined (comes only in Sec. 6)
- L 214: who is “calibrating” these trigger primitives, and how is it done?
- L 212-223: It is not clear what each layer is doing
- L 234: why “advanced”?
- L 240-244: This explanation should come before any other mention of “trigger primitives”

Explain better the difference between trigger primitives and detector hits.

- L 262: It does not send “eight muons”, but maybe their data
- L 263: Explain how “quality” is defined
- L 263: Explain how “muGT” is defined as opposed to “muGMT”
- L 266: Why not take TP from the RPC (like from DT)?
- L 288: What “extrapolation units” are you talking about?
- L 297-301: Explain motivation for additional LUT
- L 307: Explain meaning of “reference hit”
- L 328: Why not decimal numbers?
- L 395: How can you talk about the “muon’s curvature”, when you explained before that the fringe field is not homogeneous? Btw a muon does not have a “curvature”.
- Fig. 7: axis text too small.
- L 419ff: Description of Fig. 10-12 missing
- Fig. 8 right: Explain the slight drop at large pt

- Fig. 10 right: why the dips?
- L 441: How is this “calibration” made? Online?
- L 521: “tau ET” is slang
- L 676: “shifTERS” -> “shift teams, consisting of physicists...”
- L 718: Call it consistently “Run 2”
- L 723: “Trigger hardware”?
- L 726: allow the design of more powerful triggers
- L 729: lead to the deployment ... resulting in significant improvements

Type A comments:

- abstract: almost three times higher than in Run 1 ... larger than the LHC design
- L 35: during which repairs
- L 41: but they also presented
- L 45: undertook this major upgrade of the Level-1 trigger
- L 86: At the time, the LHC...
- L 89: to allow safe operation
- L 90: the CMS experiment underwent
- L 97ff: sentence too long, break into several
- L 105: interactions per event. In the
- L 108: the beam dump issues

- L 126: uses coarse granularity (how can information be coarse?)... from the muon detectors and calorimeters
- L 128: it is very unusual to use “seed” as a synonym for “algorithm”
- L 179: , however, objects are...