Fractal dimension of pi+/e+ clusters

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Cuts

- In beem: Number of used SCA (all chips) per spill >200 (max 240)

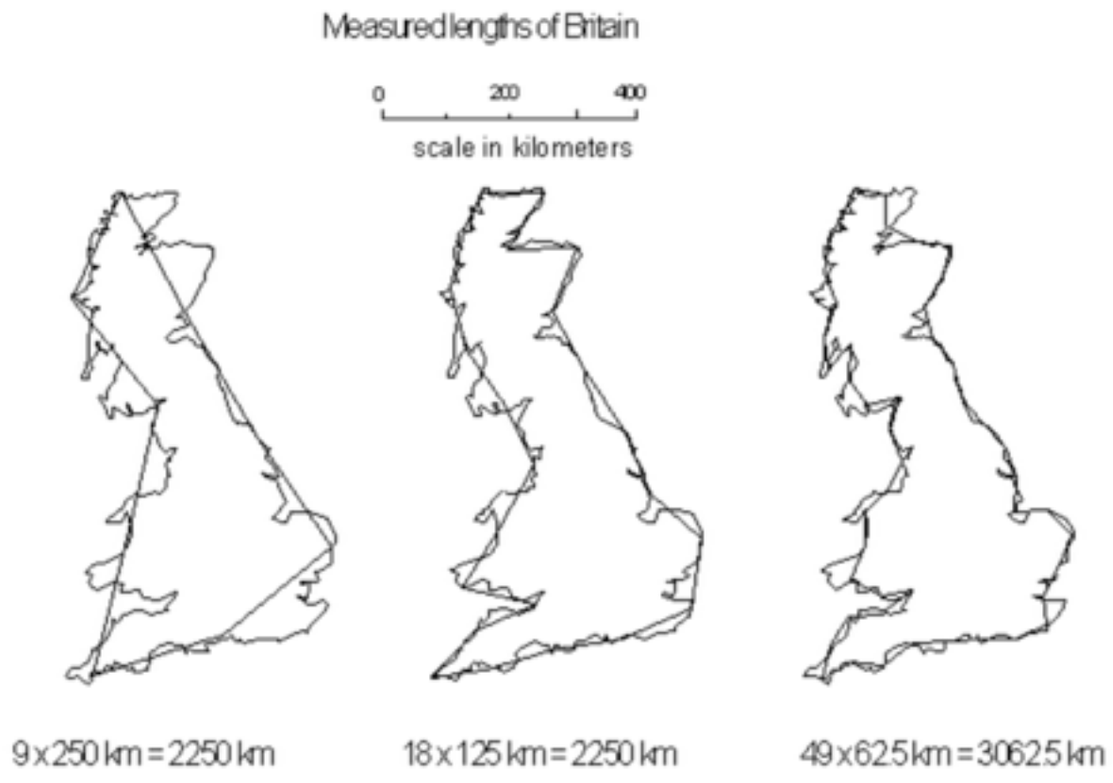
- Correctly operational central chips 3,5,10,12: number of SCA>0 and <16 for each chip

- bx.cor correction, because bx.cor is not correlated between chips

Fractal dimension of pi+/e+ clusters

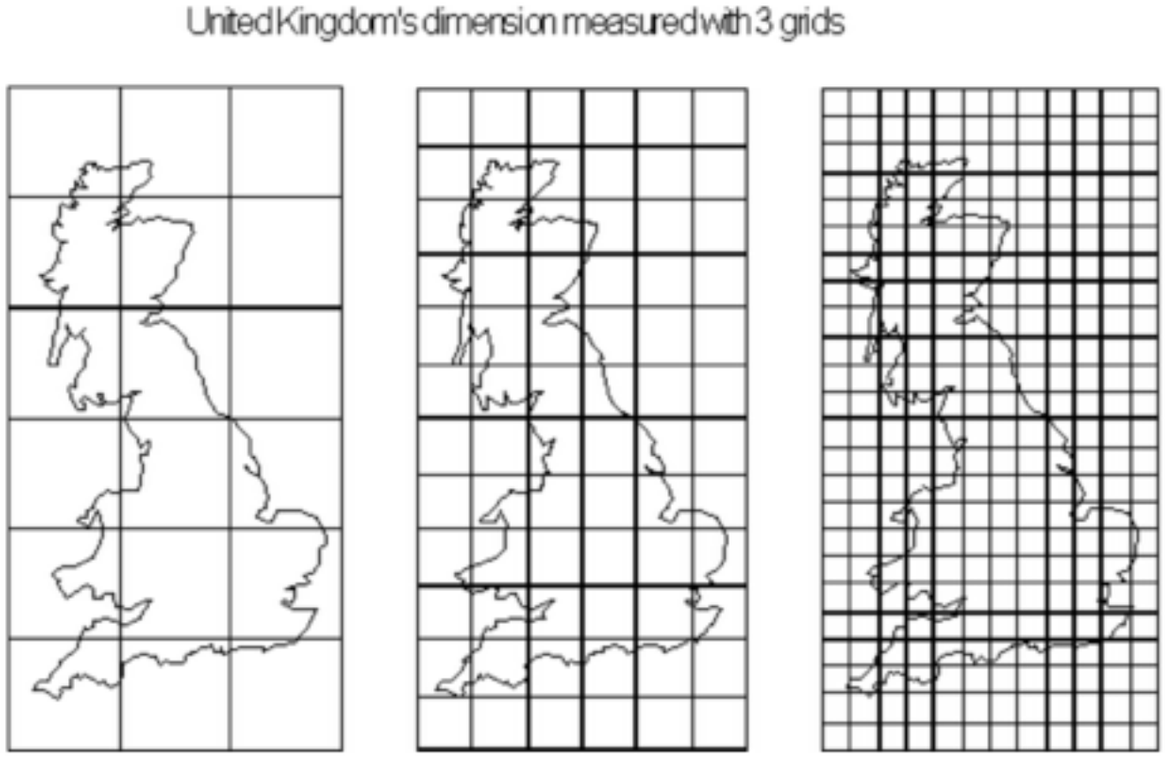
History and theory:

#lines with GB coastline



Difficult to apply for cluster dimension calculation, typical cluster has main core and some separated regions

#cells with GB coastline:



$$D_{box} = \frac{\log n(a) - \log n(b)}{\log(1/s_a) - \log(1/s_b)}$$

Possible to apply for cluster dimension calculation

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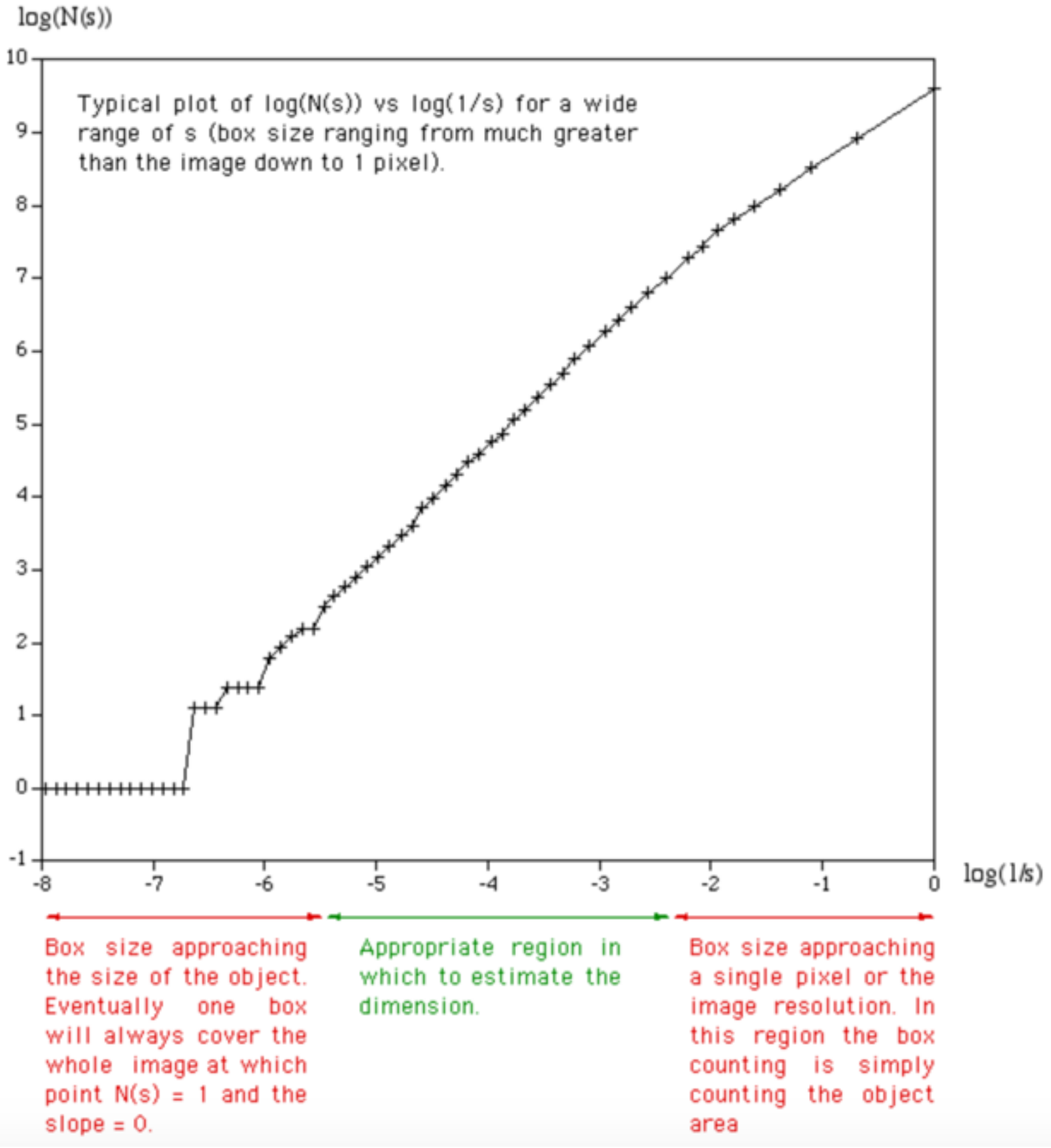
History and theory:

Box size range

The default range of box sizes is usually optimal but not always so. They should only be changed when you have some experience and understanding of the processes involved. The following graph is the result of performing the box counting where the box size ranged from being 5 times the width (or height) of the image to 1 pixel. For successful choice of the box size range it is important to understand the regions of the graph illustrated here.



Fractal dimension of pi+/e+ clusters

- For tests 8.4 X0W detector configuration was chosen

- Trigger threshold 230 ADC

Fractal dimension of pi+/e+ clusters

method

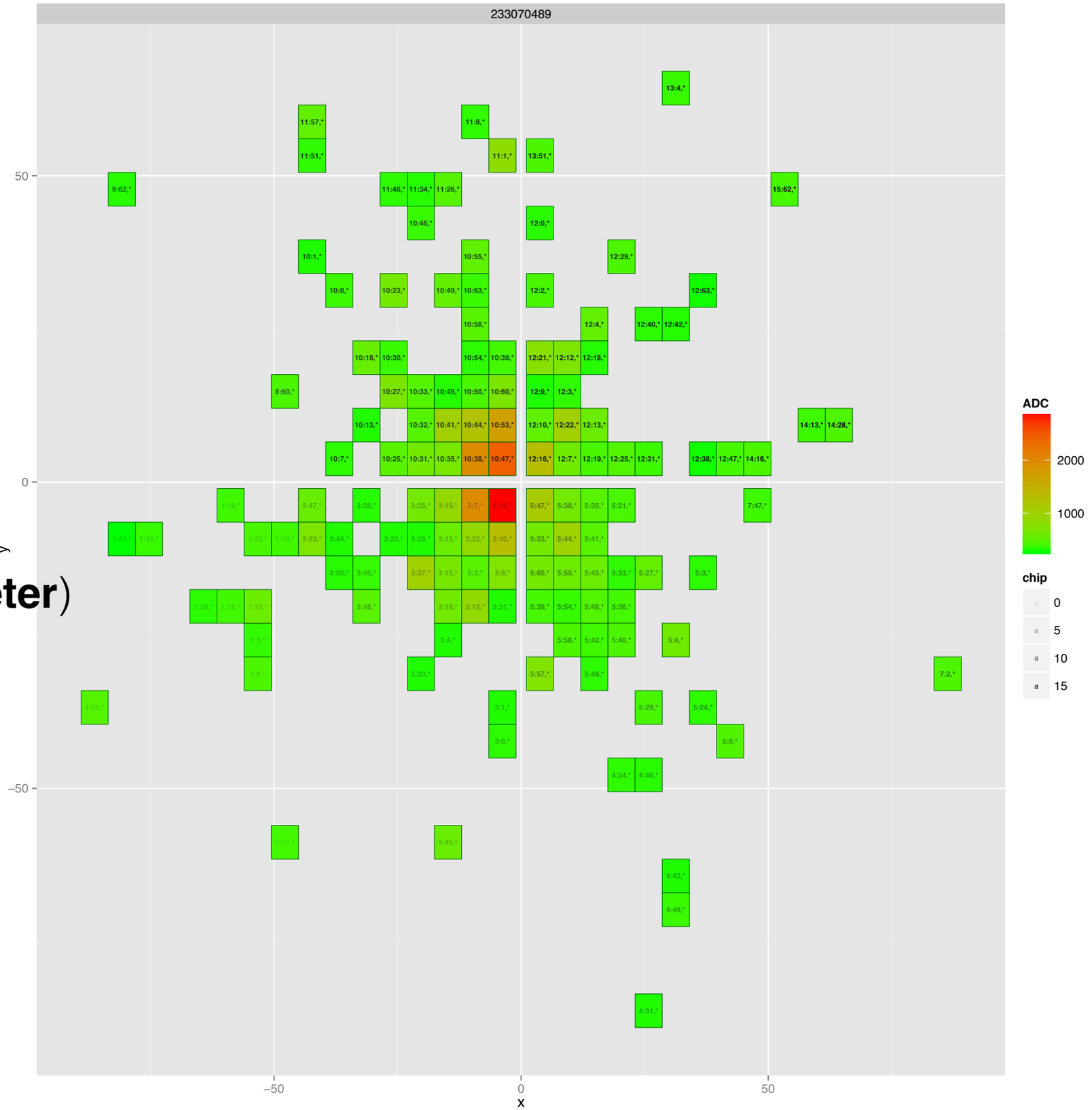
Procedure:

1) no intersensor gap
2) covering of event with few size grids:

*grid_cell=m*prototype_pixel*

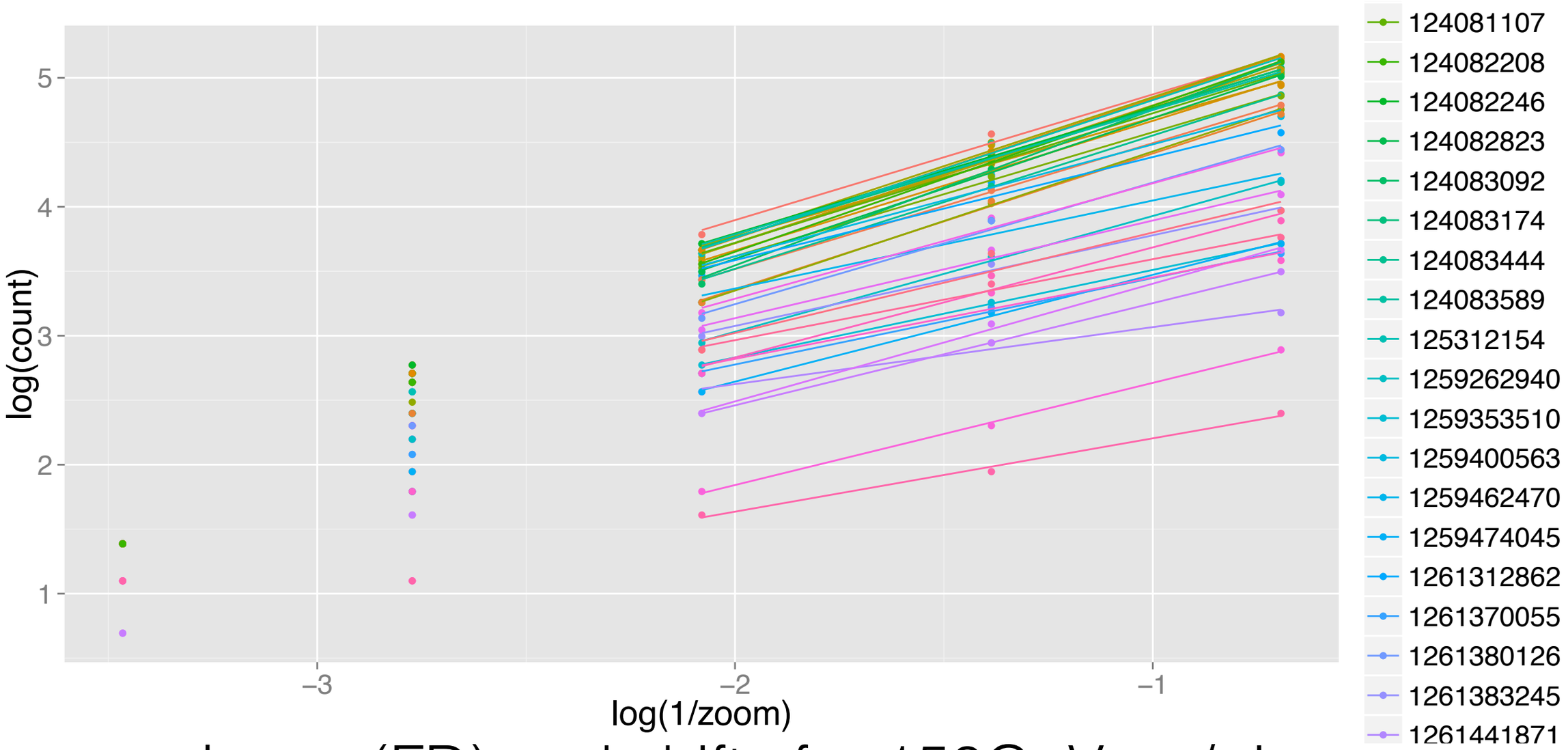
m - integer 1,2,4,8,16

3) counting of #boxes with part of event (**not only perimeter**)
4) prototype_pixel=5.5mm
5) minimal grid_cell=5.5mm
6) maximal grid_cell=88mm entire sensor



Fractal dimension of pi+/e+ clusters

3rd method



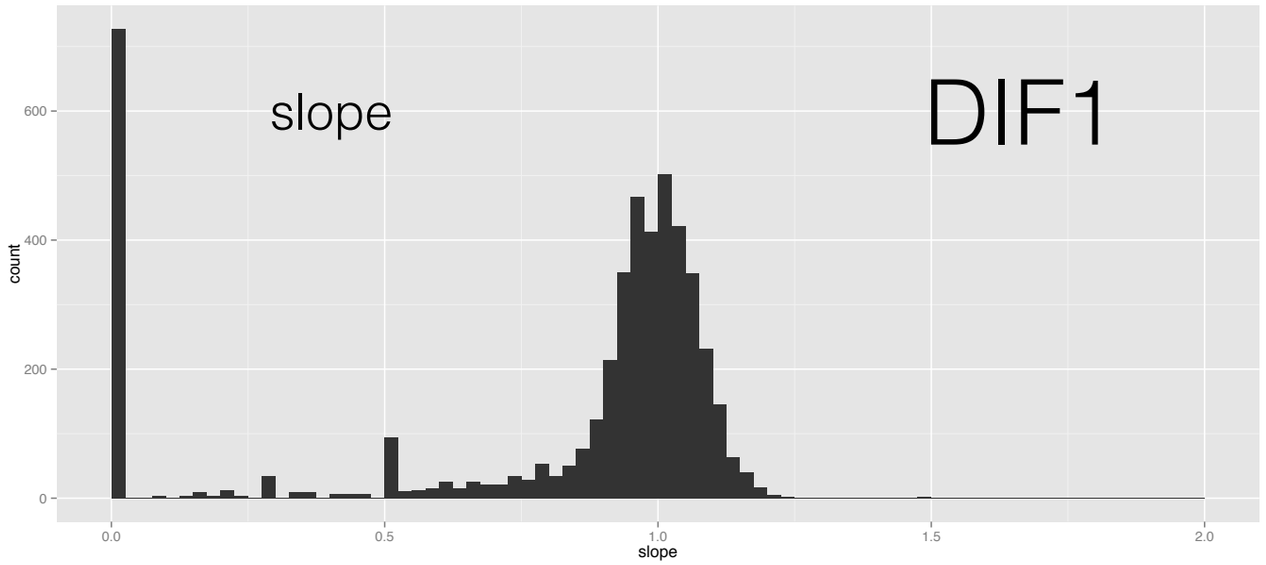
slopes (FD) and shifts for 150GeV e+/pi+

