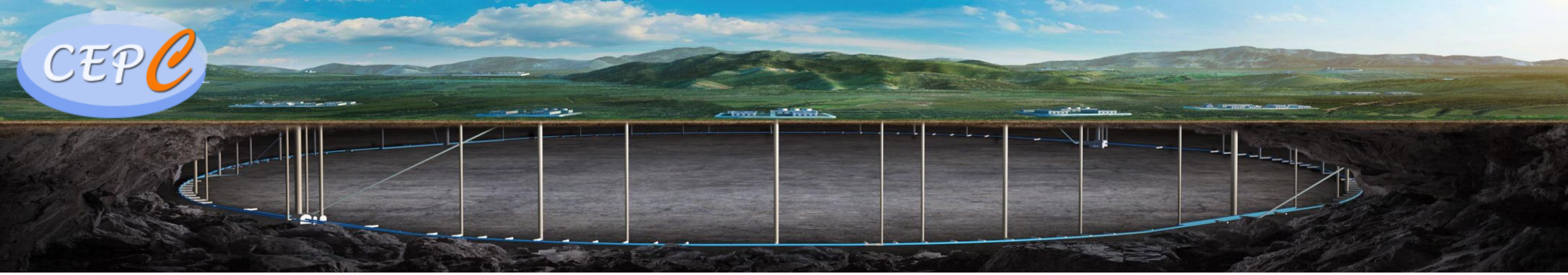

TDAQ Progress of CEPC Detector ref-TDR

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Progress of TDAQ

- Under revising the document
  - Modified TDR according to IDRC and Joao
    - 3/3 comments
    - 4.5/8 recommendations
    - Add more word for each cations
  - Update with current BG
    - Readout and storage data rate reduced
  - Offline reconstruction windows
    - VXD 200 ns , ITK/OTK 30 ns
    - TPC 34 us, Muon 100 ns
    - Ecal 150 ns, Hcal 1000 ns
  - 38 pages

backup

Data Rate Updated

- Updated to alignment current beam background with electronics
  - Readout: 30.1 and 23.6 GB/s @ZH and low lumi. Z
  - Storage: 0.5 and 2.7 GB/s @ZH and low lumi. Z
  - None safety factor at TDAQ but 1.5 at electronics

Operation phase		I		II	III
Condition	Higgs	Z (12.1 MW)	W	Z (50 MW)	$t\bar{t}$
Luminosity ($10^{34}/cm^2/s$)	8.3	26	26.7	95.2	0.8
Background data size/bunch crossing (kbyte)	500	133	-	-	-
Background data rate (Tbyte/s)	0.67	1.6	-	-	-
Physical event rate (kHz)	0.5	10	1.1	40	0.057
L1 triger rate (kHz)	50	120	65	400	2
DAQ readout rate (Gbyte/s)	30.1	23.6	-	-	-
High level trigger rate (kHz)	1	20	2	80	1
Storage event size (kbyte)	500	133	500	200	500
DAQ storage rate (Gbyte/s)	0.5	2.7	1	16	0.5

Comments of IDRC second Review

- ~~The background event rate and event size are the most critical inputs to designing the dataflow requirements for the TDAQ system. The assumptions should be clearly stated and referenced consistently in the different chapters (there are some inconsistencies in the draft document).~~
- ~~The safety factors used in the design of the system should be made explicit and clearly motivated and documented so that they can be updated and their implications for different systems readily understood.~~
- ~~Section 12.4 should be moved to come after section 12.6.~~

Strike-throughs indicate that changes have been made.

Recommendations of IDRC second Review

- ~~The data bandwidth requirements into the L1 trigger and between trigger system layers and the number of links required should be motivated. The current plans or assumptions for trigger primitives from each of the Back End Electronics types and their volume should be described. Similarly, the output products of the local trigger layers should be described, along with data bandwidth estimates into the next global trigger layer.~~
- ~~Update the design of the common trigger board, in particular the bandwidth and input links from the BEEs, to match the information shown in the presentations. Explain the factors leading to the estimated number of trigger boards at each of the three levels.~~
- The handling of the TPC data stream should be explained in detail.
- The possibility of using a fast track trigger should continue to be explored, including the potential savings in the HLT from having a lower background from the L1 level.
- ~~The need for RDMA technology for transferring data from the BEE to the HLT should be demonstrated.~~
- ~~The handling of data flow in the event of full buffers should be described.~~

Recommendations of IDRC second Review

- ●Consider whether the hierarchy of the L1 trigger could be collapsed into a multiplexer layer directly feeding into a layer with full global trigger primitives in each common trigger board.
- ●~~We recommend categorising the event rate as e+e- physics signal (e.g. ZH, but also two and four fermions, and Bhabha), gamma-gamma interactions and beam backgrounds. The first category aims at full trigger efficiency, the second one is potentially of some interest with much lower priority and the last one must be reduced as much as possible~~. We recommend studying the beam background distribution as a function of energy, multiplicity, polar and azimuthal angle, to develop the most appropriate algorithm to suppress it. The background peaks shown at Fig. 12.10 (i.e. at about 7 GeV for the ECAL Endcap) should be understood.