Pad Response Function

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require(bigints)

# Pad Response Function

The surface charge density induced on the metal surface of the cathode pad plane, by a charge at a distance from the pad plane, is given by:

Integrating this charge density over the metal surface, gives the total charge induced on the cathode pad plane, as follows:

Using this approach of integration over each pad

# Remove entries with missing pad data:

## [1] "Removed 72305 entries"

# Get a Look-Up Table for Tracks within Events:

* Use EventID, trackID, v0ID, and PDG code to get the indices in the full event list that pertain to a specific track:

events <- sapply(j,`[[`,"Event")  
events <- as.numeric(events)  
  
tracks <- sapply(j, `[[`,"track")  
tracks <- as.numeric(tracks)  
  
v0s <- sapply(j, `[[`,"V0TrackID")  
v0s <- as.numeric(v0s)  
  
pdg <- sapply(j, `[[`,"pdgCode")  
pdg <- as.numeric(pdg)

* Seperate out the detector traces for these events:

detectors <- sapply(j, `[[`,"det0")  
  
columns <- sapply(j, `[[`,"col0")  
  
rows <- sapply(j,`[[`,"row0")  
  
pads <- sapply(j,`[[`,"layer0")

* Create the Look-Up Tables for electrons and pions:

# look.up.table <- data.frame(cbind(events,tracks,v0s,pdg))  
# look.up.table$index <- 1:nrow(look.up.table)  
  
look.up.table <- data.frame(cbind(pdg,1:length(pdg)))  
names(look.up.table) <- c("pdg","index")  
  
electrons <- look.up.table[which(look.up.table$pdg %in% pdg.elec),]  
pions <- look.up.table[which(look.up.table$pdg %in% pdg.pion),]  
  
electrons <- unique(electrons)  
pions <- unique(pions)

* Create a unique identifier for a specific track, by concatenating its eventID and trackID, and get the number of detector hits for that unique ID: