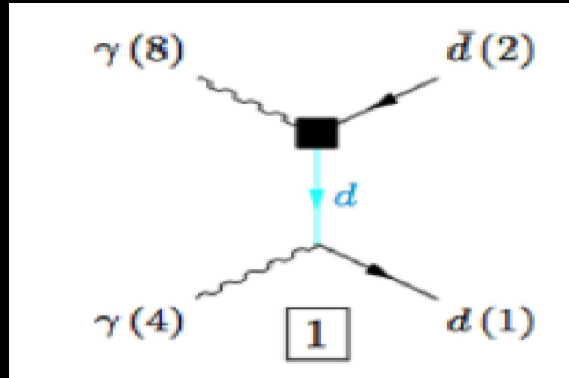
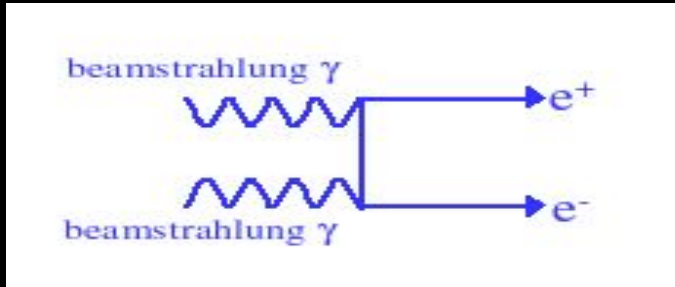


Forward ECal Occupancy Study Wrap Up

Christopher Milke
Bruce Schumm
UCSC/SCIPP
SiD Optimization Meeting
April 13, 2016

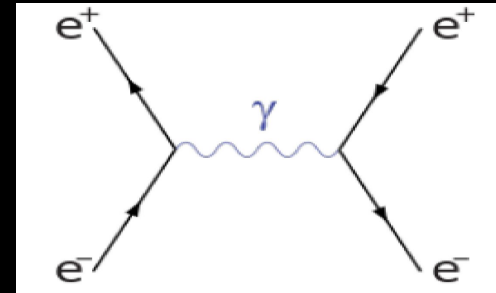
Event Types Included

Pair Backgrounds

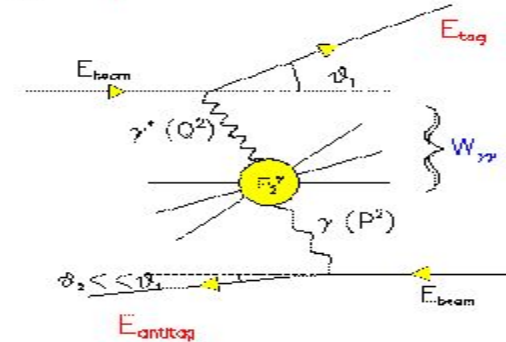


Gamma-gamma to Hadron

BhaBha



Singly tagged $e\gamma$ events:



Low Cross-section

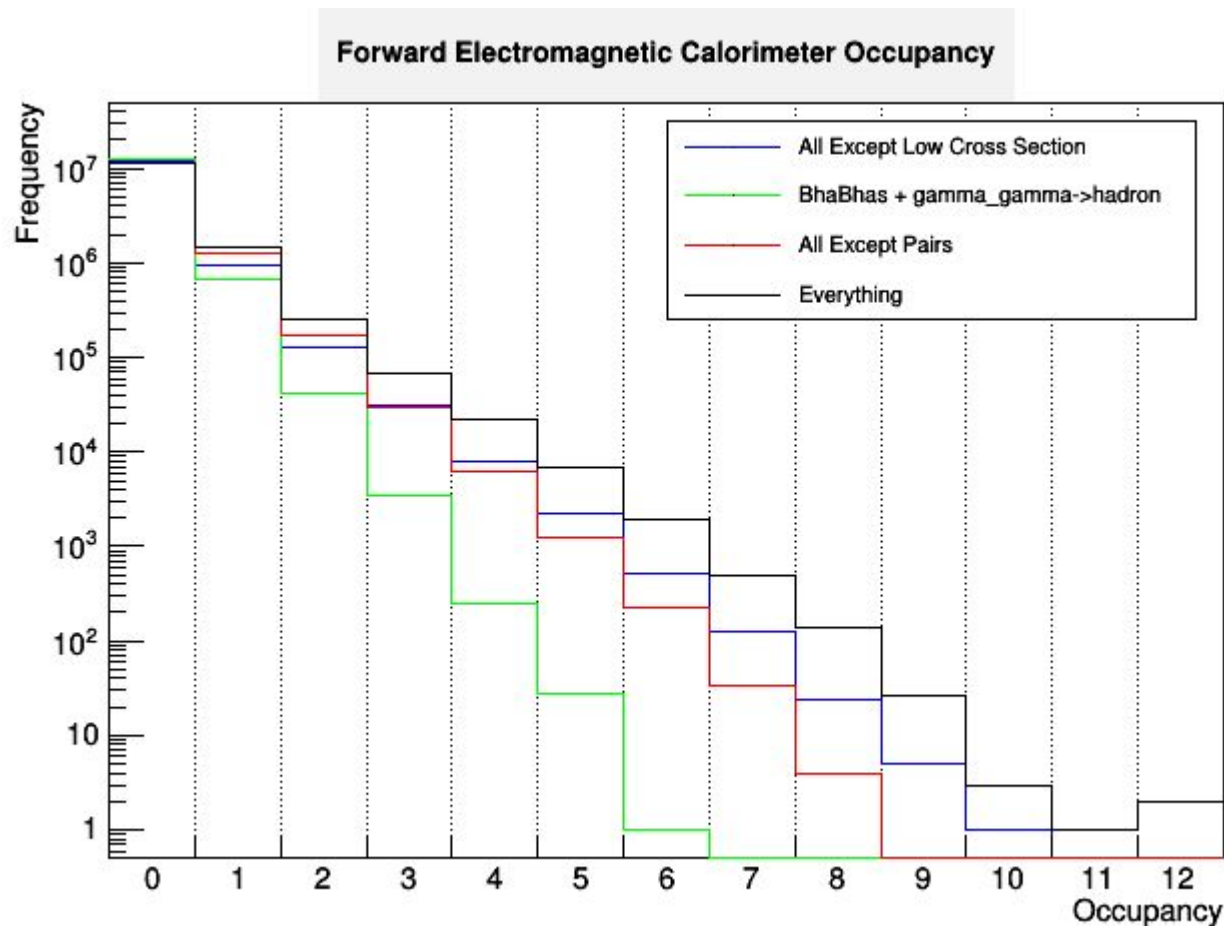
Raw Occupancy: Number of channels across all layers (y-axis) which were hit exactly the given number of times (x axis), across a luminosity upgrade train's (2624*) worth of bunch crossings.

Note: All other plots are also over a LU train.

**Individual event rates calculated as $Luminosity_{train} * Cross_section_{Event}$*

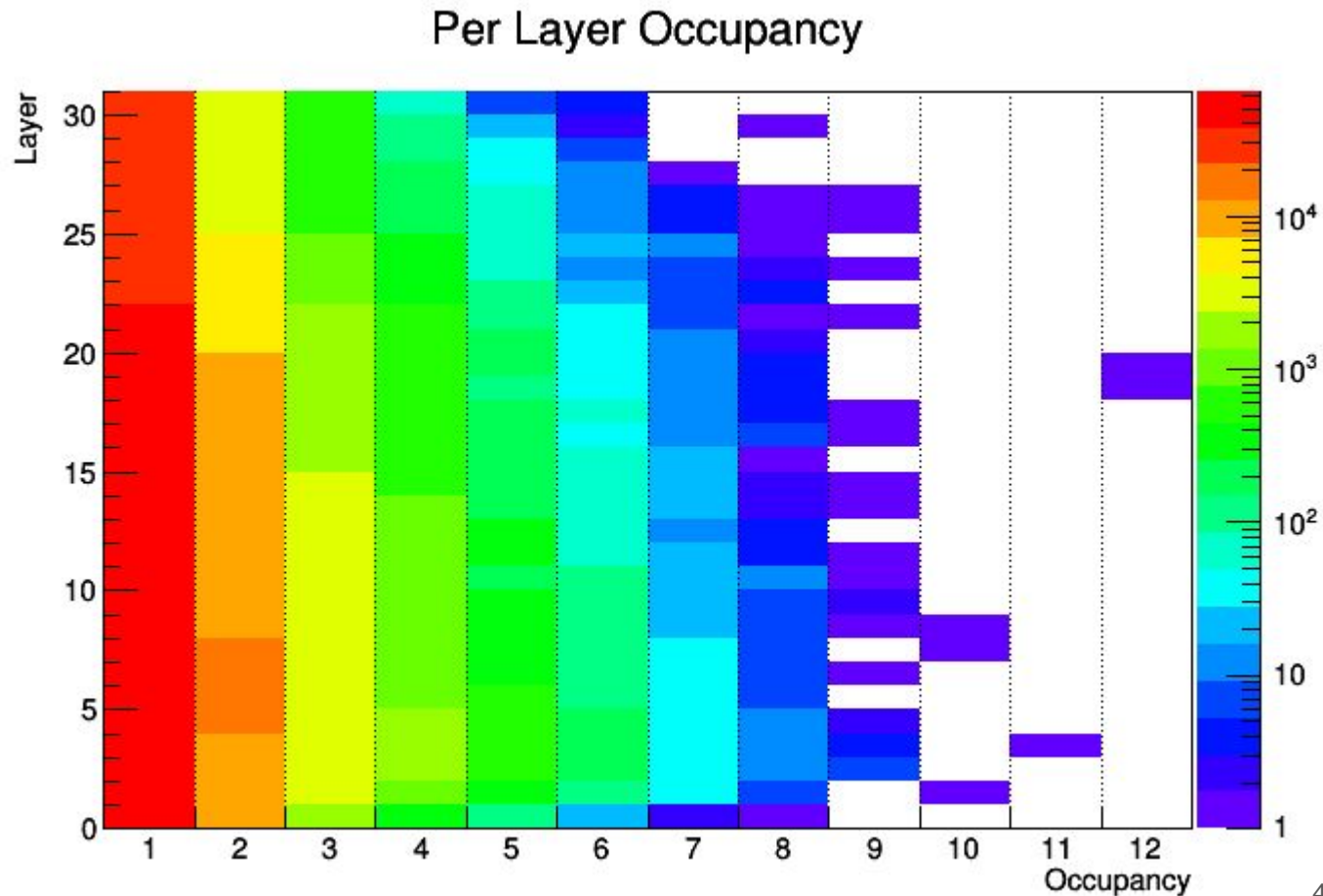
*where $Luminosity_{train} = Luminosity/frequency = 3.6 * 10^{-34} cm^{-2} s^{-1} / 5Hz = 7.2 * 10^{-6} fb^{-1}$.*