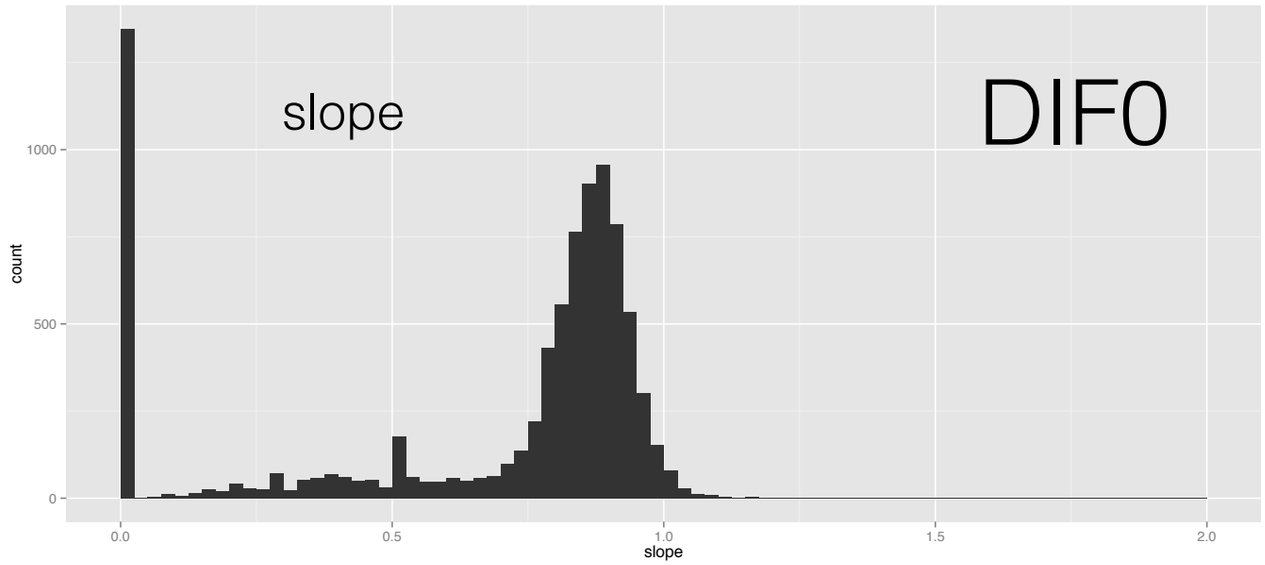
used grids: 1x pixel
2x pixel
4x pixel

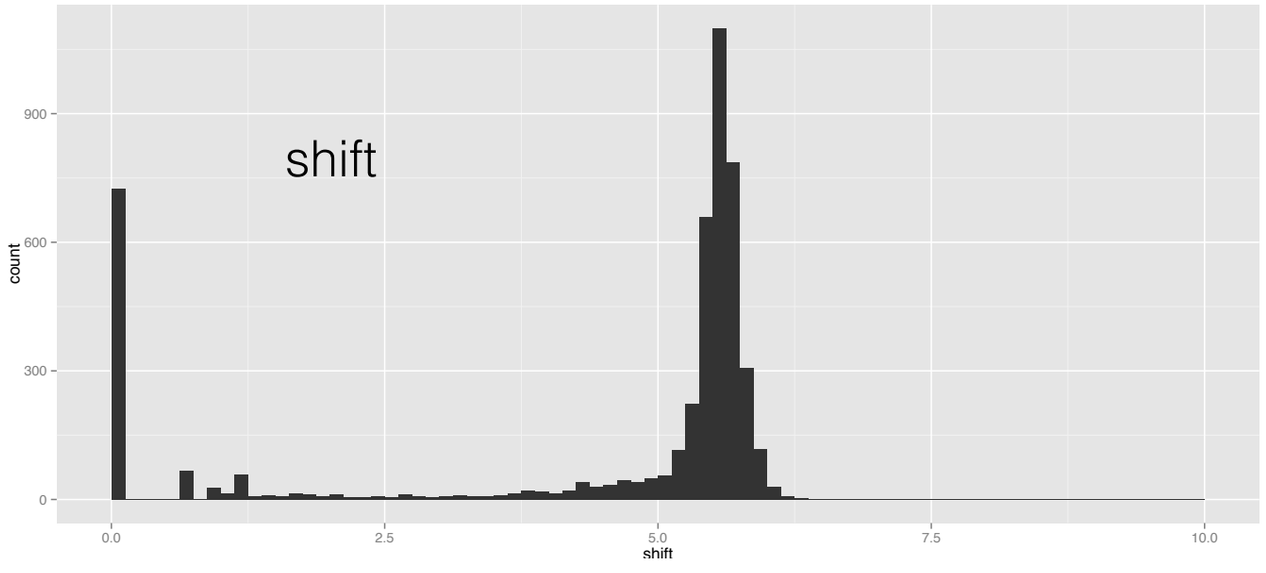
log(1/zoom)> -2.5

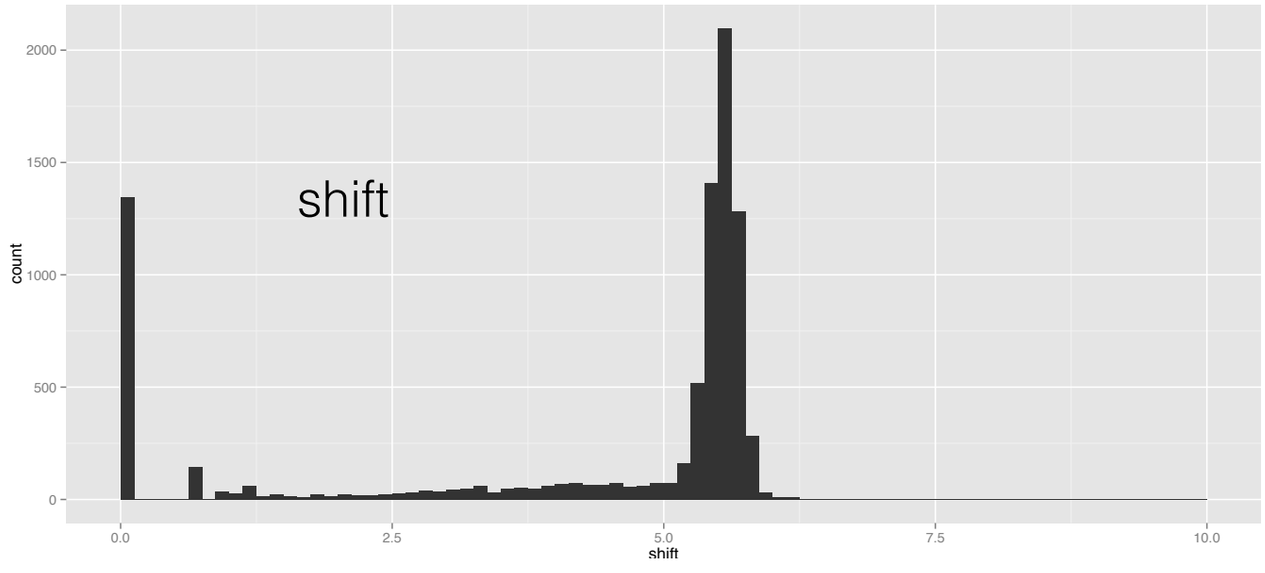
log(1/zoom)< -0.5

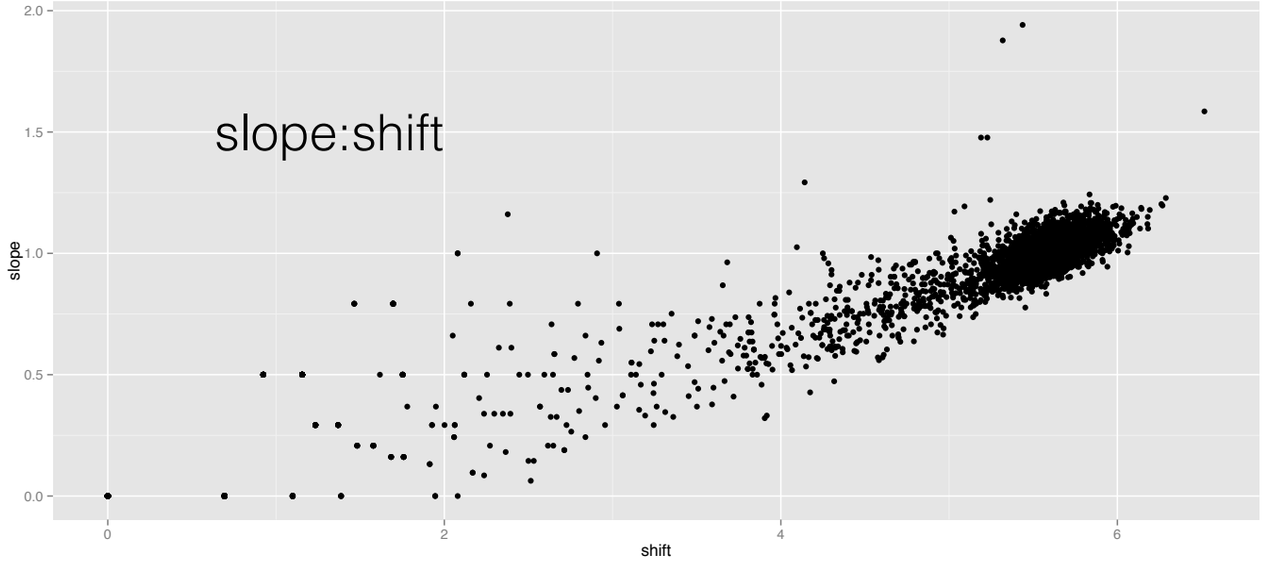
100GeV e+/pi+ run211, full statistics in DIFs

