

# The Progress on SDHCAL Digitisation

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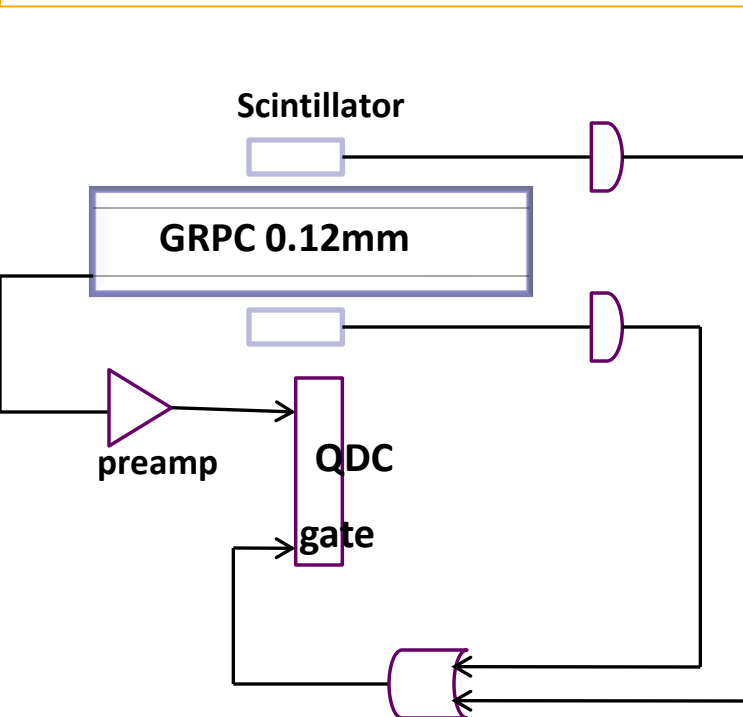
2010.07.02



# Cosmic Ray Charge Spectrum

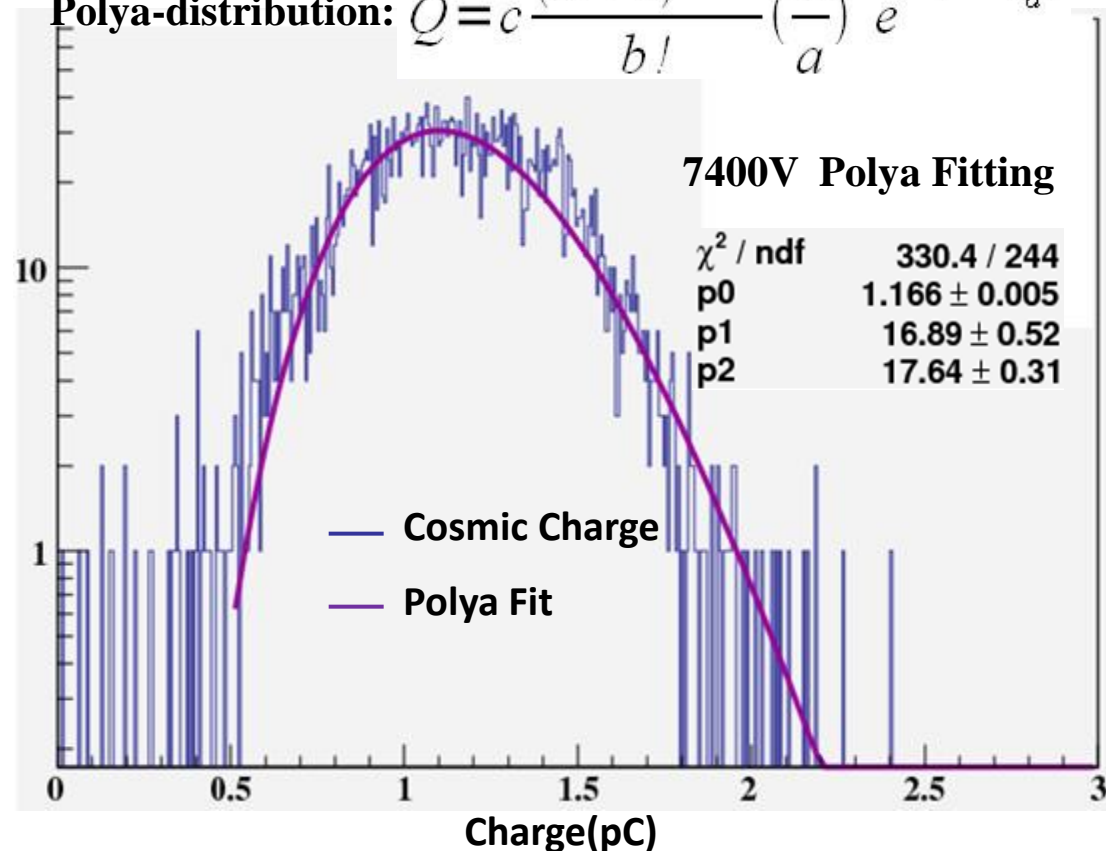
**Motivation:** Work out Charge Spectrum in Simulation

