TDAQ Progress
of CEPC Detector ref-TDR

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On behalf of CEPC TDAQ Group
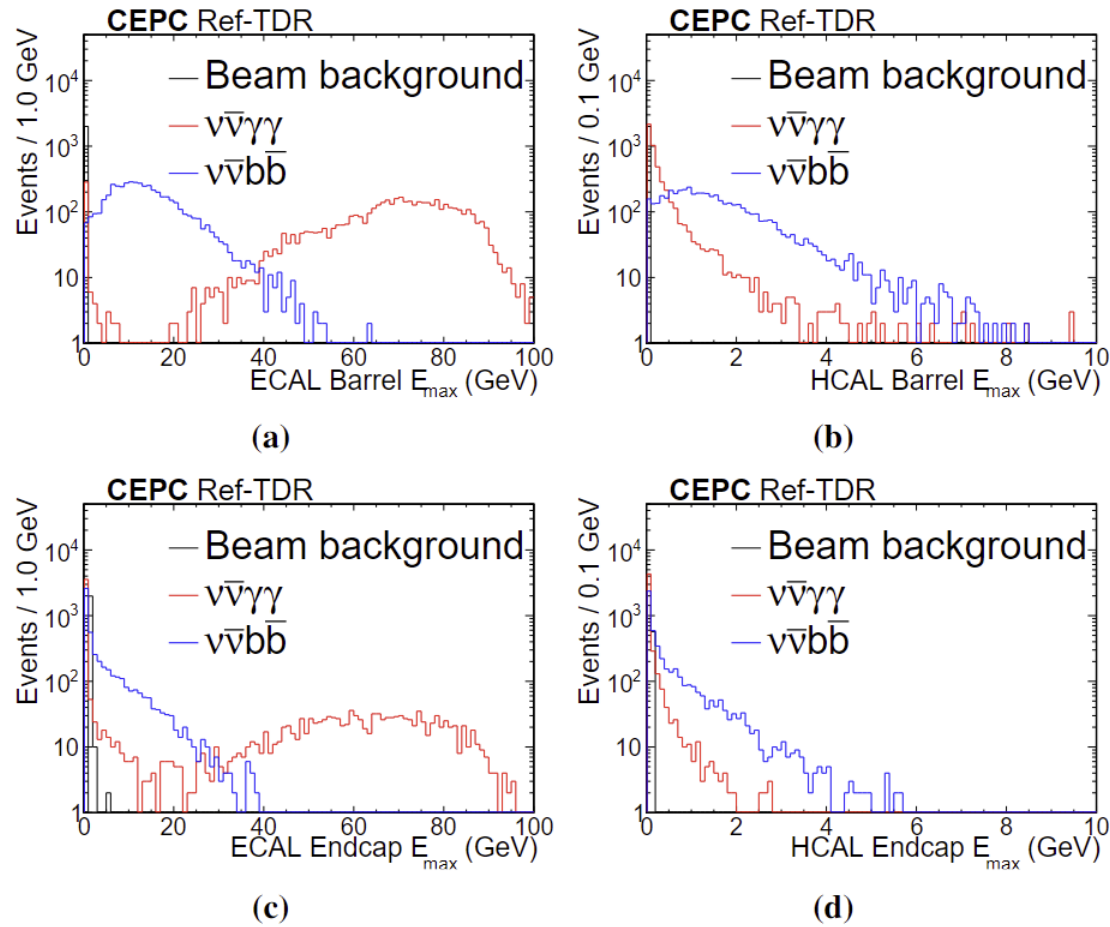
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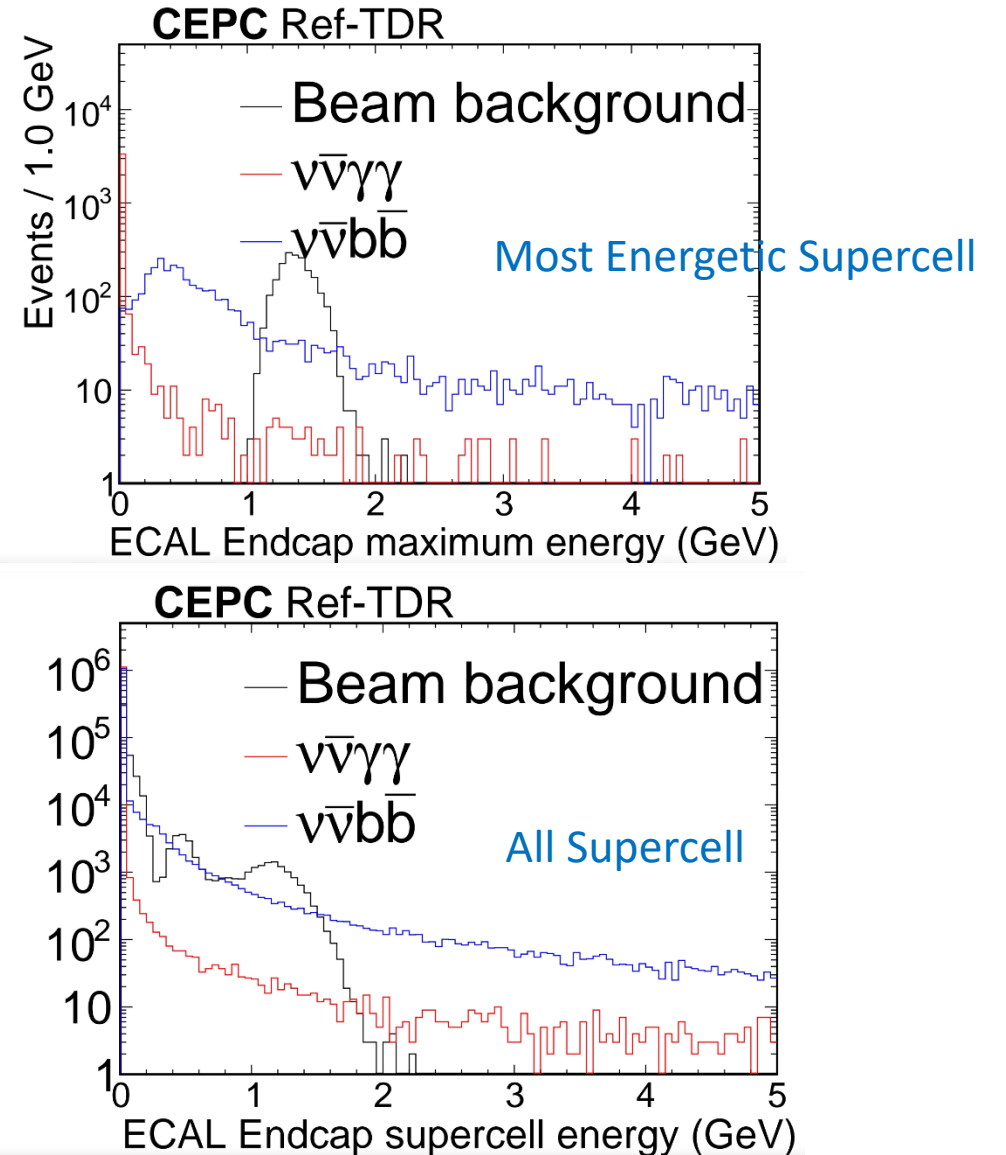
Update After Review