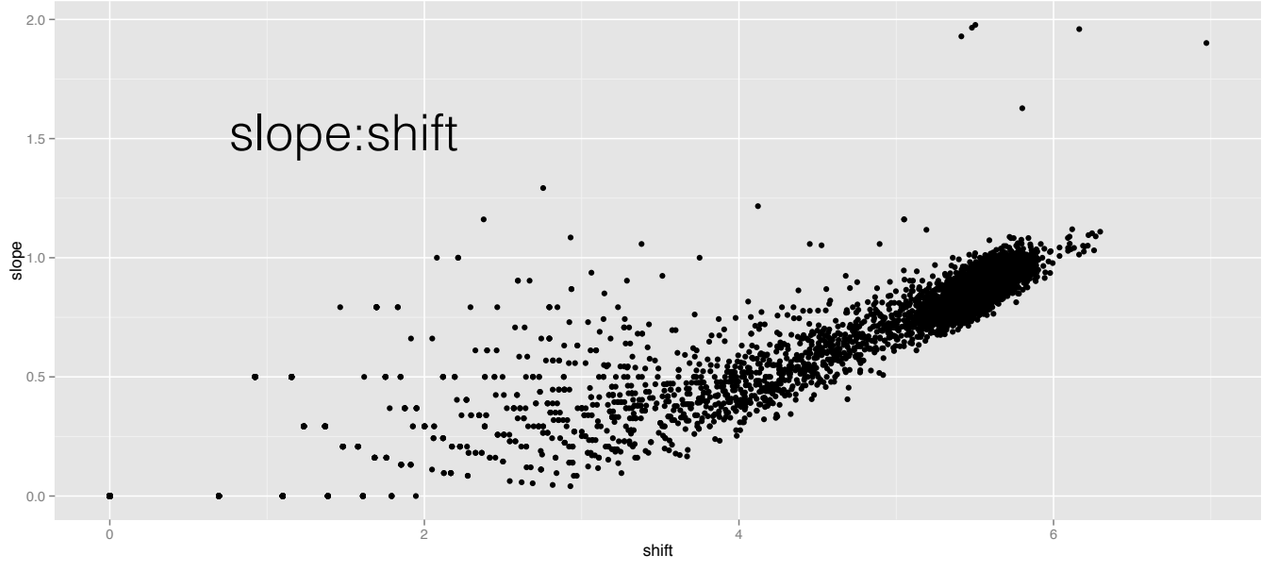




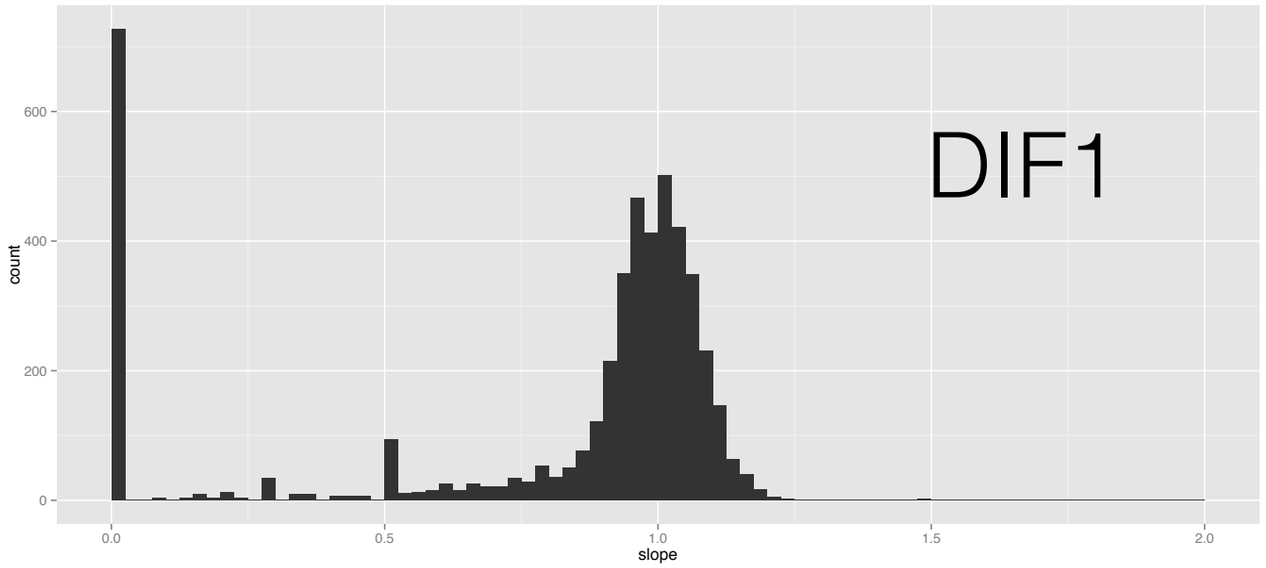


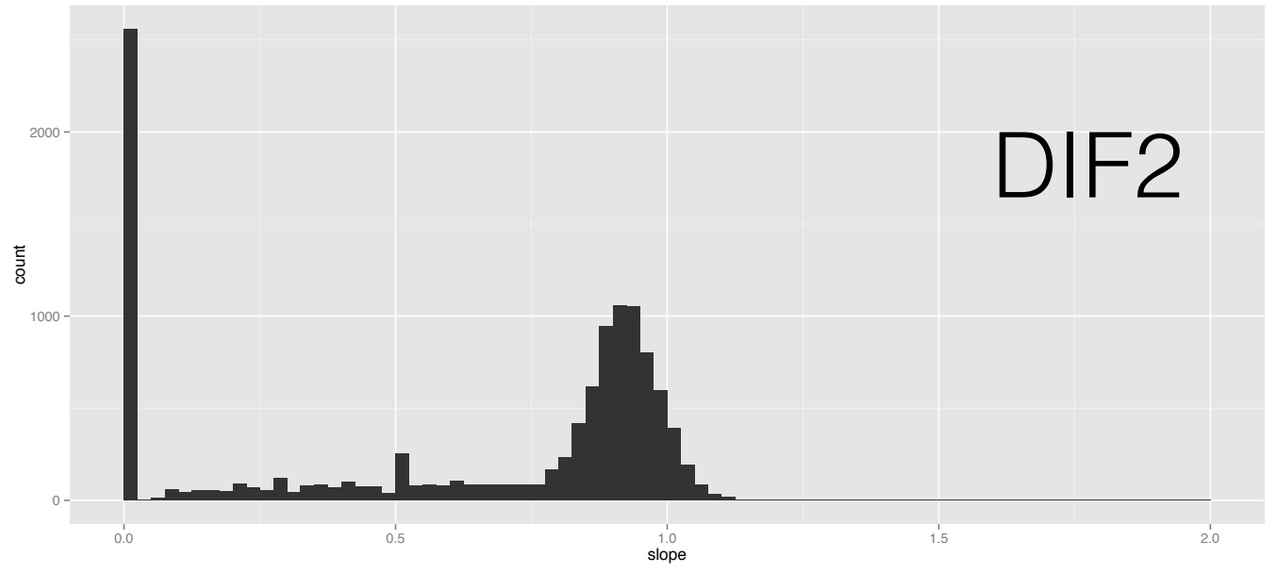


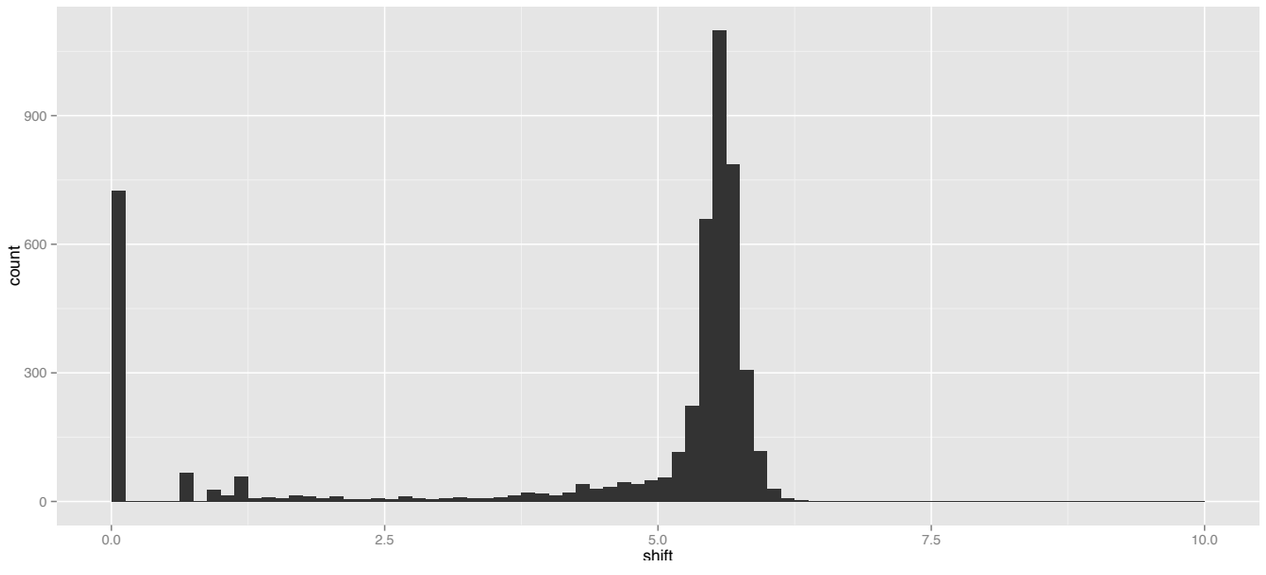


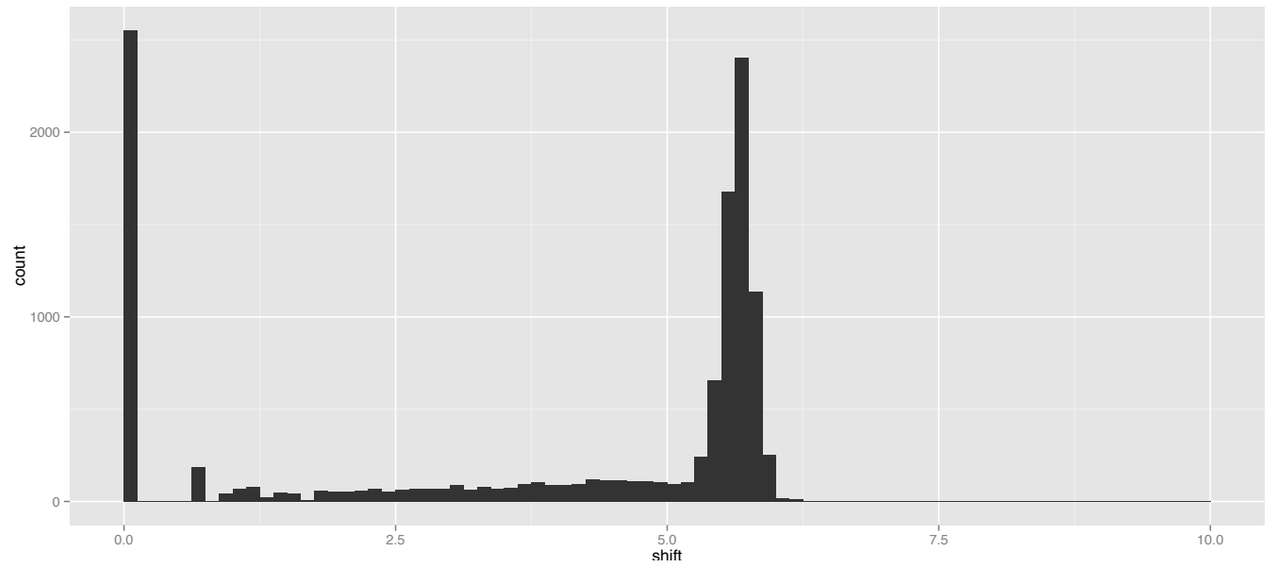


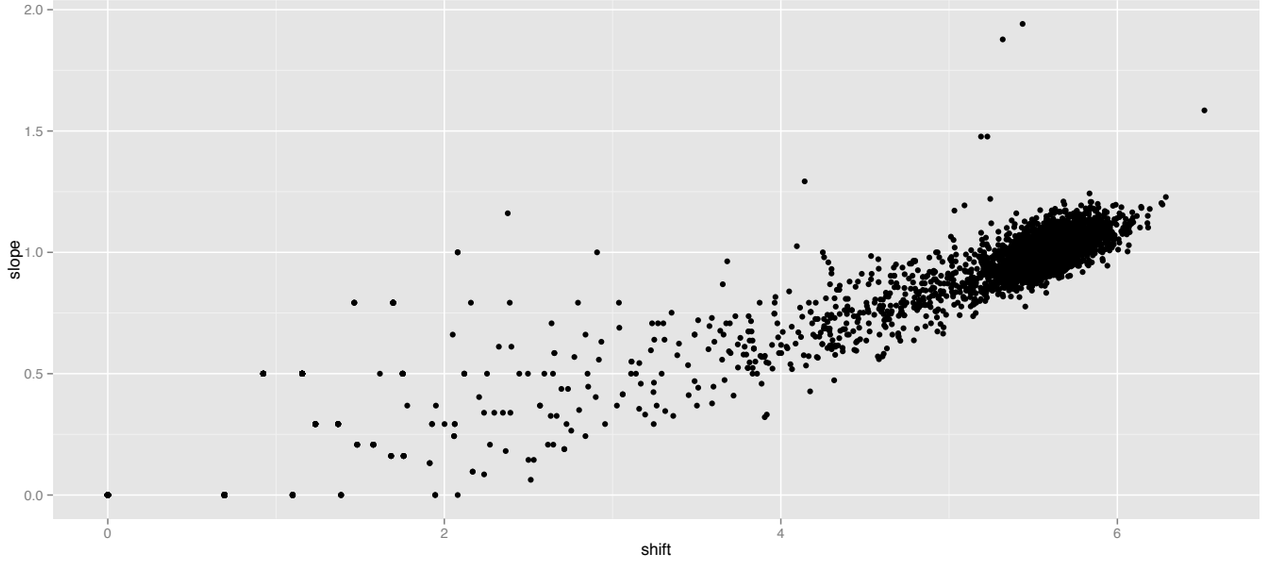
100GeV e+/pi+ run211, full statistics in DIFs

