First Look at FMA VdG Data

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1. Runs Analyzed
2. Cal-Hi without Cal-Lo: What triggered?
   • What Triggered: GemConditionsWord
   • Hard X-ray Bursts from VdG
   • Response of Cal Studied by CalMaxEne
   • How Was EM1?
3. Upward VdG Photons
   • Vertex Z Distribution
   • VtxZDir Distribution
   • Tkr1NumHits and Tkr1EndPosZ
4. Conclusion

1. Run Analyzed
   Flight Model A was set horizontally
   • Run 971: VdG at Cal Side
   • Run 954: VdG off (Cosmic Ray)
   • Run 949: VdG at Top (75mm)
   • Run 945: VdG at Top (75mm) No Zero-Suppression
What Triggered: GemConditionsWord

What causes CalHi without CalLo?

GemConditionsWord for CR, VdG Top, VdG Side

- BlueFilledSquare: VdG below CalLayer 1 Run971
- GreenOpenTriangle: VdG Normal NoZeroSupp Run945
- GreenOpenSquare: VdG Normal ZeroSupp Run949
- RedColumn: Hor Cosmic Ray Run954

Entries / bin

- Tk r
- CalLo
- Tk r CalLo
- CalHi
- Tk r CalHi
- CalLo CalHi
- Tk r CalLo CalHi
Hard X-ray Bursts from VdG
Can VdG deposit a few GeV?

CalEneSum Distr: CR, VdG Top, VdG Side

BlueDashed: VdG below CalLayer 1 Run971
GreenDotDashed: VdG Normal NoZeroSupp Run945
GreenDot: VdG Normal ZeroSupp Run949
RedSolid: Hor Cosmic Ray Run954

VdG at Cal Side
Response of Cal Studied by CalMaxEne

Cutoff at 1GeV >> Hits in Photodiodes

Multiple hard X-rays hitting on a smaller photodiode can make such distribution.
How Was EM1?
Something has been changed

CalEnergySum: EM1 VdG+CR/CR:CalLO/Tkr Trig

- RedSolid: VdG CalLo Trigger
- BlueDashed: VdG Tkr Trigger
- GreenDotDashed: CR CalLo Trigger
- GreenDotted: CR Tkr Trigger

VdG at Cal Side with CalLO

1GeV
Vertex Z Distribution
VdG at Cal Side vs. Top

VtxZ0 Distr: CR, VdG Top, VdG Side

- BlueFilledSquare: VdG below CalLayer 1 Run971
- GreenOpenTriangle: VdG Normal NoZeroSupp Run945
- GreenOpenSquare: VdG Normal ZeroSupp Run949
- RedColumn: Hor Cosmic Ray Run954
VtxZDir Distribution

Tendency to align to z-axis

VtxZDir Distr: CR, VdG Top, VdG Side

- BlueDashed: VdG below CalLayer 1 Run971
- GreenDotDashed: VdG Norm NoZeroSupp Run945
- GreenDotted: VdG Norm ZeroSupp Run949
- RedColumn: Hor Cosmic Ray Run954
Tkr1NumHits and Tkr1EndPosZ (1/2)

Cosmic Ray vs. VdG at Cal Side

Tkr1NumHits
Cosmic Ray
FMA horizontal

Tkr1EndPosZ
Cosmic Ray
FMA horizontal

Tkr1NumHits
VdG Side + CR
FMA horizontal

Tkr1EndPosZ
VdG Side + CR
FMA horizontal
Tkr1NumHits and Tkr1EndPosZ (2/2)

(VdG + CR) - CR

Most stops at 1st encounter with Super-Layer

Many enters from the bottom as electrons.
Conclusion

1. **Good start:** Thanks to Eduardo, Xin, Anders and others
2. **Mitigation plan needed for hard X-ray hitting photo-diodes**
   • Require some signal in another photo-diode in a same log
3. **We need a robust method to eliminate electrons and gammas coming upward from Calorimeter**
4. **Hint of small difference between with and w/o zero-suppression**