**Way:** Charge Spectrum is Polya Distribution (F.Suli, Gas Detectors, 2009), extract parameters in Polya function **from Data**



**Charge Spectrum Cosmic Test Set Up**  
64 Channels, trigger area < Channel area  
Analog readout

**Polya-distribution:** 
$$Q = c \frac{(b+1)^{(b+1)}}{b!} \left(\frac{x}{a}\right)^b e^{-(b+1)\frac{x}{a}}$$



**Avalanche signal charge spectrum (Cosmic Ray)** 2

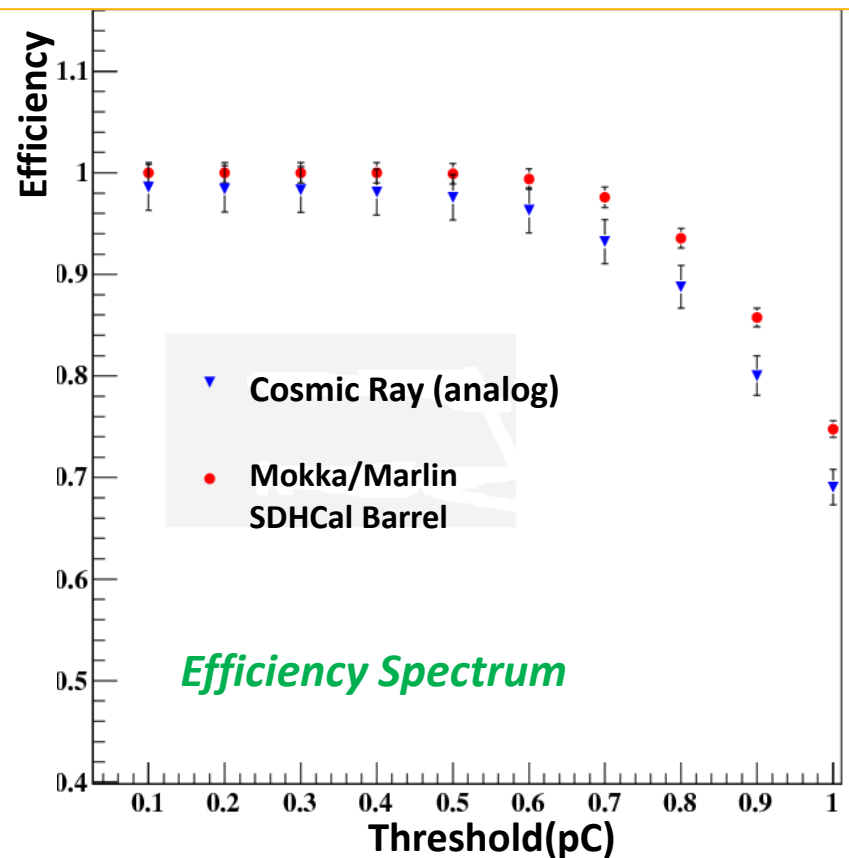
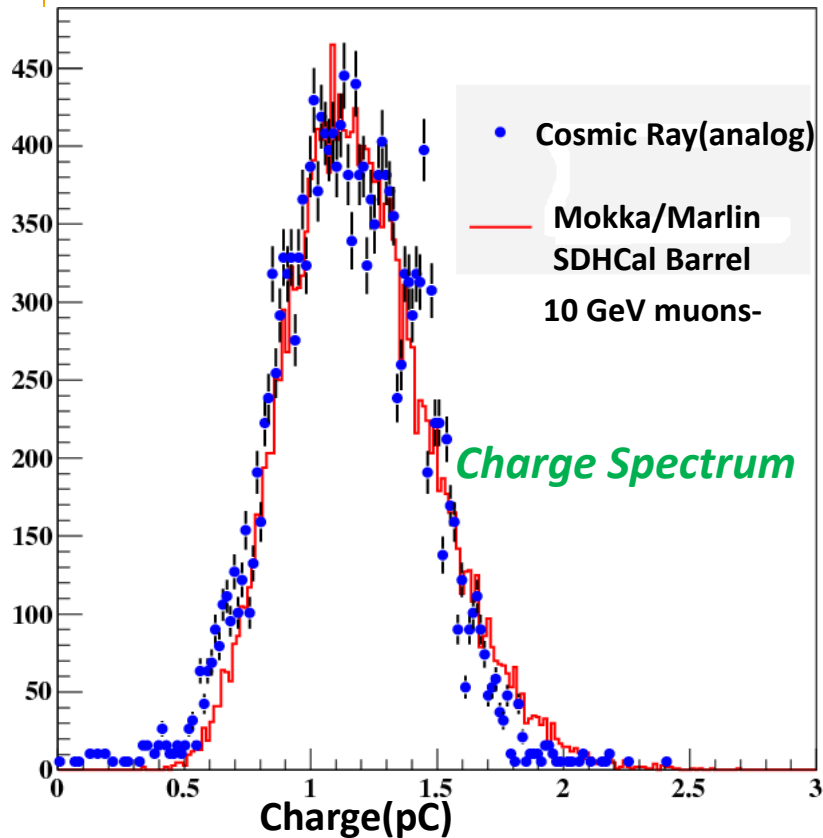
# Simulation Charge and Comparison