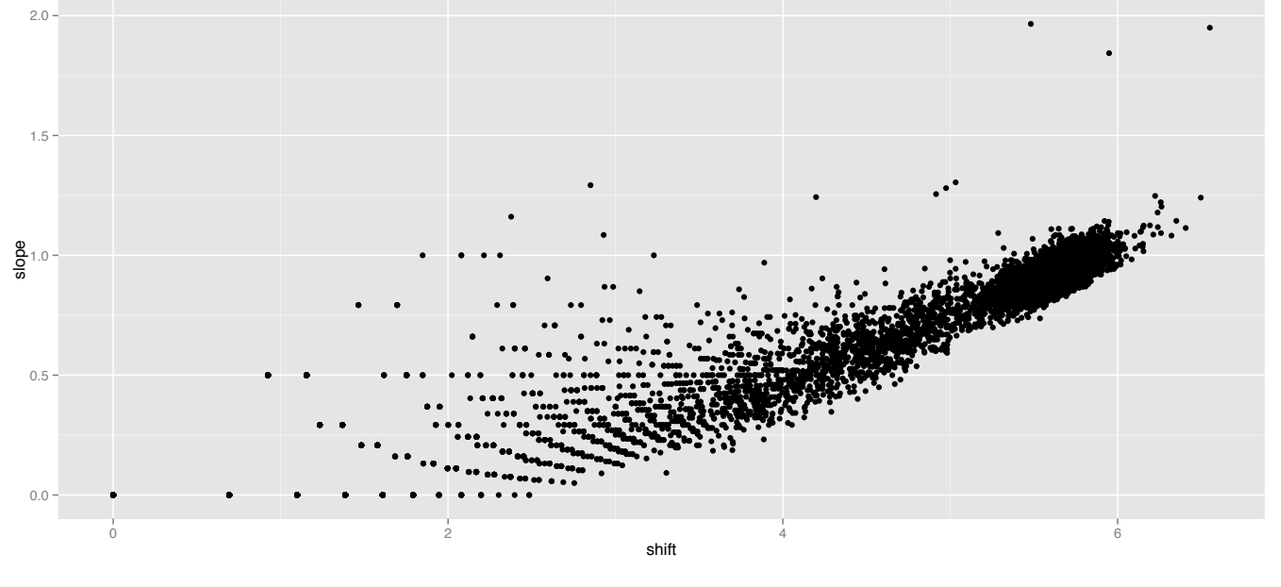




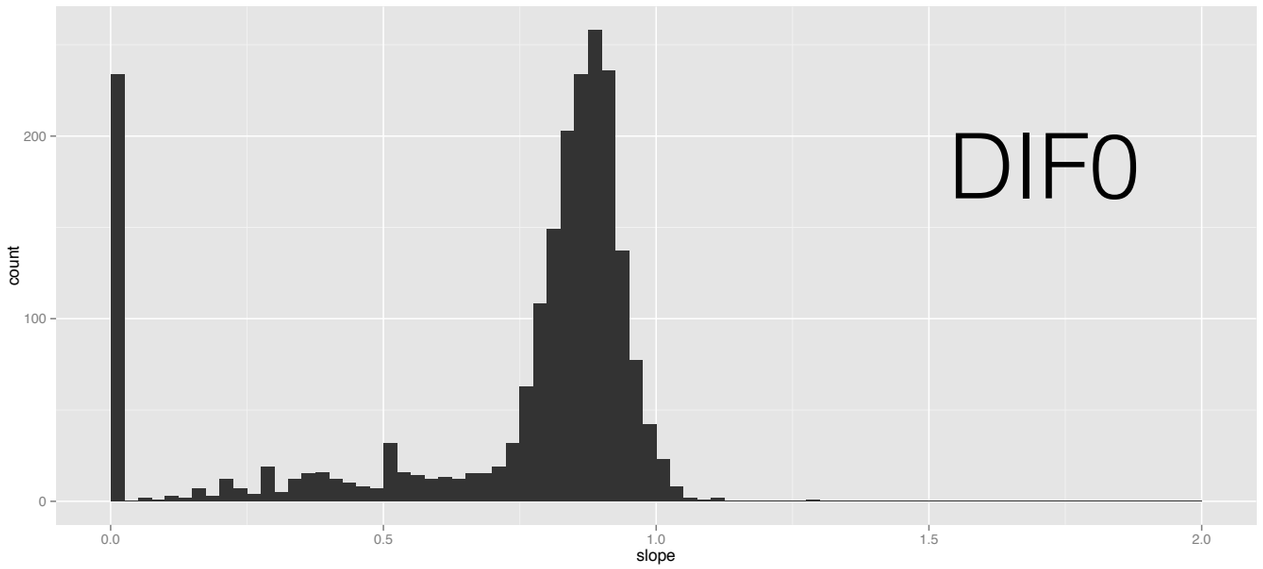


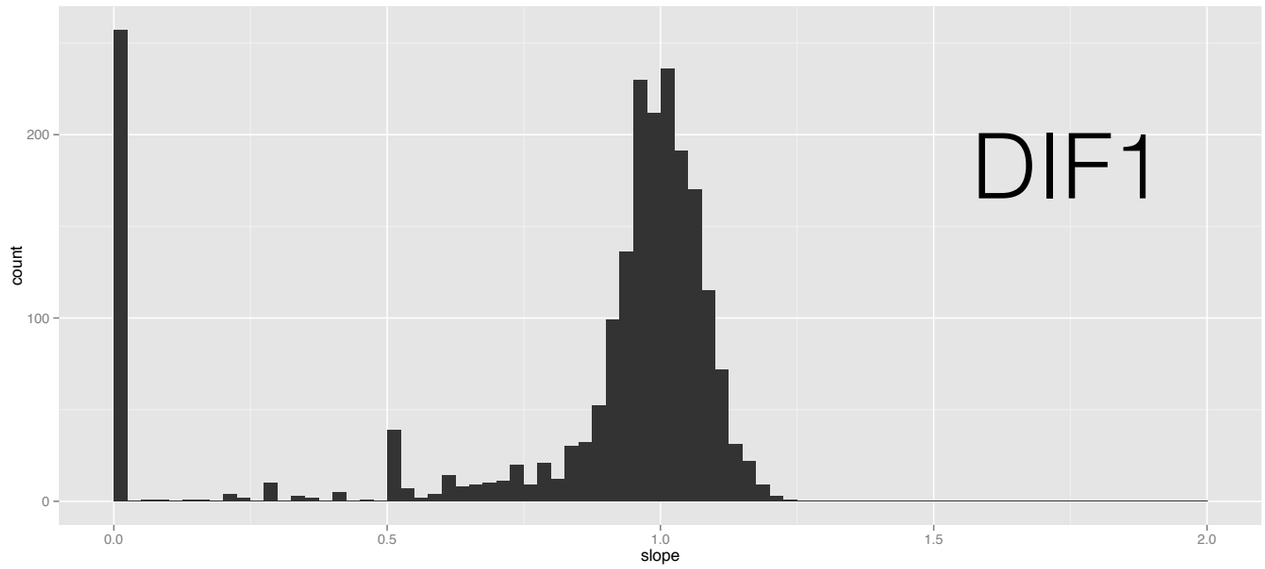


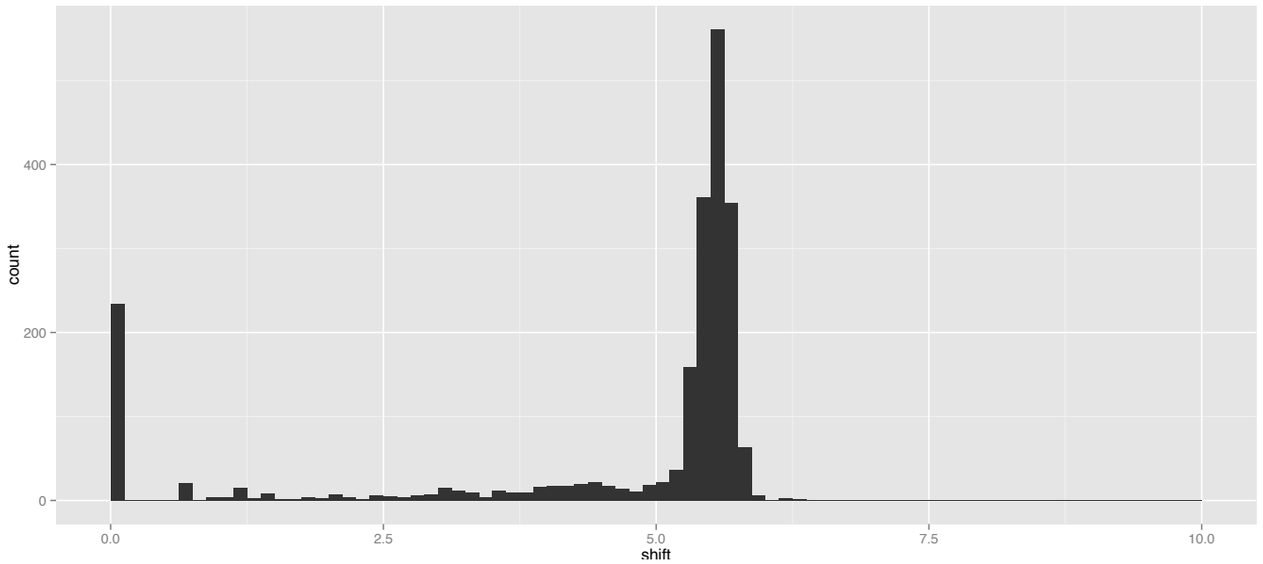


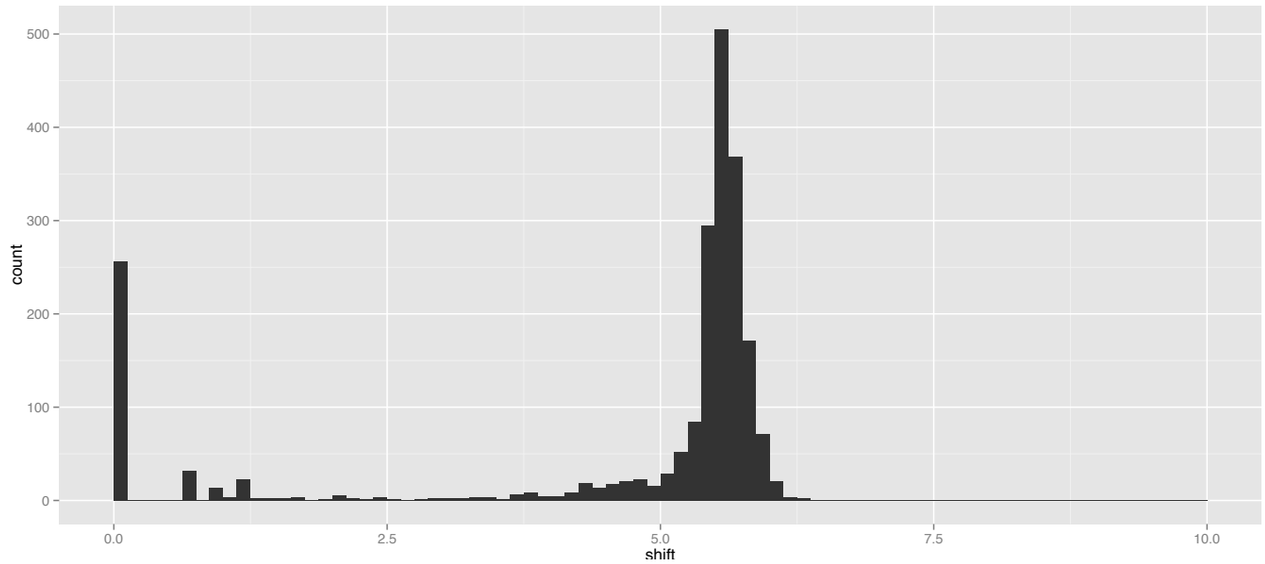


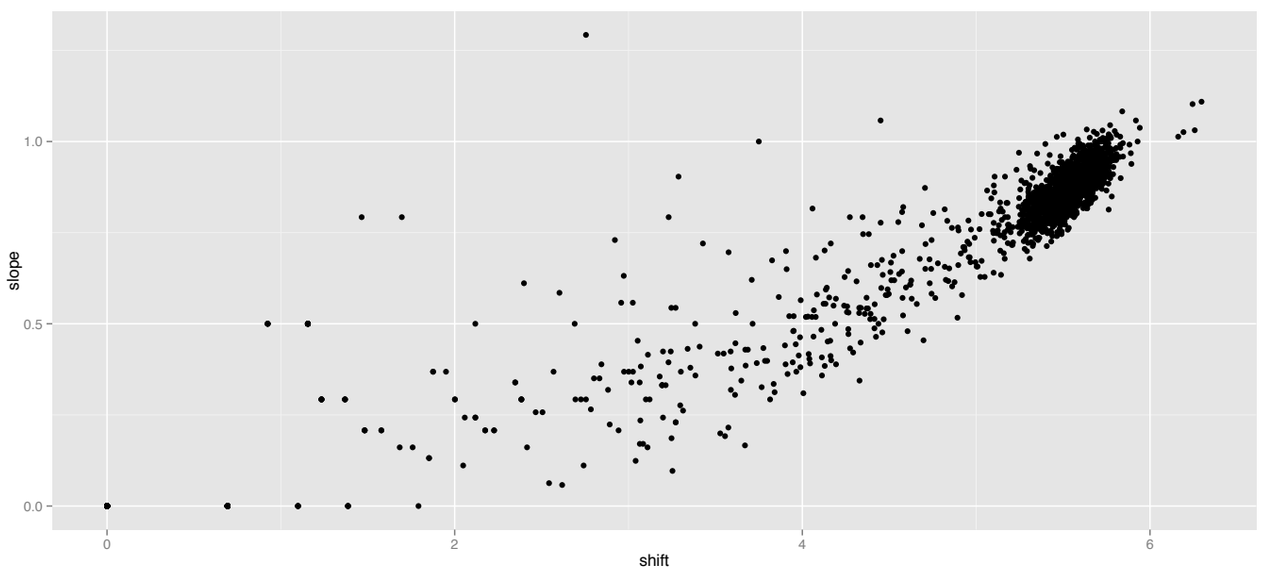
100GeV e+/pi+ run211, same events