Pairbackgrounds rate was once per bunch crossing

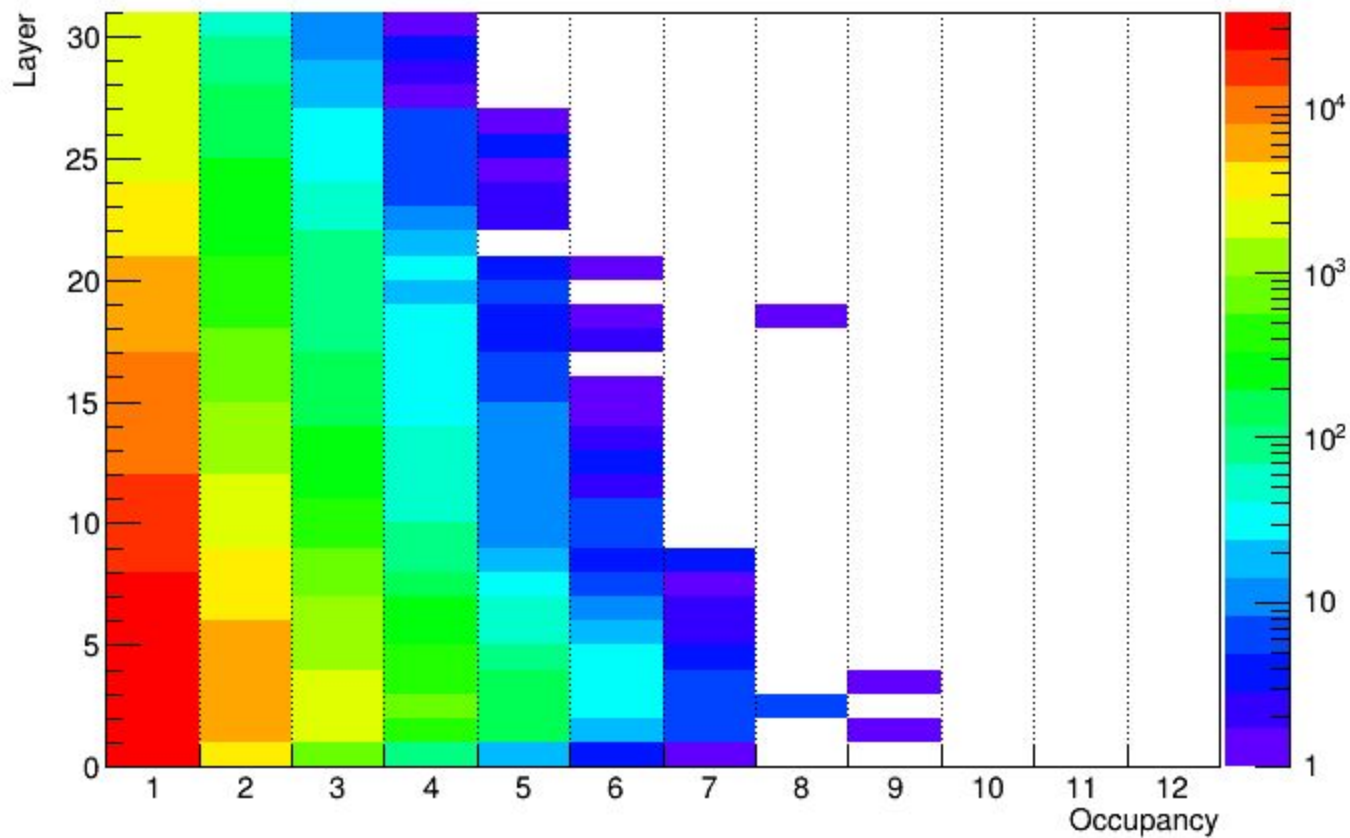


Raw Layer Occupancy:

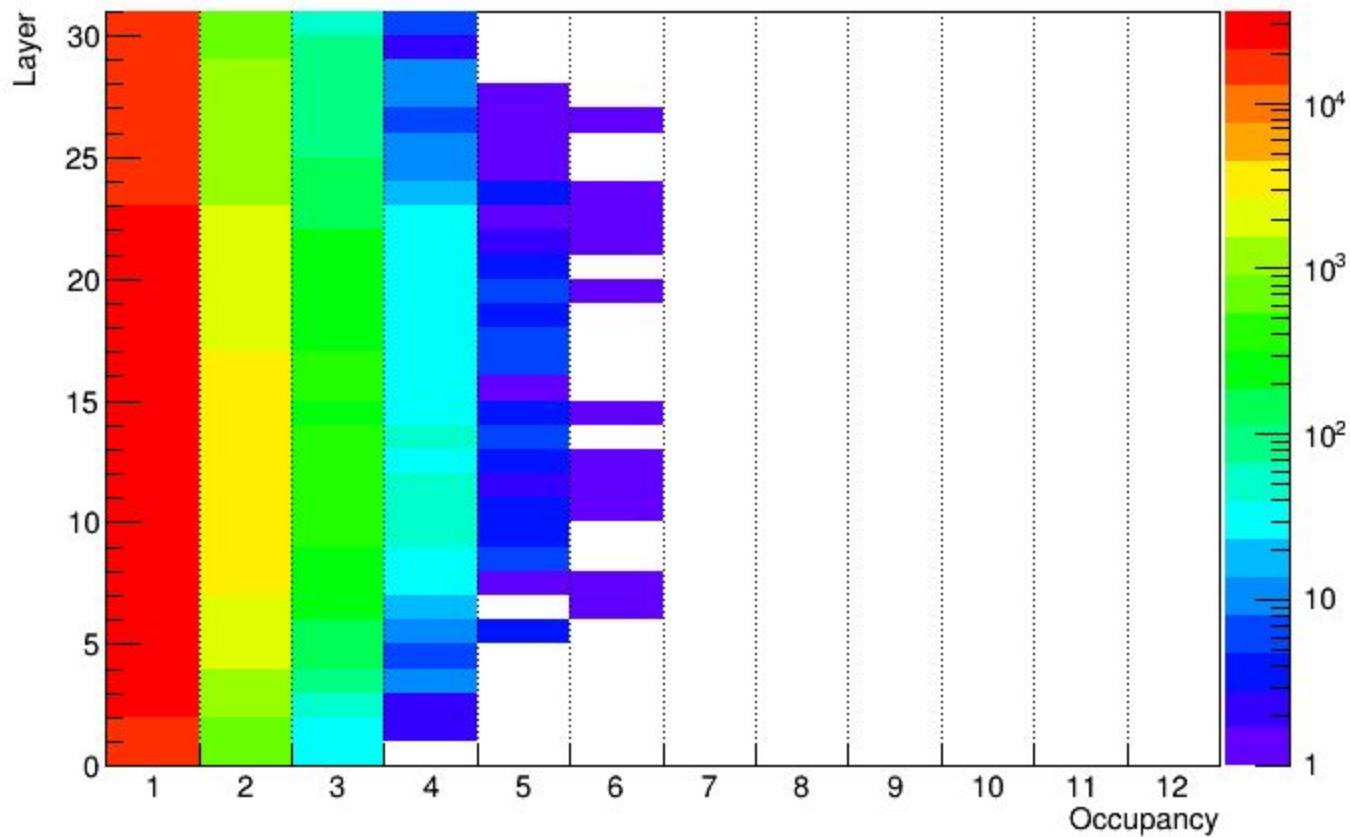
As before, but with number of channels also now given as a function of layer (channel frequency given by color)