**Mokka Input:** 10 GeV muons-, ILD-00fw\_Dhcal

**Marlin:** use our DHCAL energy to charge conversion processor.

**Collected:** Hcal Barrel Collection/SimCalorimeterHit

**The full study has been processed by prototype simulation before applying to Mokka/Marlin**



**Next Step:** Collect data based on Digital(or Semi-D) ,  
Compare the difference, Do full study

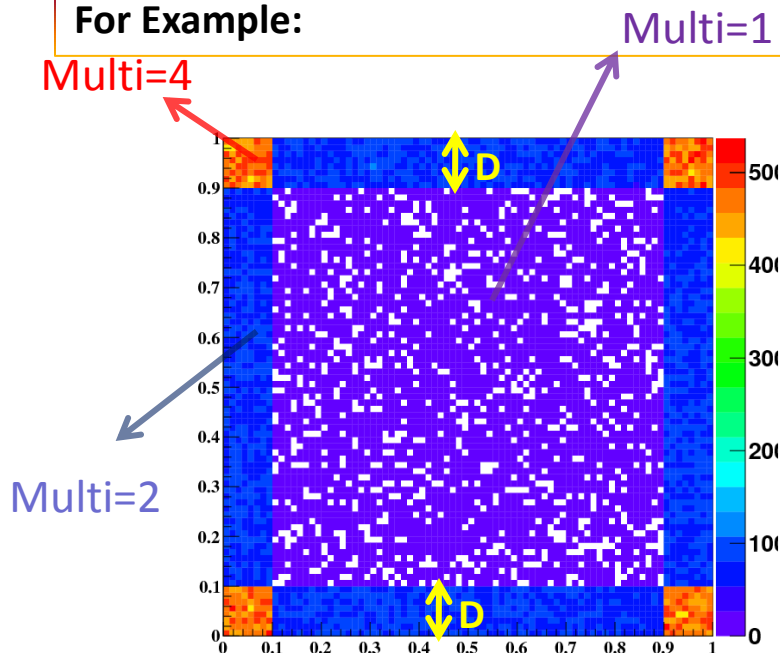
# The Definition of Pad Multiplicity in Prototype Simulation

**Define Pad Multiplicity in Simulation:**

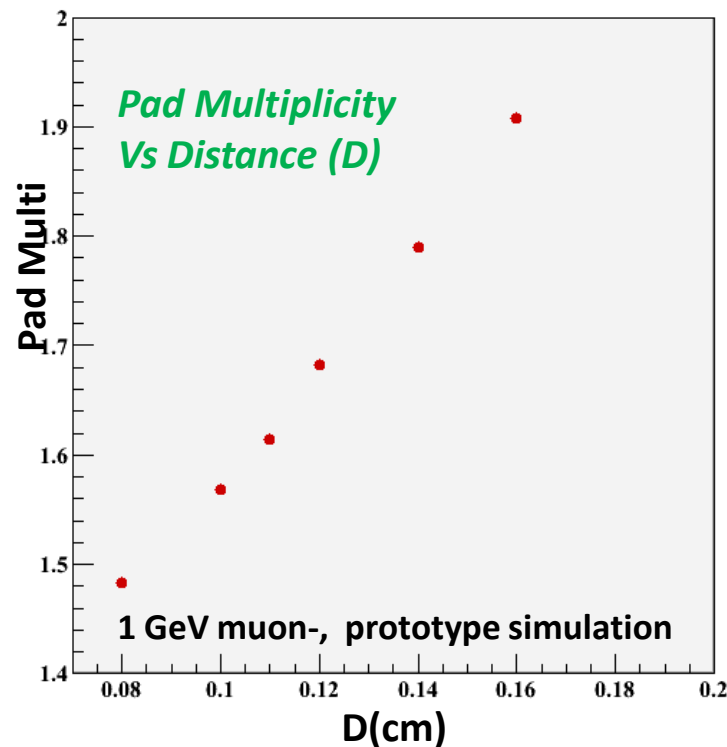
**Pad size:** 1 \* 1 cm<sup>2</sup>

**Each Pad:** pad-multi depends on the position of the hits in one pad

**For Example:**



**From the Left Plot:** pad-multi depends on the definition of the distance "D"



**Ongoing Study: 1:** add charge division between pad in simulation.

**2:** No hits position, Only pads position, add hits position in Mokka for Pad-Multi?