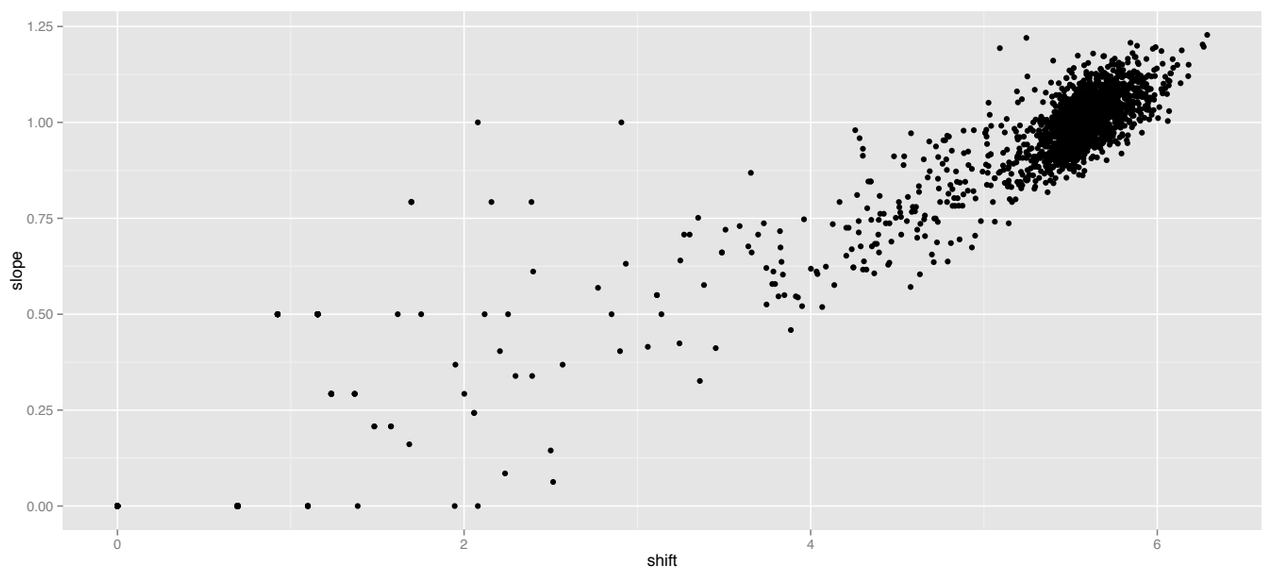




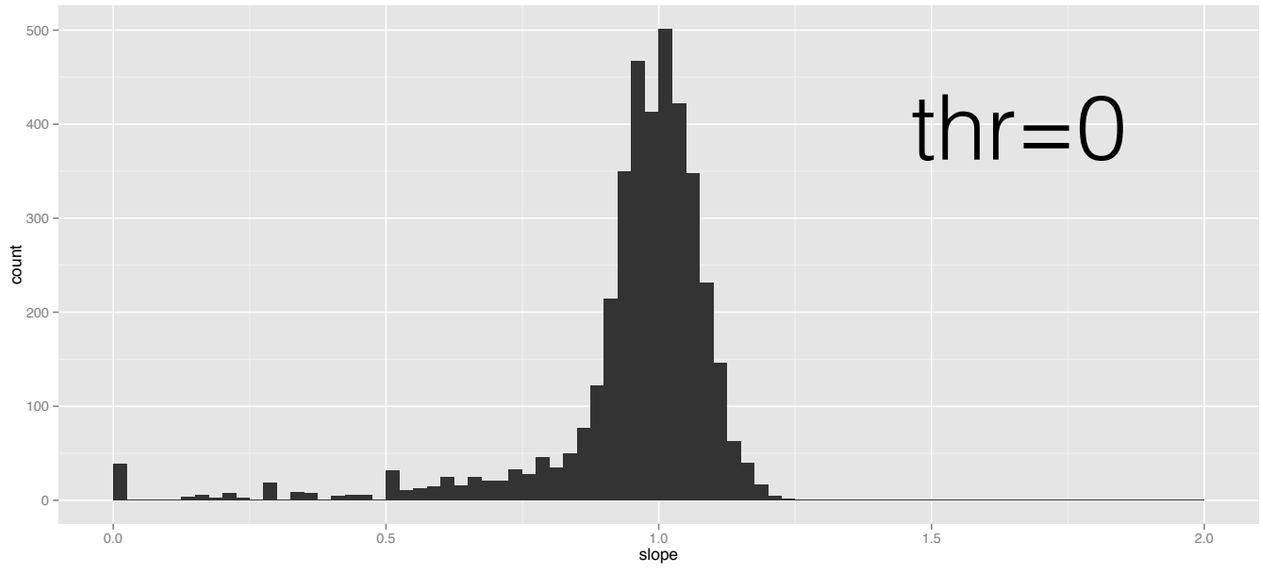


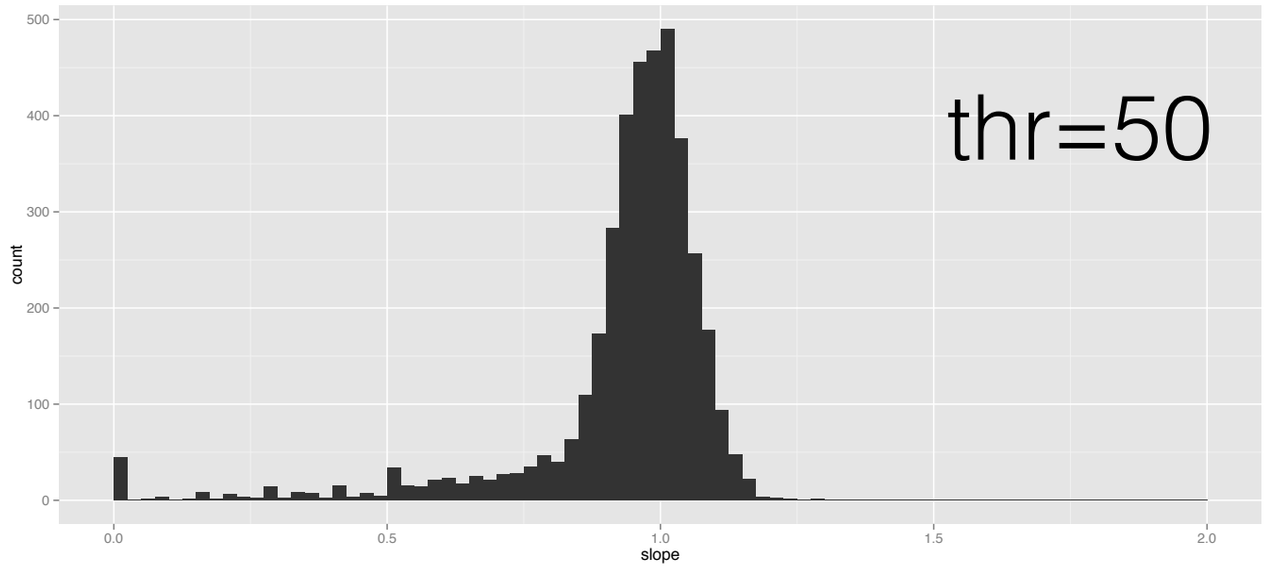


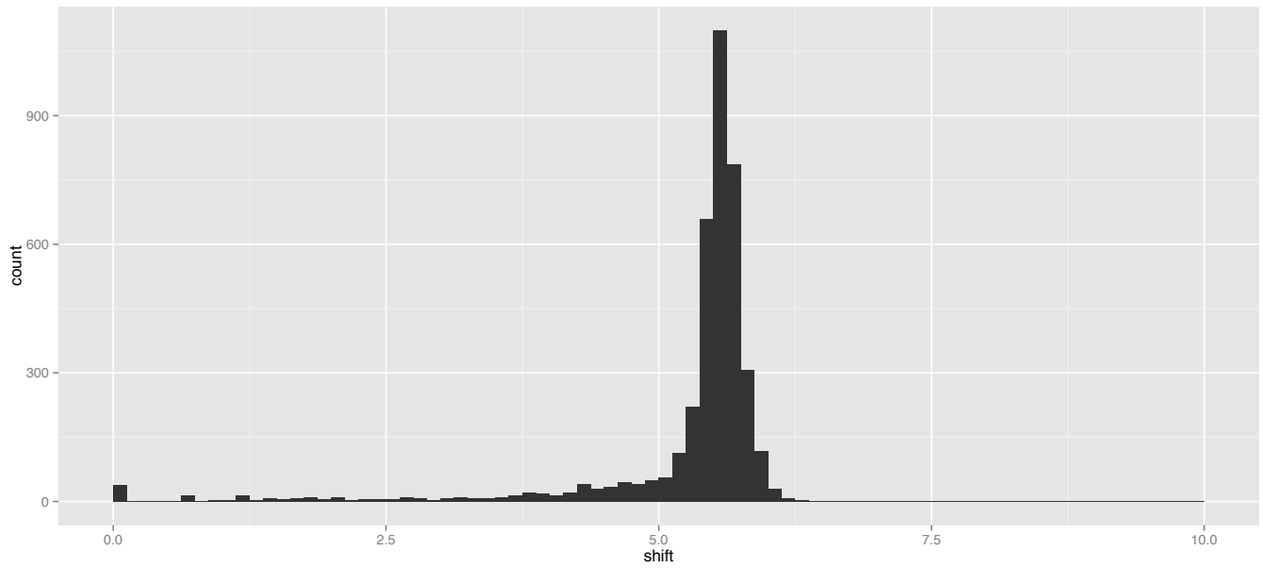


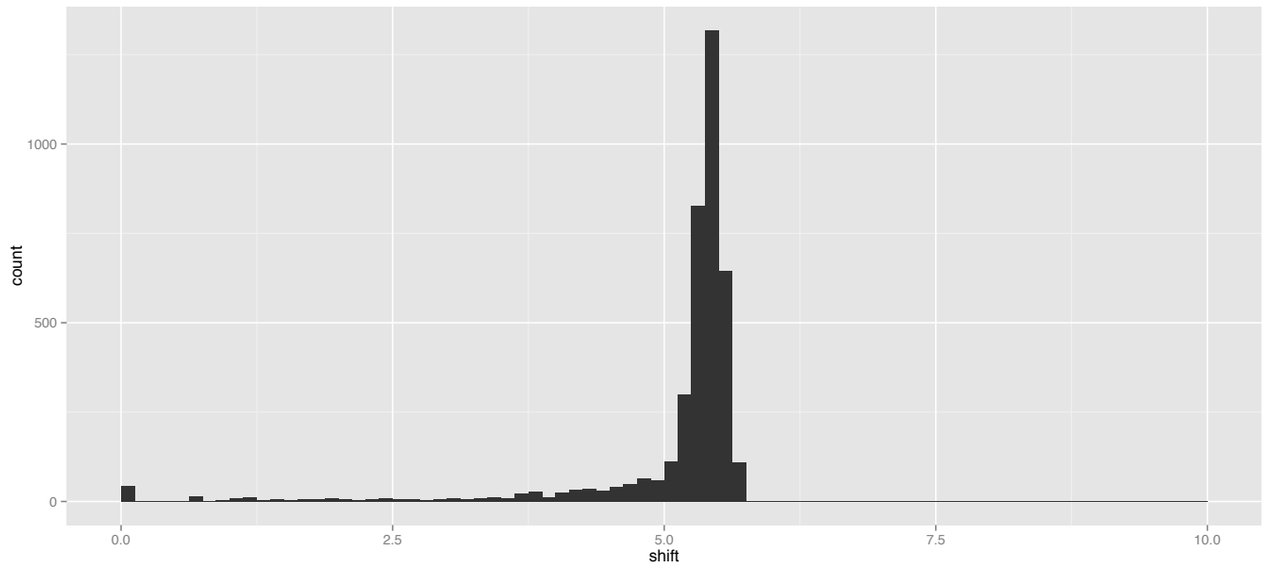


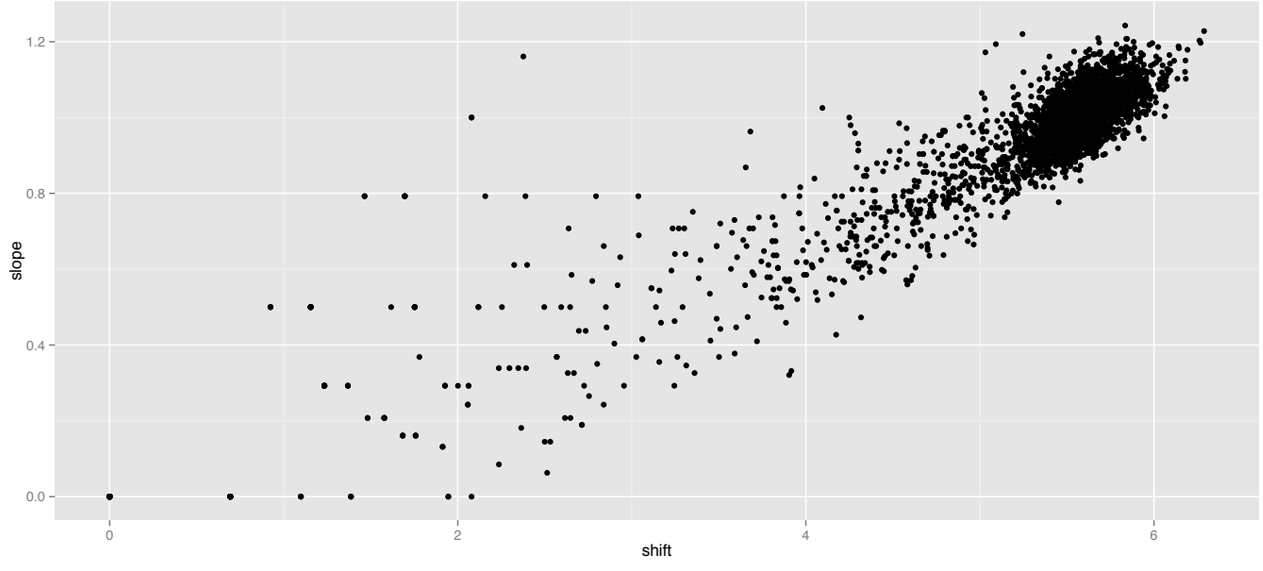
100GeV e+/pi+ run211, DIF1(same statistics for all thr)