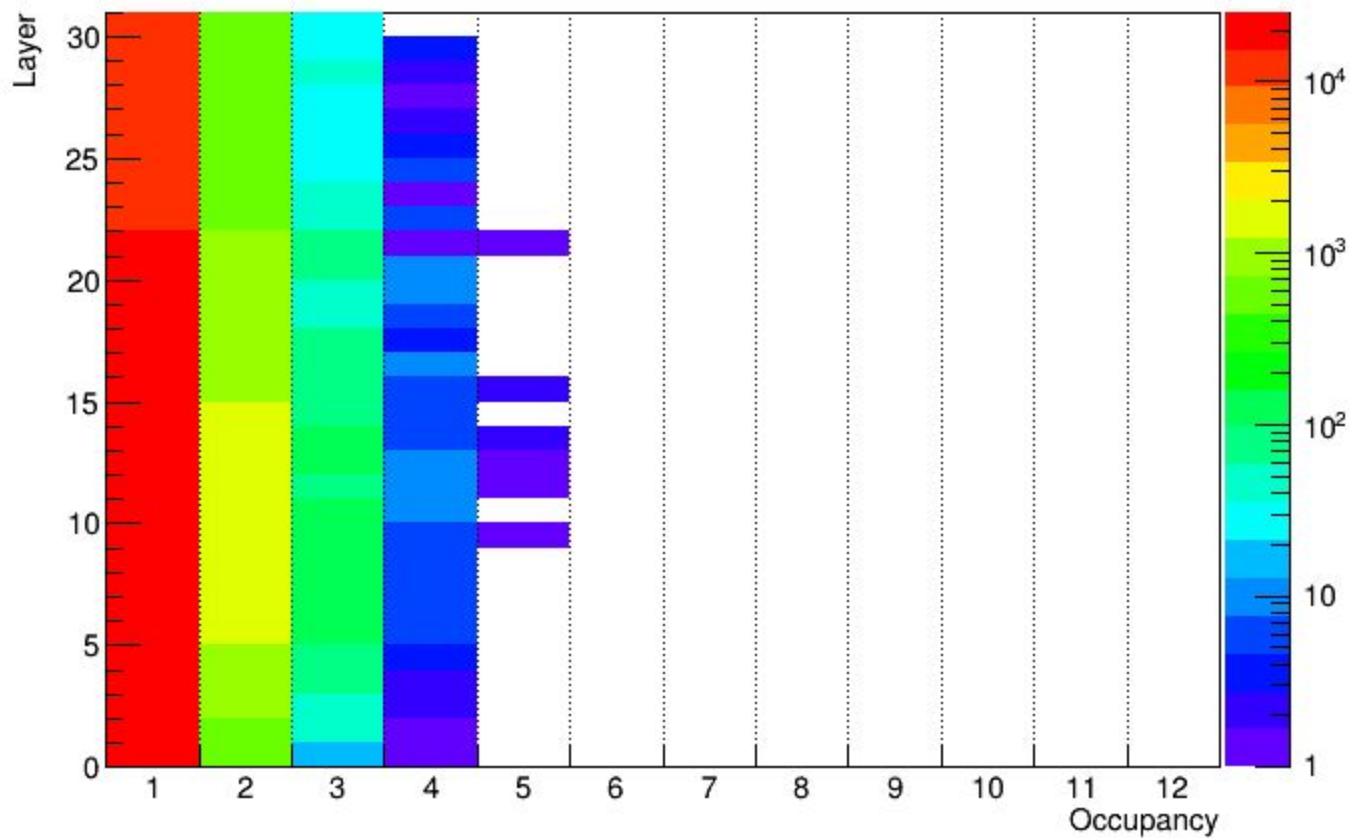
PairBackgrounds Per Layer Occupancy



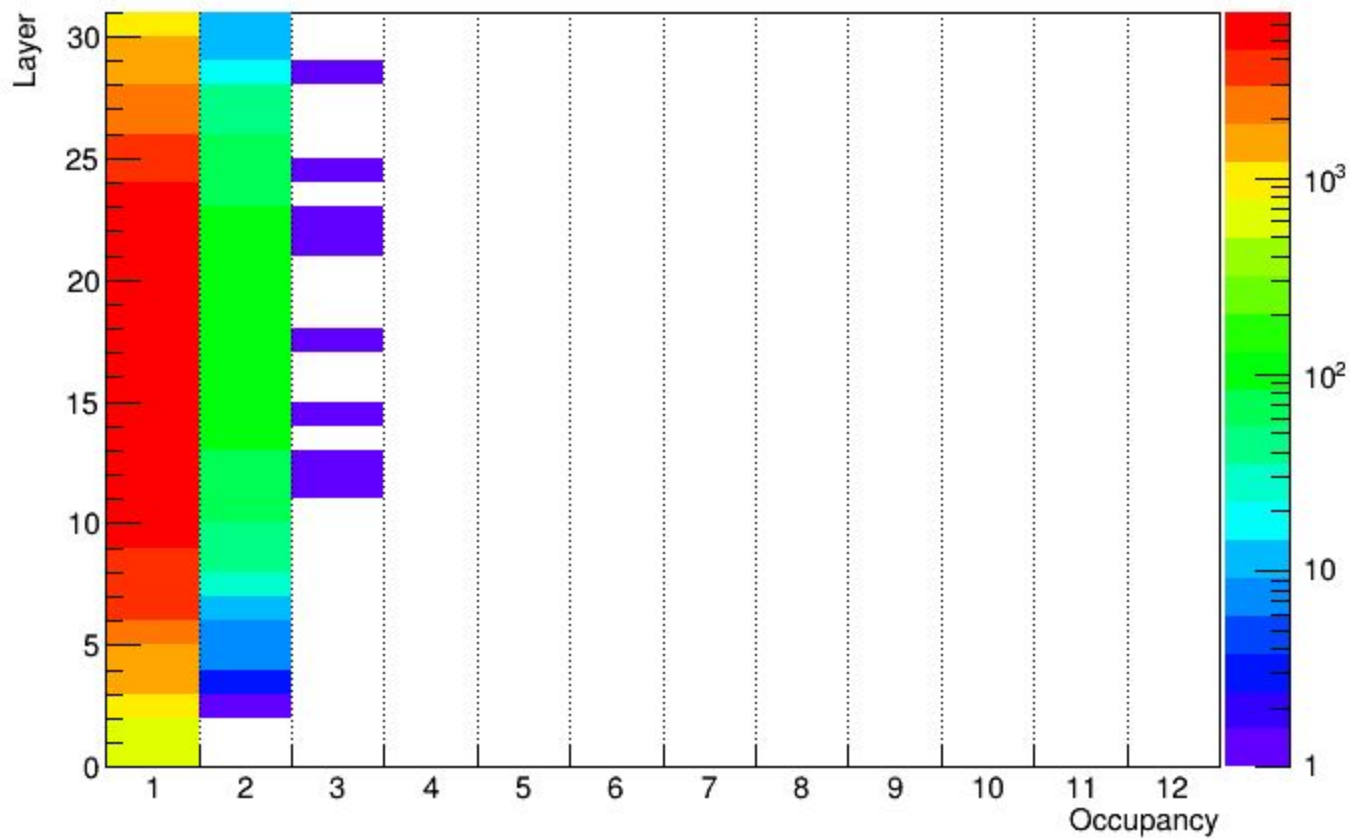
Low_Cross_Section Per Layer Occupancy



Gamma_Gamma->Hadron Per Layer Occupancy

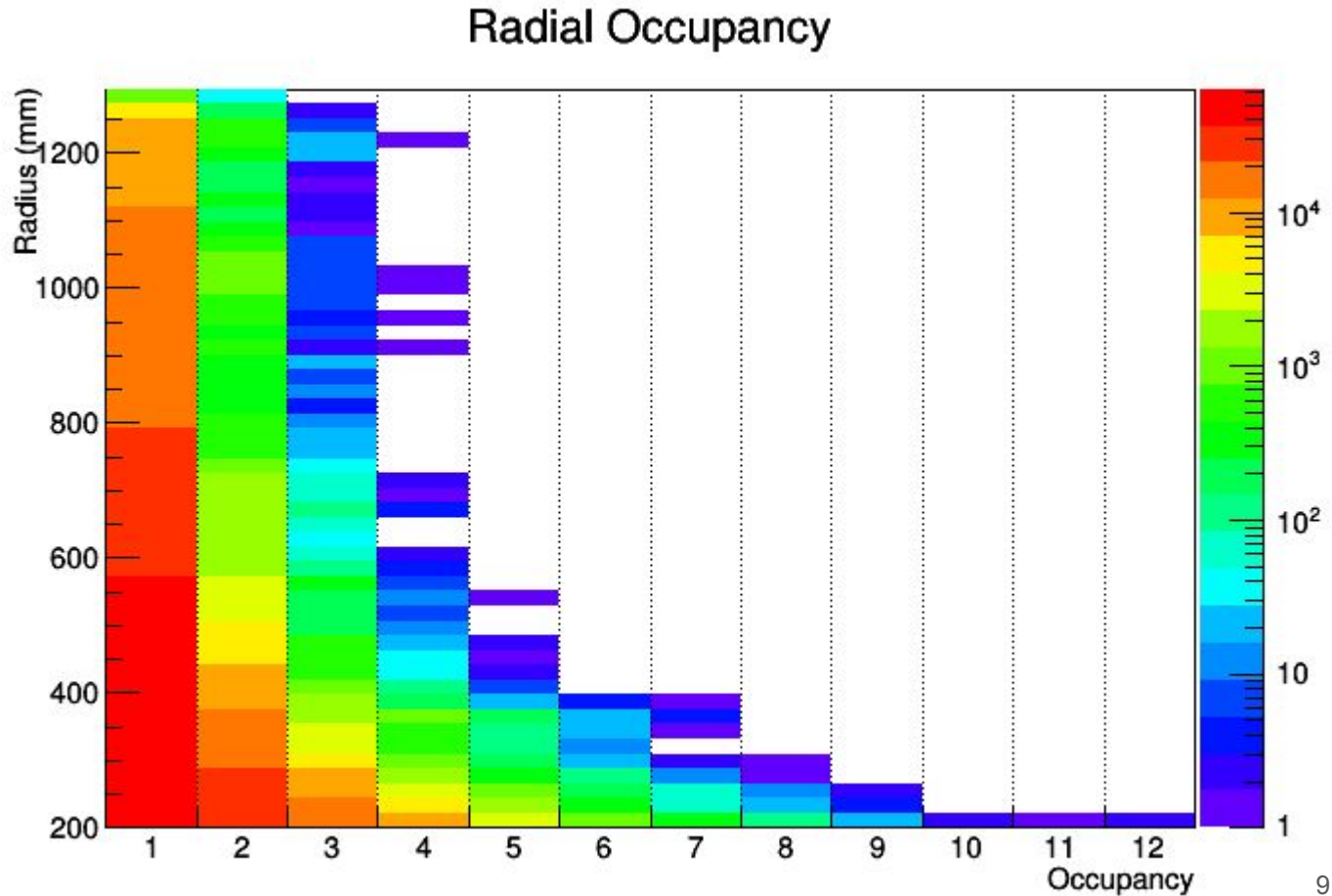


BhaBha Per Layer Occupancy

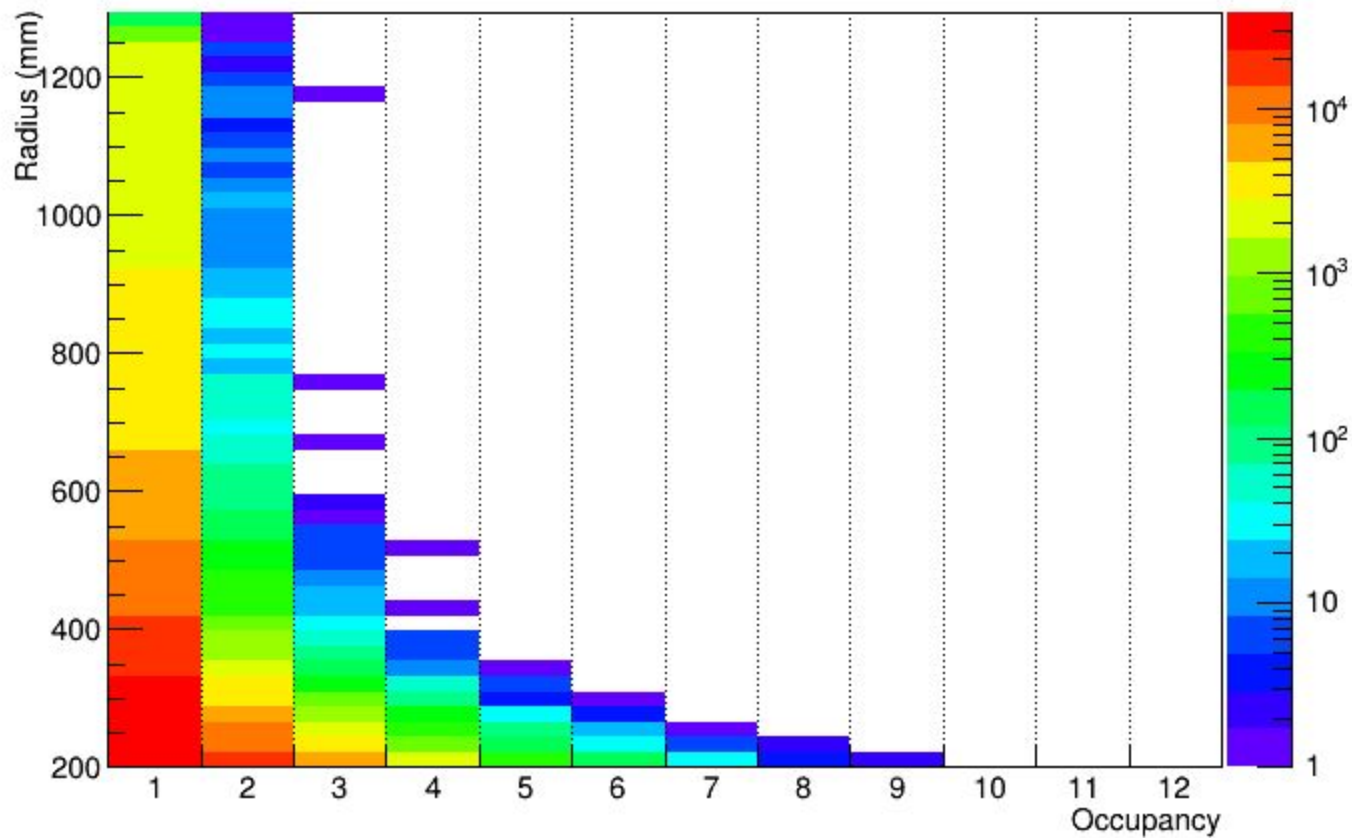


Raw Radial Occupancy:

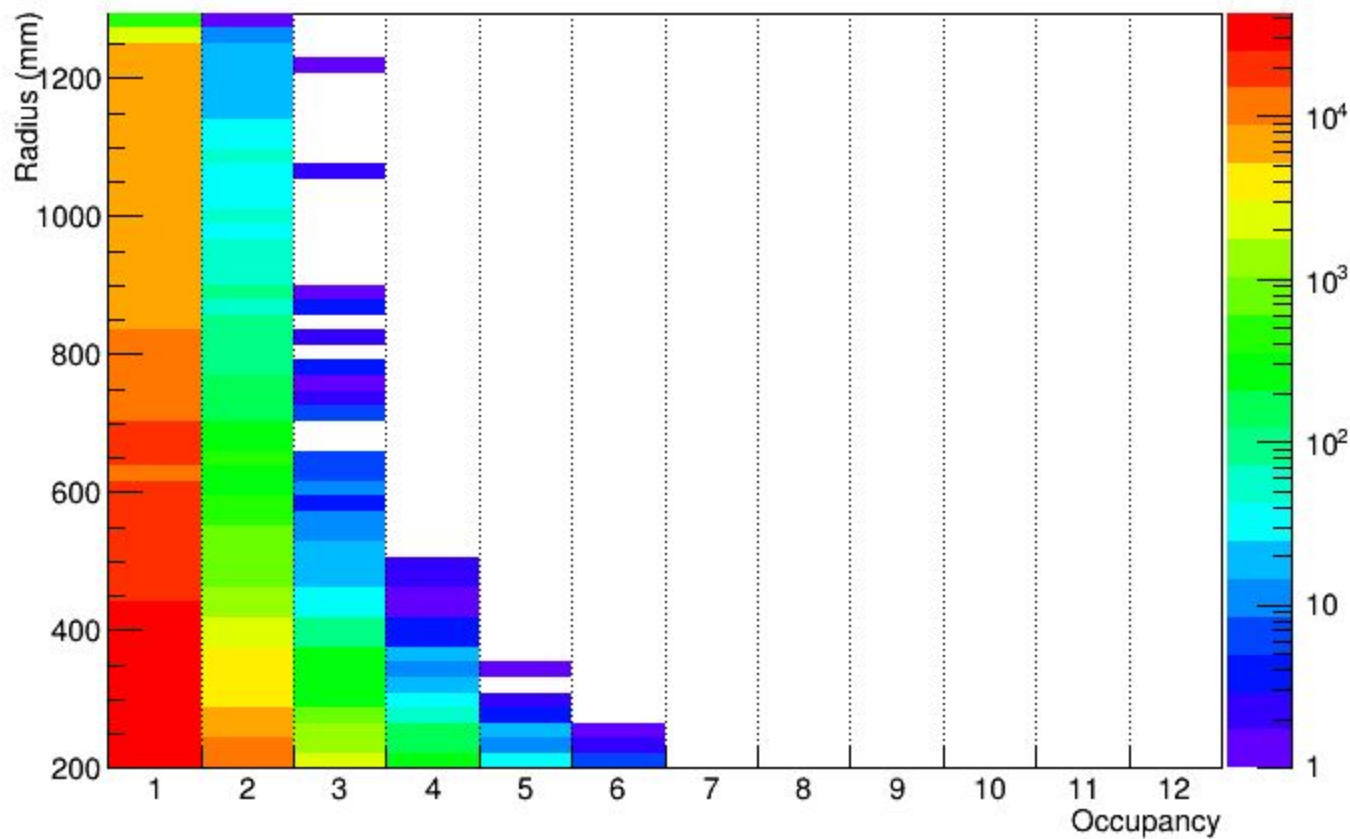
As before, but with number of channels also now given as a function of radius (channel frequency given by color)



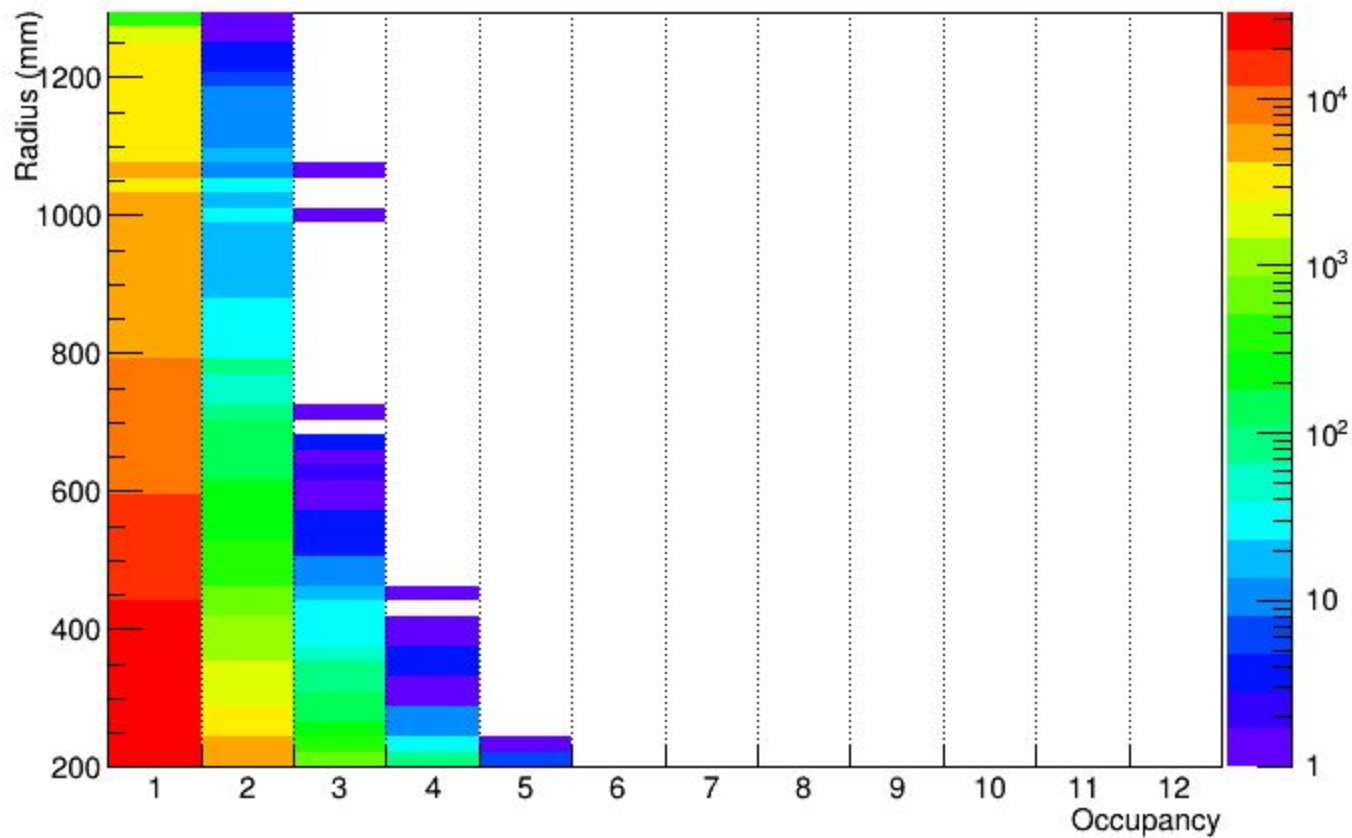
PairBackgrounds Radial Occupancy



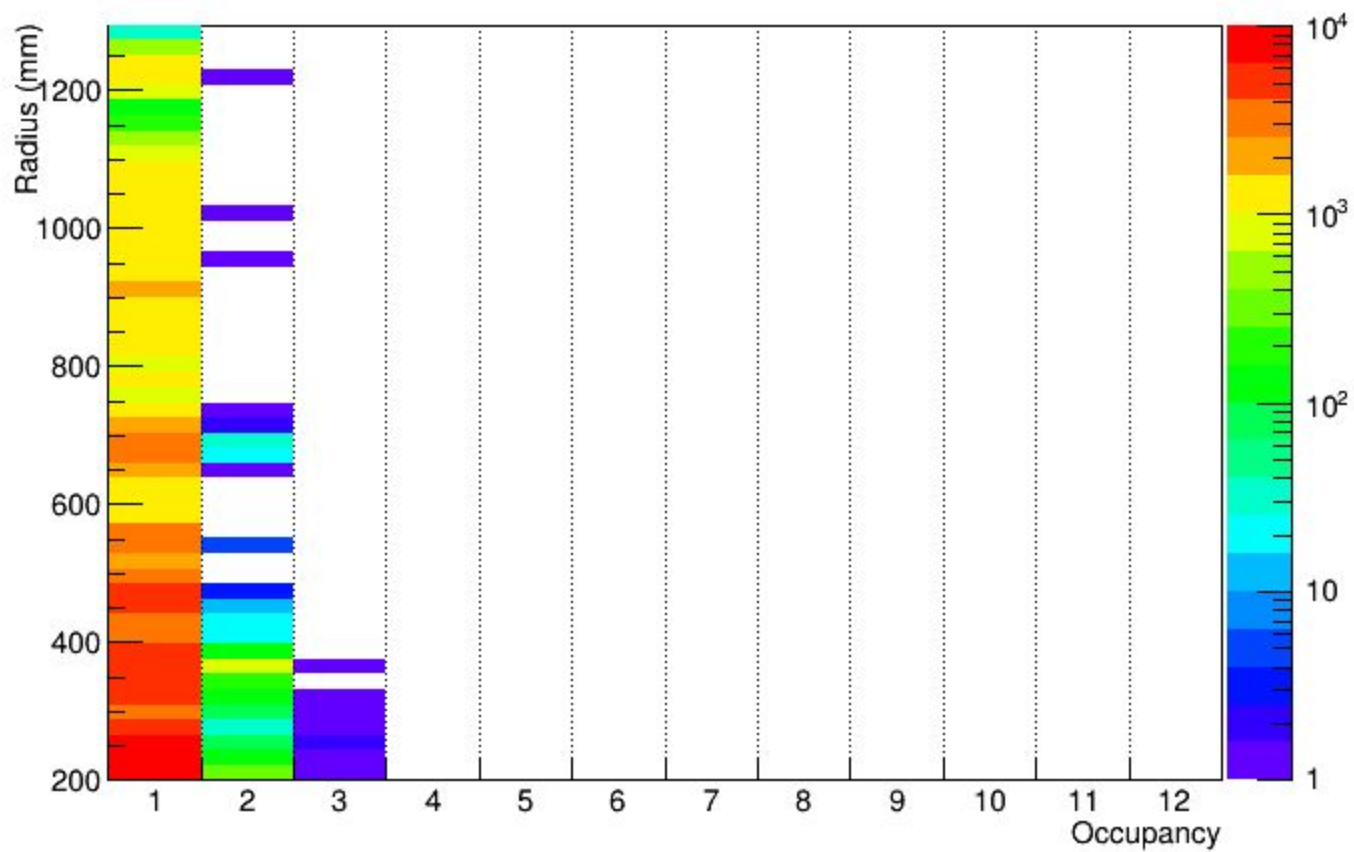
Low_Cross_Section Radial Occupancy



Gamma_Gamma->Hadron Radial Occupancy



BhaBha Radial Occupancy



Weighted Integrated Occupancy:

