OAK RIDGE National Laboratory

ePIC LFHCAL SiPM Considerations

Friederike Bock, Oskar Hartbrich, Norbert Novitzky, Ken Read, Nico Schmidt

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U.S. DEPARTMENT OF ENERGY

Summary

	A	B	C	D	E	F
1	Manufacturer	Type	Size	N pixels	Comment	
2	Hamamatsu	S13360-1325PE	1.3x1.3	2668	for SiPM-on-tile	
3	Hamamatsu	S14160-1315PS	1.3x1.3	7284	for SiPM-on-tile	
4	Hamamatsu	S13360-3025PE	3.0x3.0	14400	for fiber-based design	
5	Hamamatsu	S14160-1315PS	3.0x3.0	39960	for fiber-based design	
6						
7	OnSemi	MicroC 10010	1.0x1.0	2880	for SiPM-on-tile	
8	OnSemi	MicroC 30020	3.0x3.0	10998	for fiber-based design	
9	OnSemi	MicroJ 30020	3.0x3.0	14410	for fiber-based design	

- Dynamic Range:
  - ~2.5GeV max per 5-tile-segment E_{rec}
  - ~1500-2500 pixel total per segment - 300-500px/SiPM
  - ~2000px(+) SiPM should be sufficient
- Radiation Damage Impact:
  - increased noise, thus increased cell trigger threshold
  - potential impact on auto-trigger performance.
  - need radiation map and some SiPM rad test results
    - (e.g. Miguel's, or SiPM irrad data available elsewhere) to get a real estimate.
  - latest irradiation estimate map available? Data available, or just plots?
    - Really need to put in real LFHCAL eta coverage to estimate spreads
- Specifications: 1.3x1.3mm^2 (or similar), 25um or 15um pitch.
- Readout Electronics:
  - Ideal: Dynamic range to cover single pixel regime up to full deposition scale.
  - HGCROC should cover that.
  - Some thinking and R&D needs to be done for impact of signal-summing board.