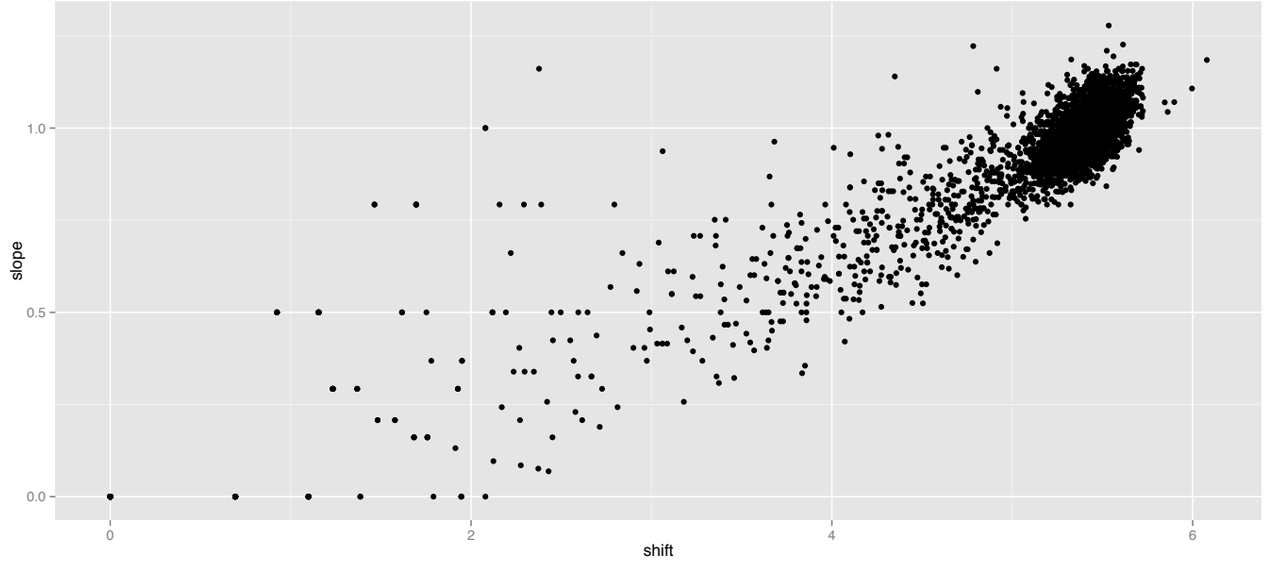




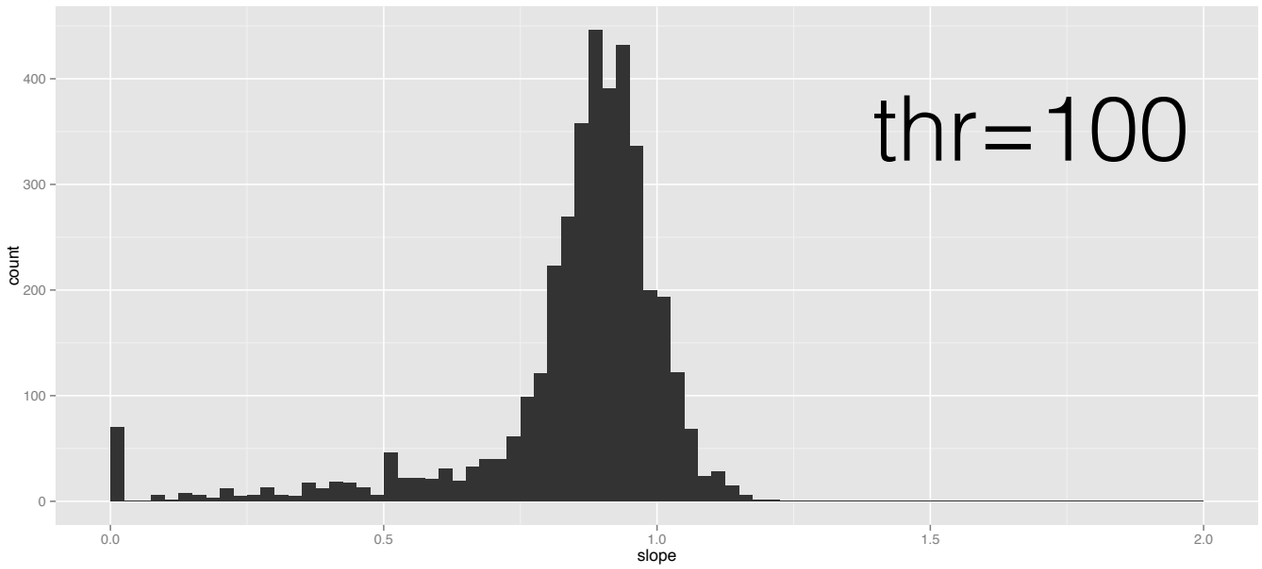


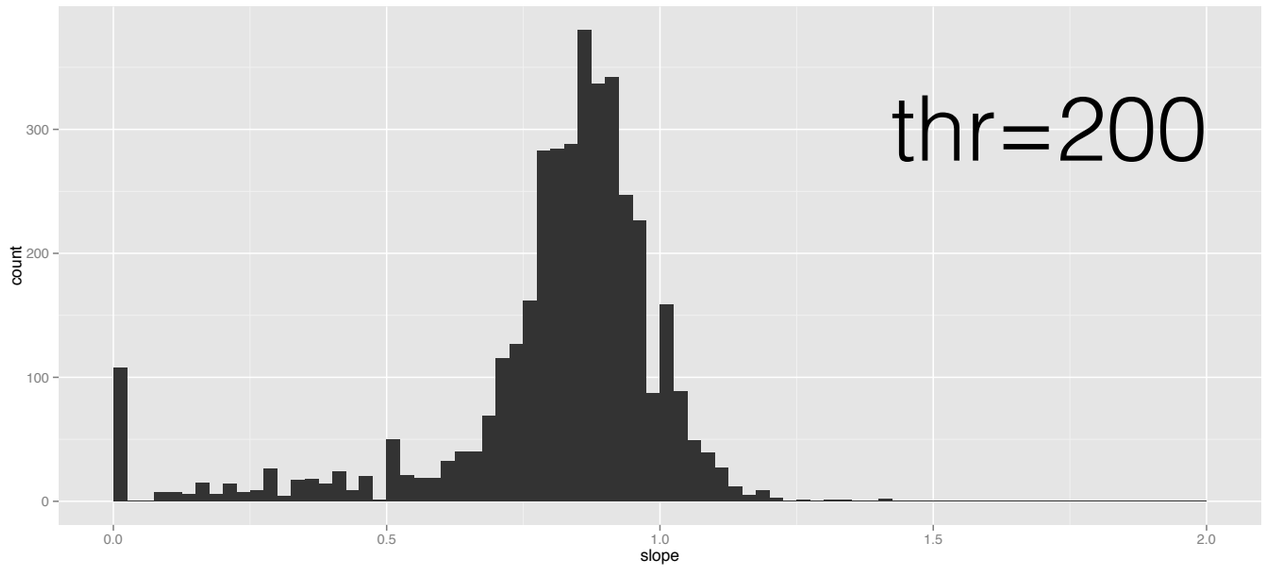


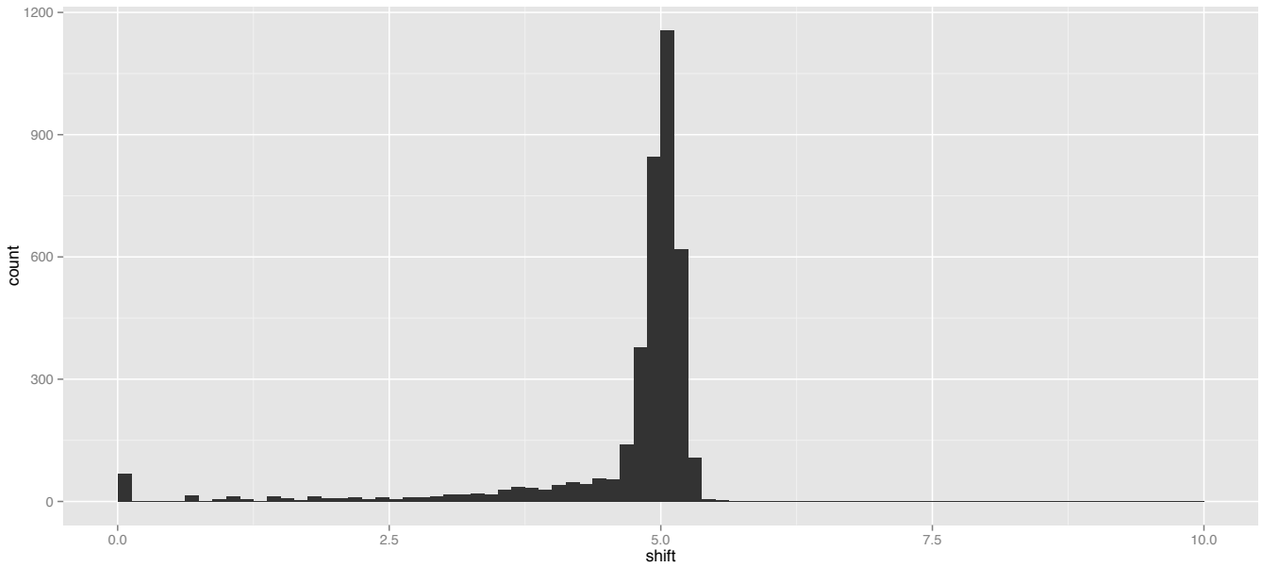


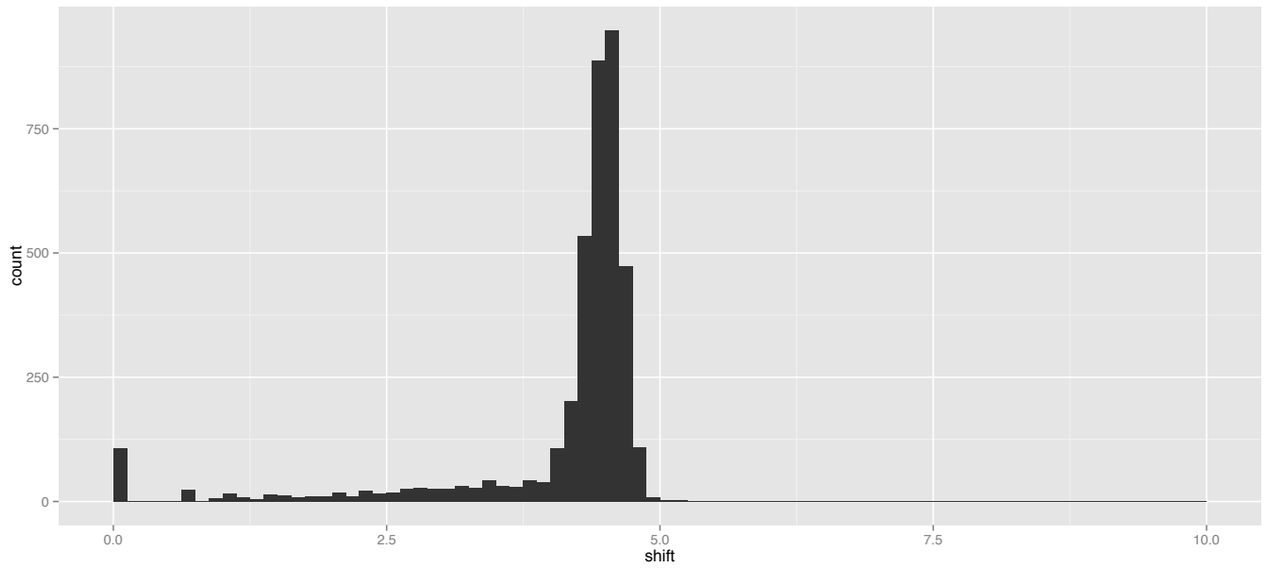