The i^{th} bin contains the number of *hits* that are lost with a given buffer depth. Specifically,

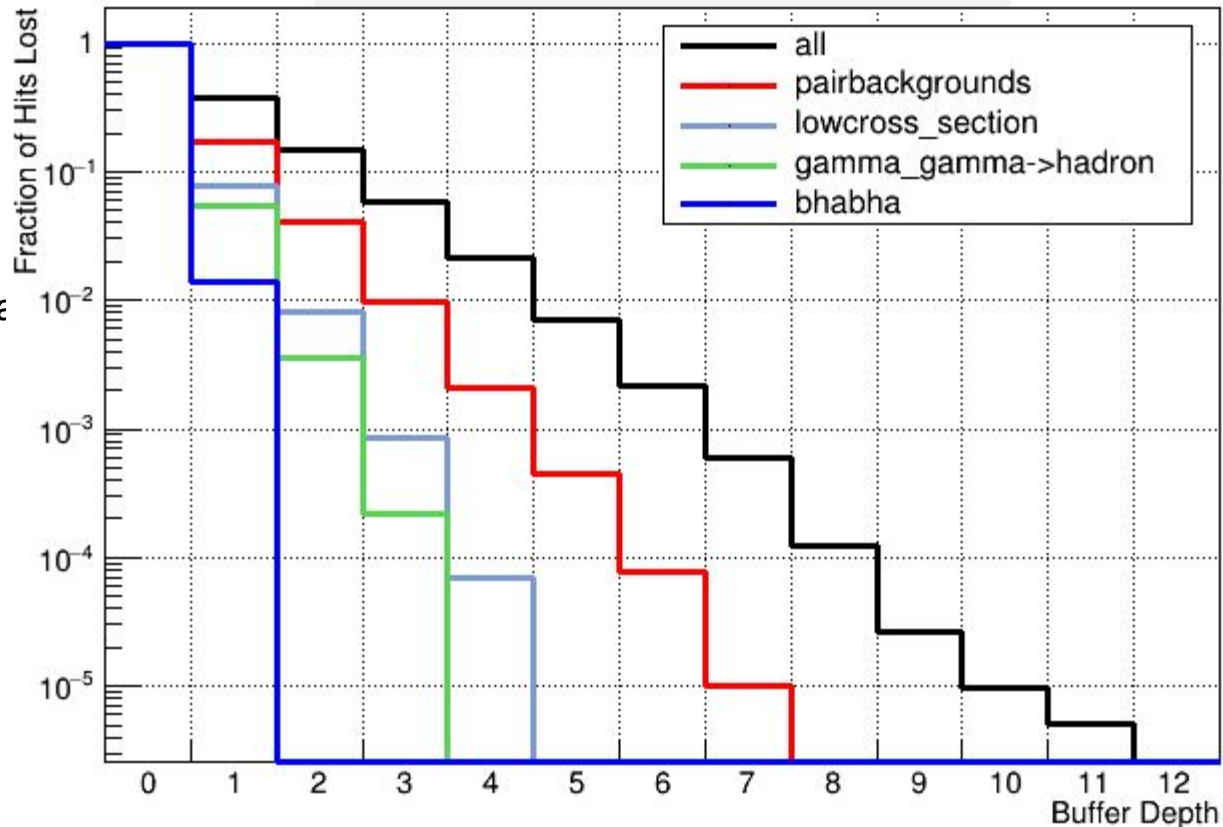
$$\text{Bin}_{i-1} = \sum_{j=i}^{12} [(\text{frequency}_i) * (j-i+1)] / \text{totalHits}$$

where frequency is the number of times a channel received i number of hits.

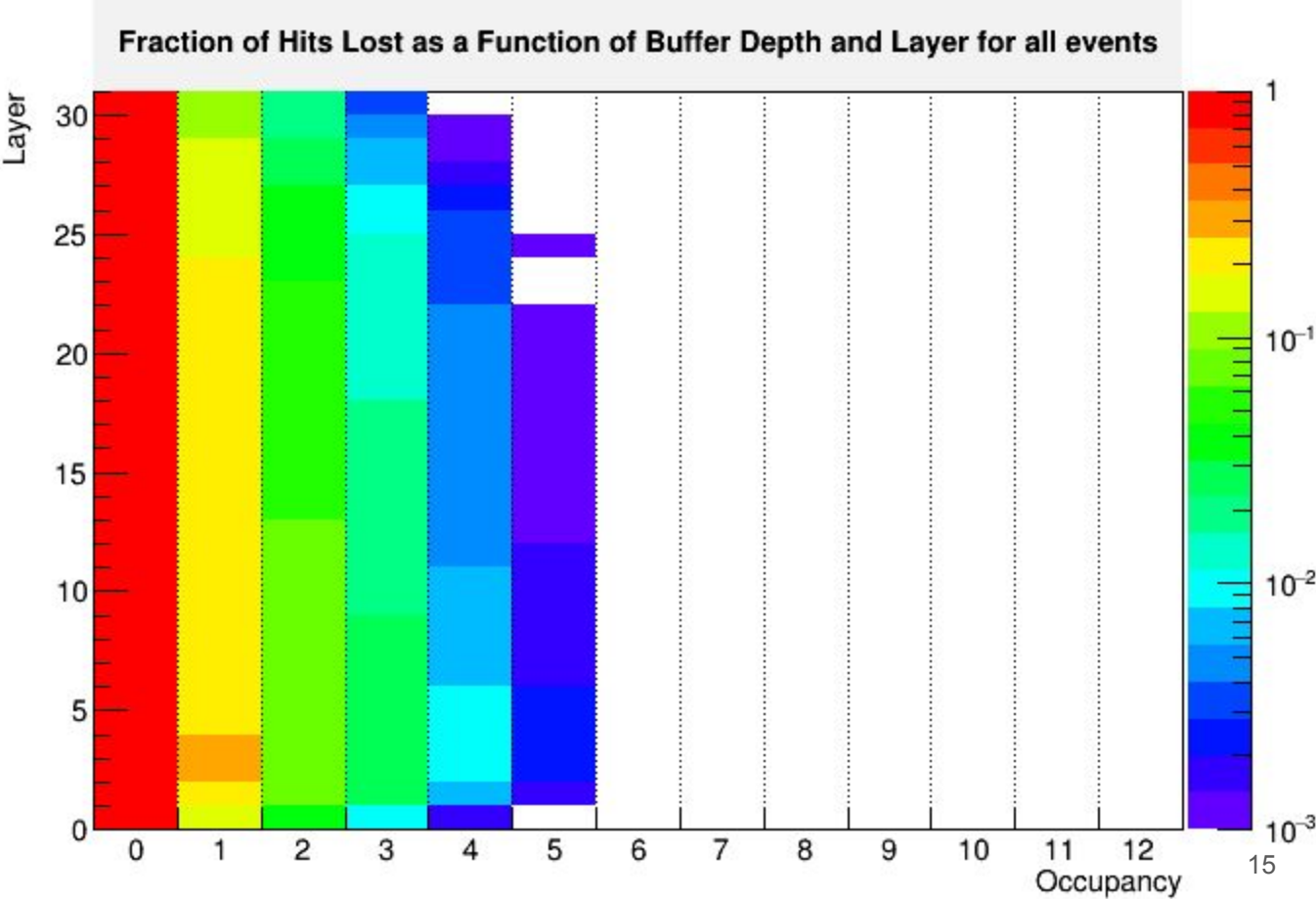
So $(\text{frequency}_i * i)$ equals the number of times the channel was hit.

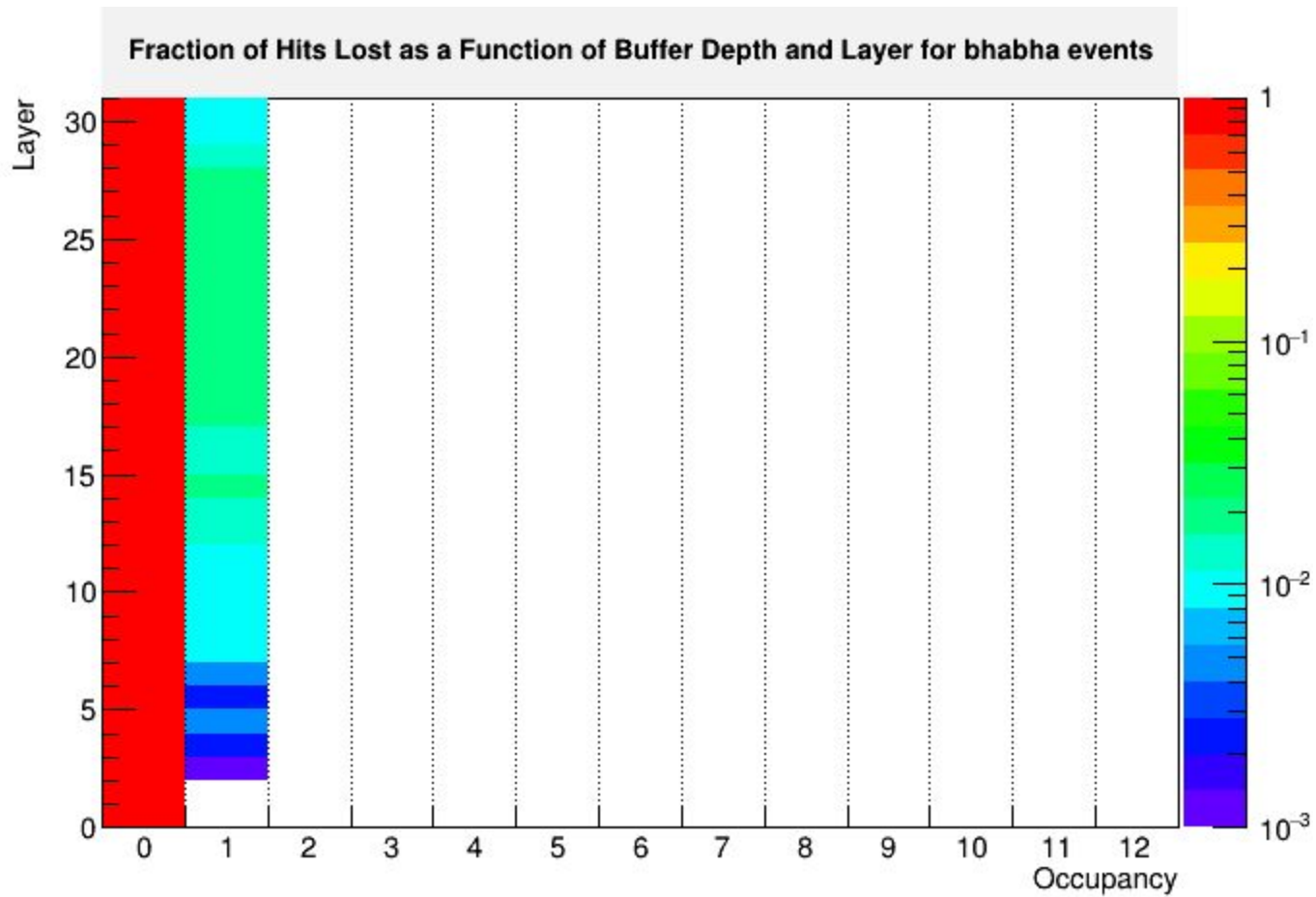
note: The individual event types do NOT add linearly.