- **Comments just before review day and TDR v0.7.3**
  - Change safety factor
  - Updated trigger simulation and efficiency
  - Updated trigger rate and data rate
  - Remove the W, tt and high lumi Z modes for all the tables.
  - Text
- **Comments after TDR v0.7.3.**
  - Changed from pseudorapidity to polar angle as Robert's suggestion
  - Text modification according to auto check script by Joao
- **A document for all comments and answer**
  - https://docs.qq.com/doc/DSXJIaWticnJsUG95?u=81439efebae44e4a935b b1aeaa2110f7

Simulation of Beam Background

Figure 12.6: Energy distribution of the most energetic supercell, E_{max}, of beam background, $e^+e^- \rightarrow Z(\nu\bar{\nu})H(\gamma\gamma)$ and $e^+e^- \rightarrow Z(\nu\bar{\nu})H(b\bar{b})$ in (a) ECAL Barrel, (b) HCAL Barrel, (c) ECAL Endcap and (d) HCAL Endcap region.

Safety factor 2

Trigger and Data Rate

Table 12.10: Expected L1 trigger rate for the baseline threshold for the Higgs mode for 50 MW and at the Z mode for 12.1 MW. Samples are simulated with CEPCSW. Electronic noise is not added. Pile up event is not added.

Higgs mode	Efficiency(%)	Z mode	Efficiency(%)
Higgs Boson production	>99.9	$q\bar{q}$	>99.9
$q\bar{q}$	>99.9	$\mu^+\mu^-$	>99.9
$\mu^+\mu^-$	99.8	$\tau^+\tau^-$	>99.9
$\tau^+\tau^-$	99.6	Bhabha	>99.9
Bhabha	99.9		
Di-photon processes		**Di-photon processes**	
Di-photon event rate	**Efficiency(%)**	**Di-photon event rate**	**Efficiency(%)**
9.1 kHz	40.3	Low Lumi: 18.5 kHz	42.9
Beam Background		**Beam Background**	
Background event rate	**Veto efficiency(%)**	**Background event rate**	**Veto efficiency(%)**
11.4 kHz	99.2	Low Lumi: 90.0 kHz	99.3
Total		**Total**	
20.6 kHz		Low Lumi: 118.9 kHz	

Running mode SR power	Higgs 50 MW	Z 12.1 MW
Non-empty bunch crossing rate (MHz)	1.34	12
Luminosity ($10^{34}/cm^2/s$)	8.3	26
Physical event rate (kHz)	0.5	10
L1 triger rate (kHz)	20	120
DAQ readout rate (Gbyte/s)	5.34	11.9
HLT rate (kHz)	1	20
Raw event size (kbyte)	405	333
DAQ storage rate (Gbyte/s)	0.405	6.66