# GBP MC Update

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### Detector separation

- Looked into effect of detector separation on energy deposition with air environment
- Two cases:
  - 10.0 GeV mono-energetic beam (r = 0.02 cm)
  - Ptarmigan xi = 2.0 MC data
- Range of separations between
  5mm and 50mm



#### Difference in energy deposition – 10.0GeV



ROOT command: h\_w2\_42->Add(h\_w2\_41, -1)

No. Primaries = 1.e7 (0.04 BX)

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#### Energy deposition projection



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#### Estimate of produced charge

Estimate of charge production in profiler (CCE = 1.0) Estimate of charge production in profiler (CCE = 1.0) h w3 42 py h w0 42 py 160801 Charge produced (nC/BX) Entries 160801 Entries Charge produced (nC/BX) -0.005304 h w3 42 px Mean -0.004334h w0 42 px Mean 5 mm - 5 mm 160801 Entries 160801 Std Dev 0.04937 Std Dev 0.1042 Entries -0.0055290.0701754 FWHM 0.0701754 Mean -0.004842Mean - 20 mm FWHM - 20 mm 0.06482 0.105 Std Dev Std Dev •0-1 h\_w5\_42\_py 10 50 mm 50 mm 0.0701754 0.0701754 FWHM FWHM 160801 Entries Mean -0.004956h\_w5\_42\_px Std Dev 0.05603 160801 Entries 0-2 FWHM 0.0701754 -0.004661Mean  $10^{-2}$ Std Dev 0.05701 0.0701754 FWHM 10<sup>-3</sup> • 10  $10^{-4}$ 10  $10^{-5}$ 10 -0.50 0 0.5 0.5 X (cm) Y (cm)

> Assumes all energy deposited in each strip is converted to eh pairs, with no charge charge sharing effects.

## Conclusions

- Distortion of beam shape by increasing the air gap between profiler stations from 5 mm to 50 mm is negligible
- Background outside of dominant cone will vary slightly but less than 3 orders of magnitude smaller than the peak signal
- For test 10.0 GeV photon beam, choice of air gap in range 5 mm to 50 mm is arbitrary in terms of beam distortion and noise generation