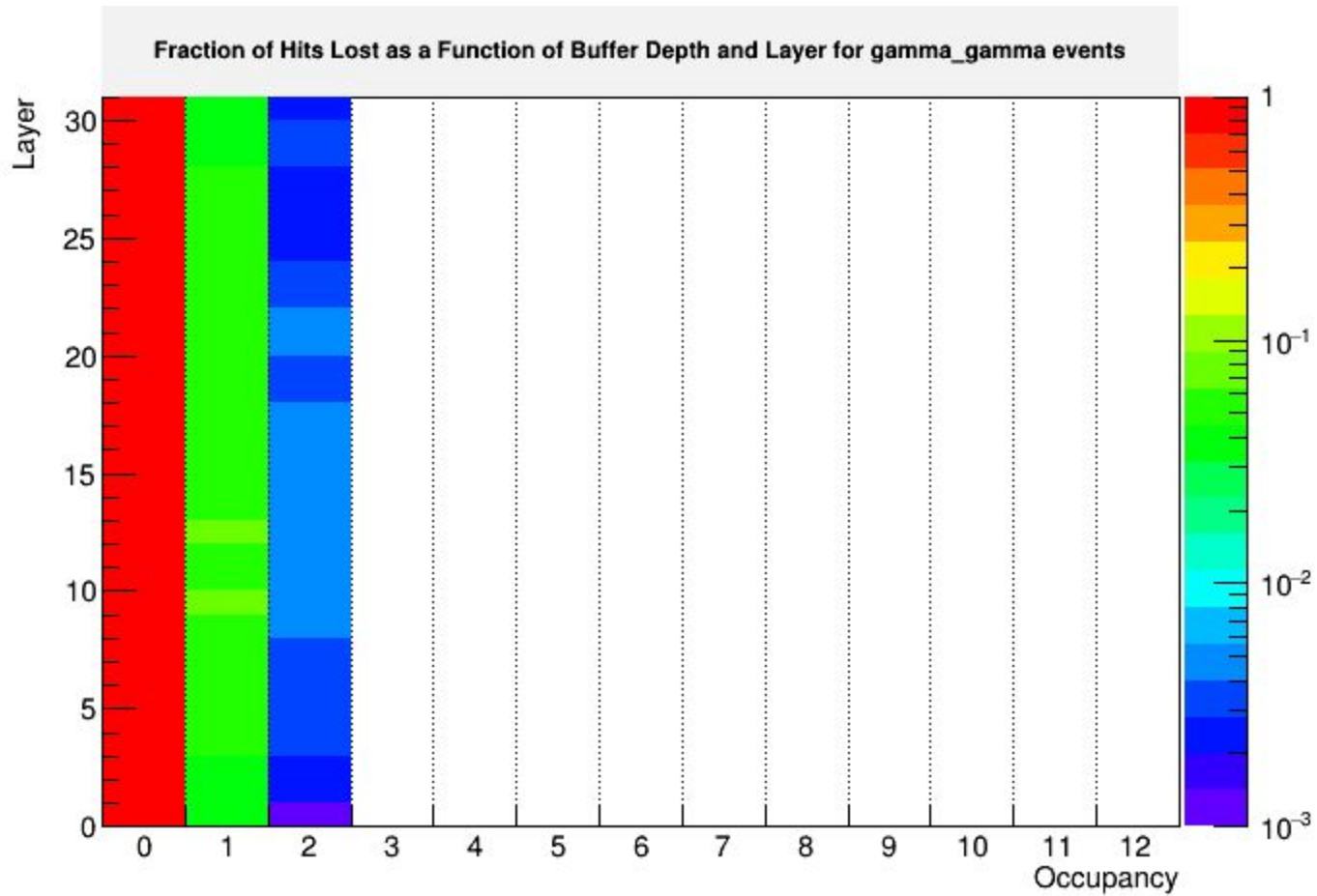
Fraction of Hits Lost as a Function of Buffer Depth

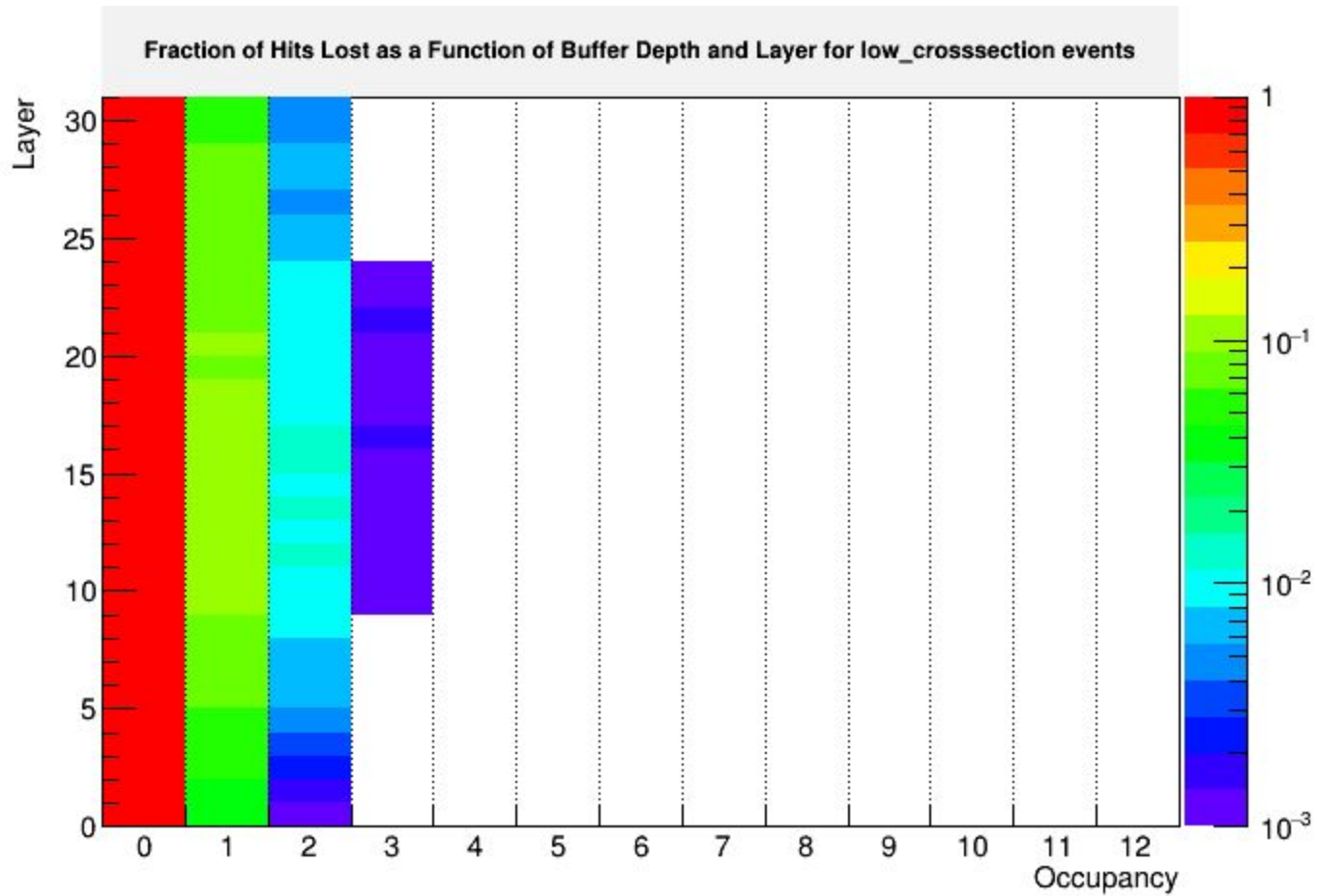


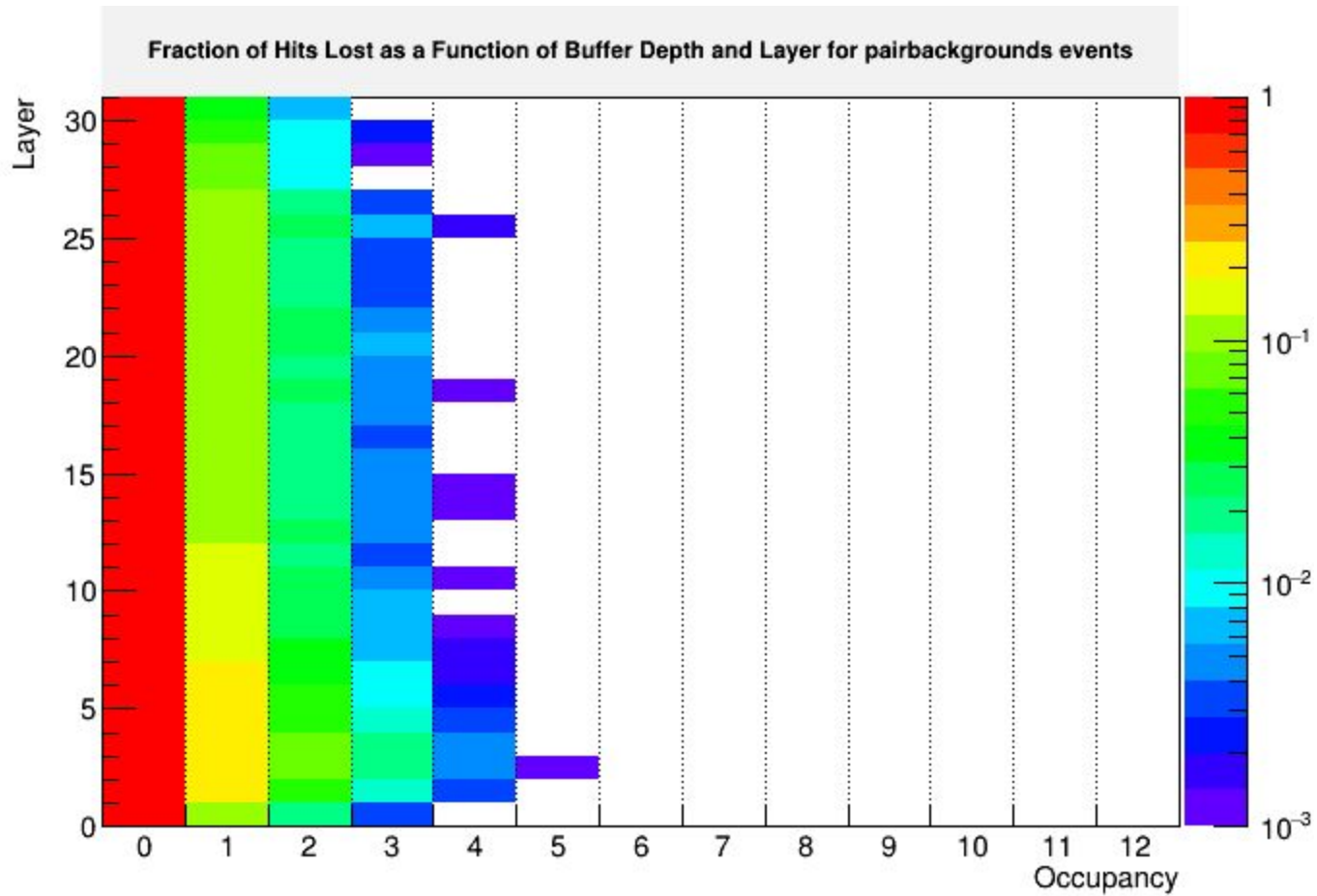
Layer Buffer Depth: As before, but with number of channels also now given as a function of layer (channel frequency given by color)



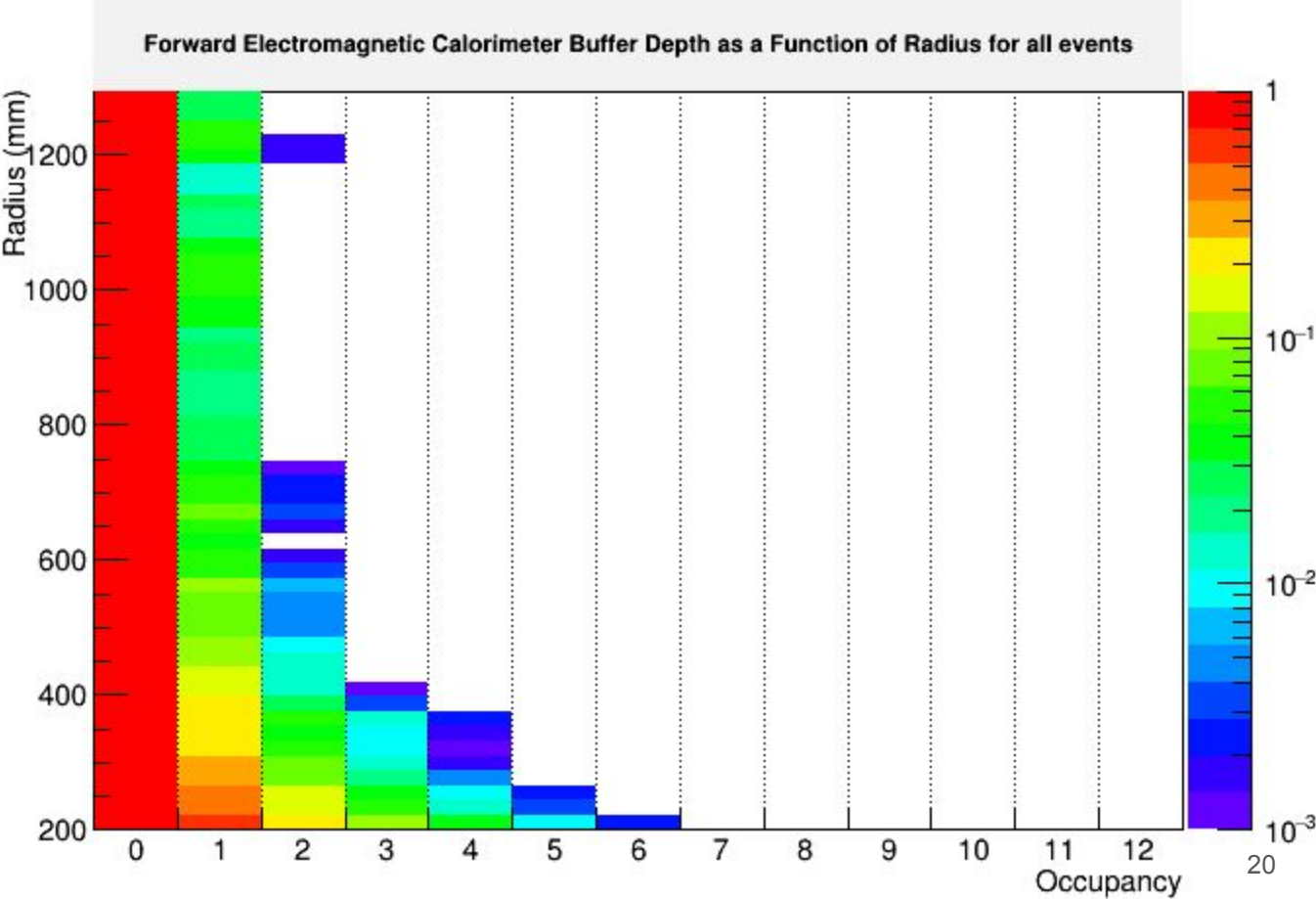




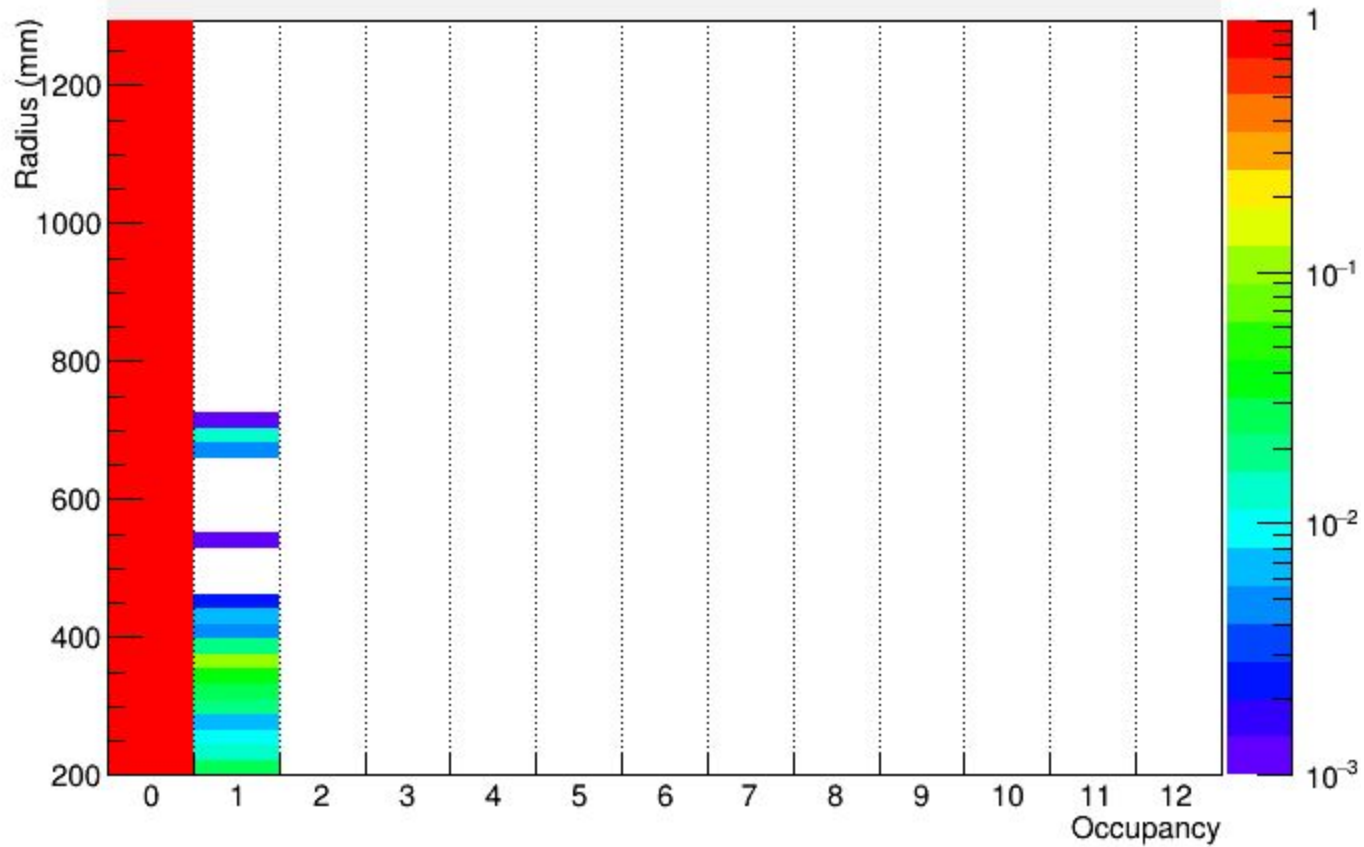




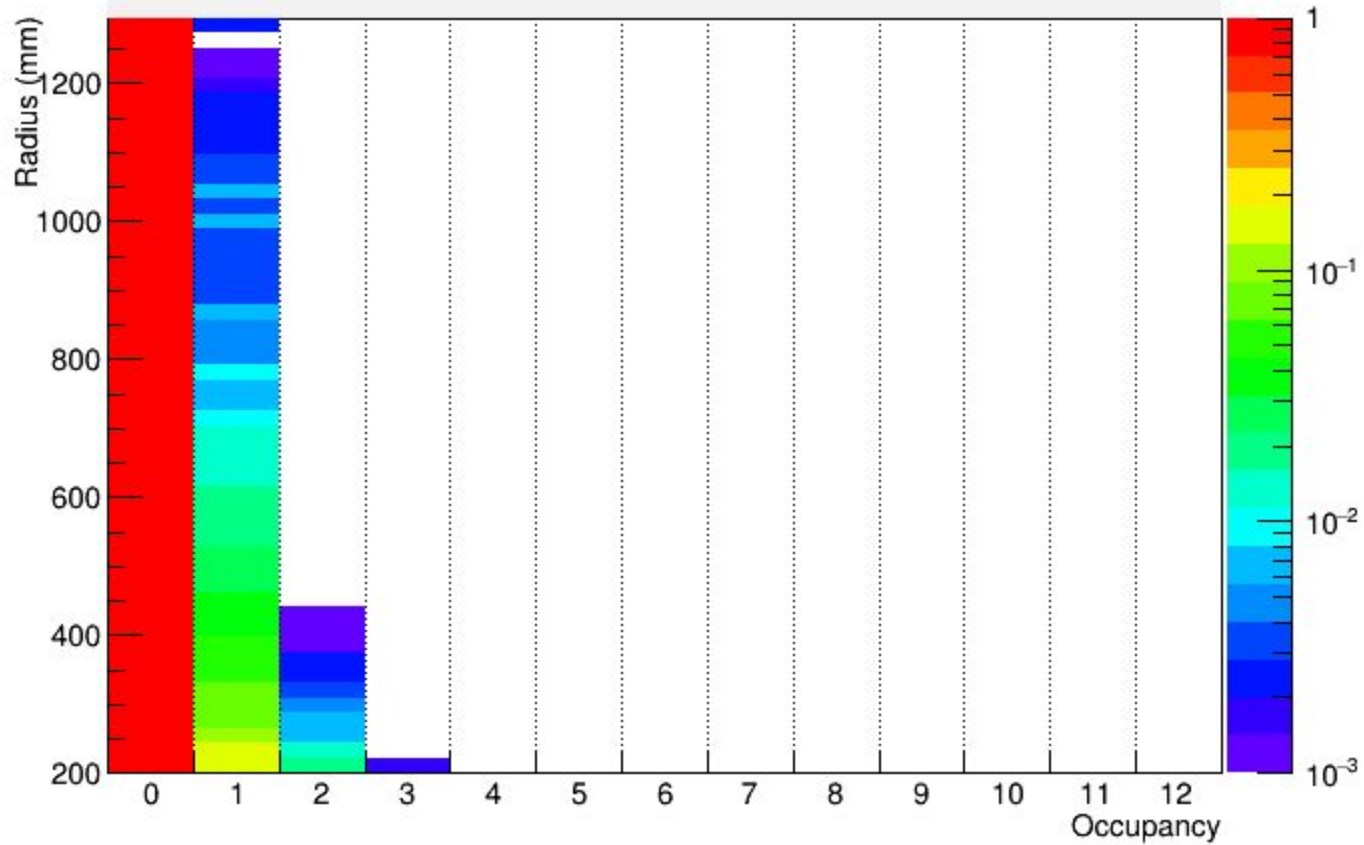
Radial Buffer Depth: As before, but with number of channels also now given as a function of layer (channel frequency given by color)



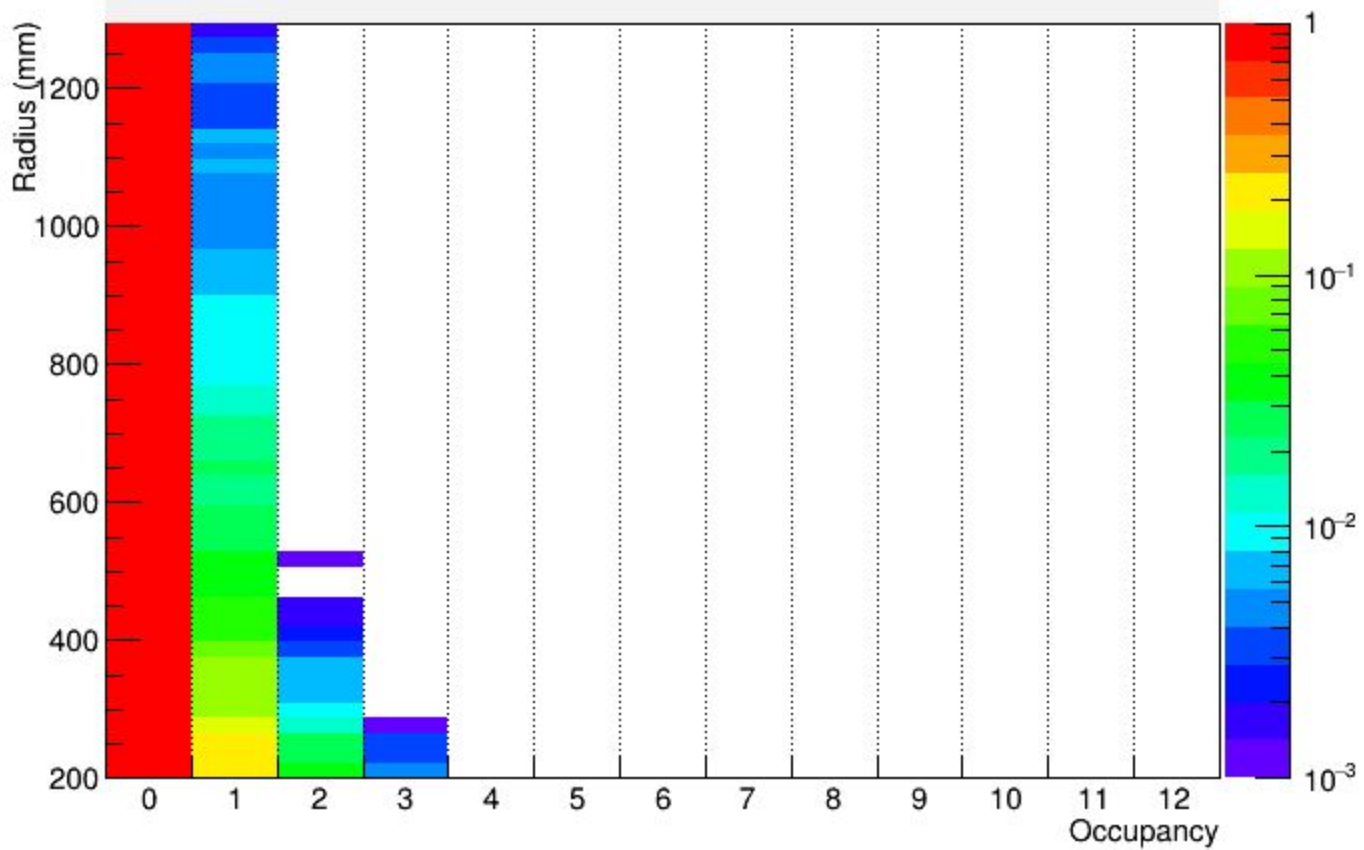
Forward Electromagnetic Calorimeter Buffer Depth as a Function of Radius for bhabha events



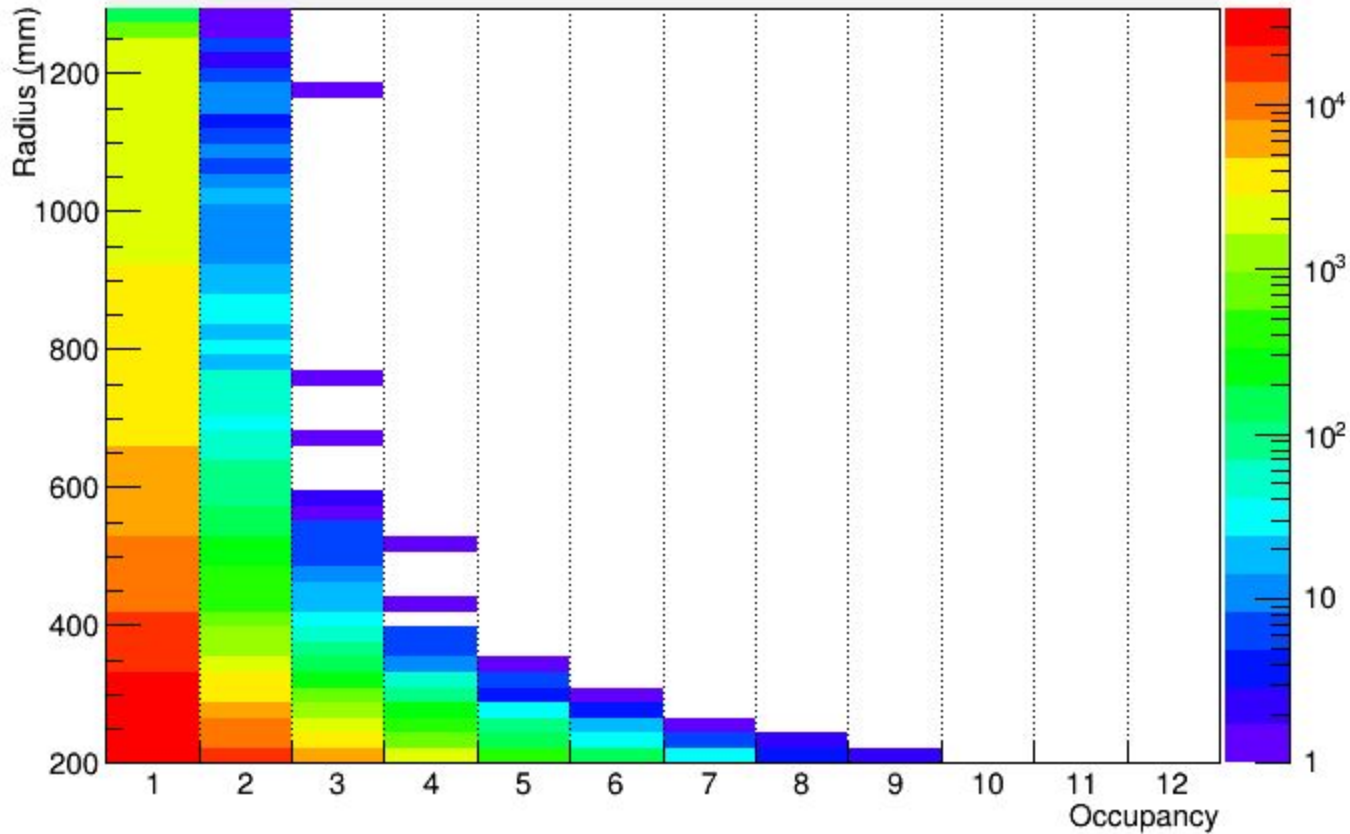
Forward Electromagnetic Calorimeter Buffer Depth as a Function of Radius for gamma_gamma events



Forward Electromagnetic Calorimeter Buffer Depth as a Function of Radius for low_crosssection events



Forward Electromagnetic Calorimeter Occupancy as a Function of Radius for pairbackgrounds events



Energy Deposited in Ecal by Two Photon Events by Layer