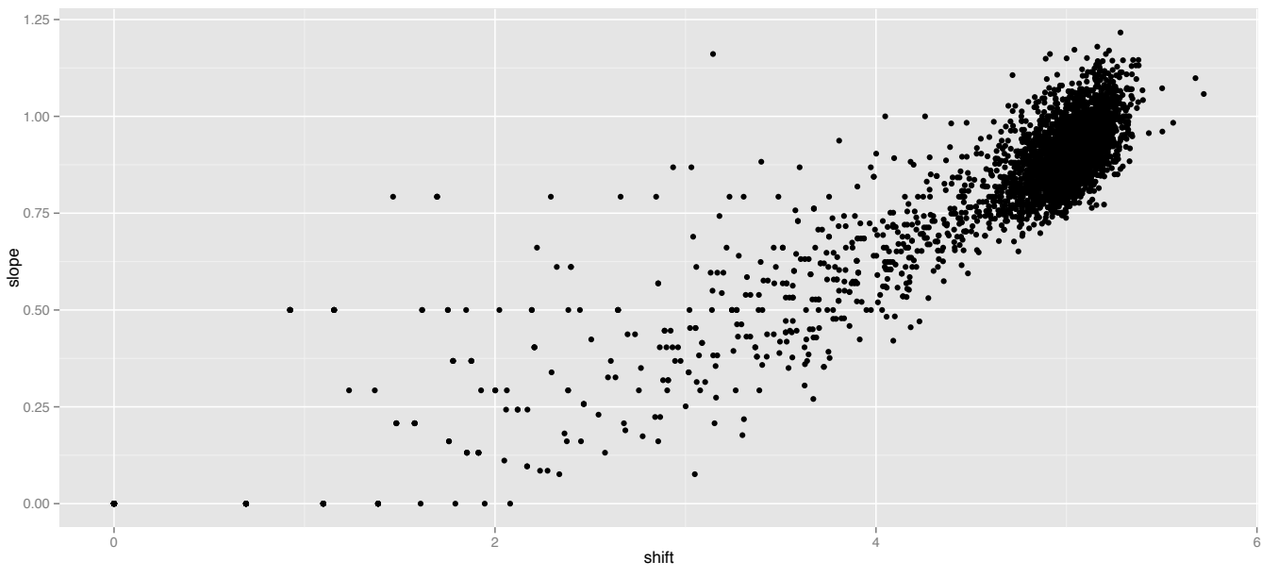
100GeV e+/pi+ run211, DIF1(same statistics for all thr)

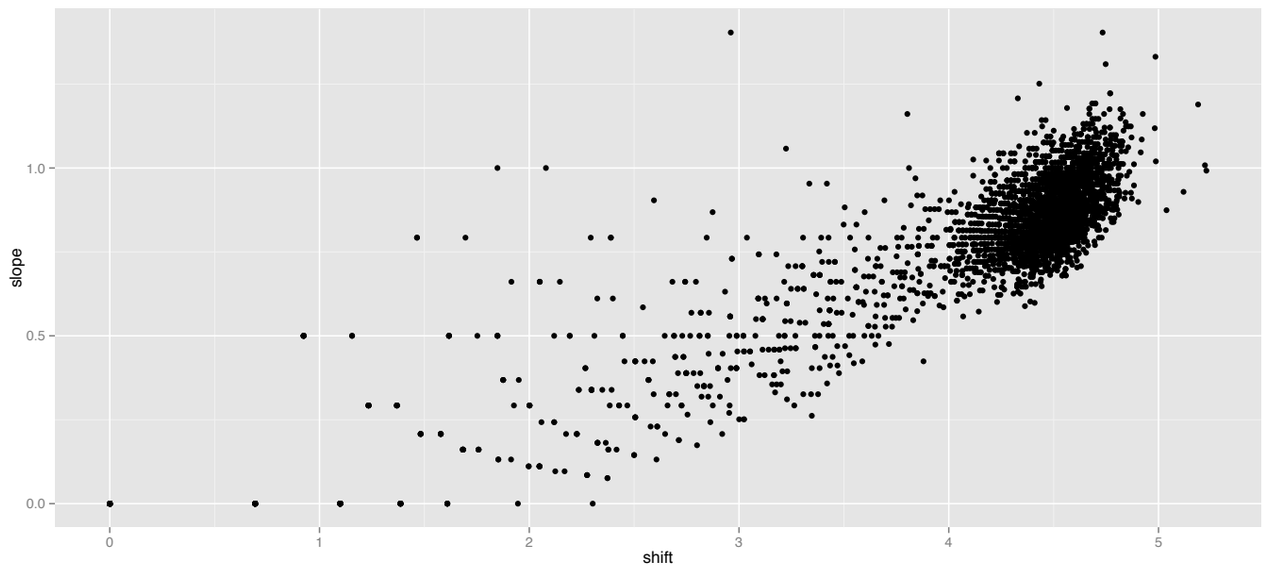




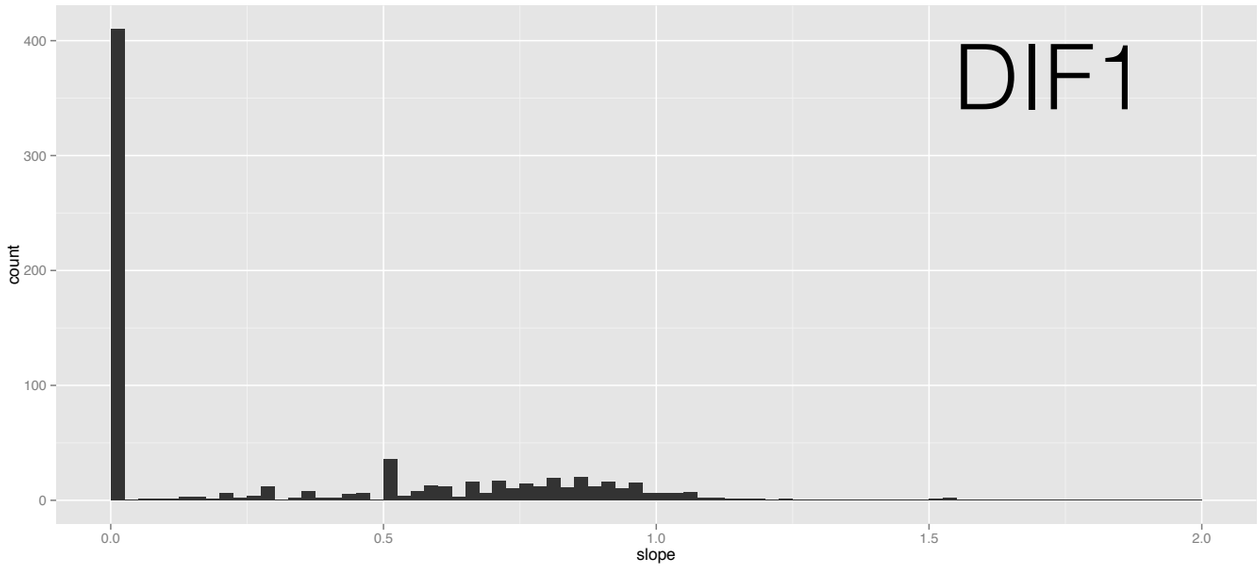


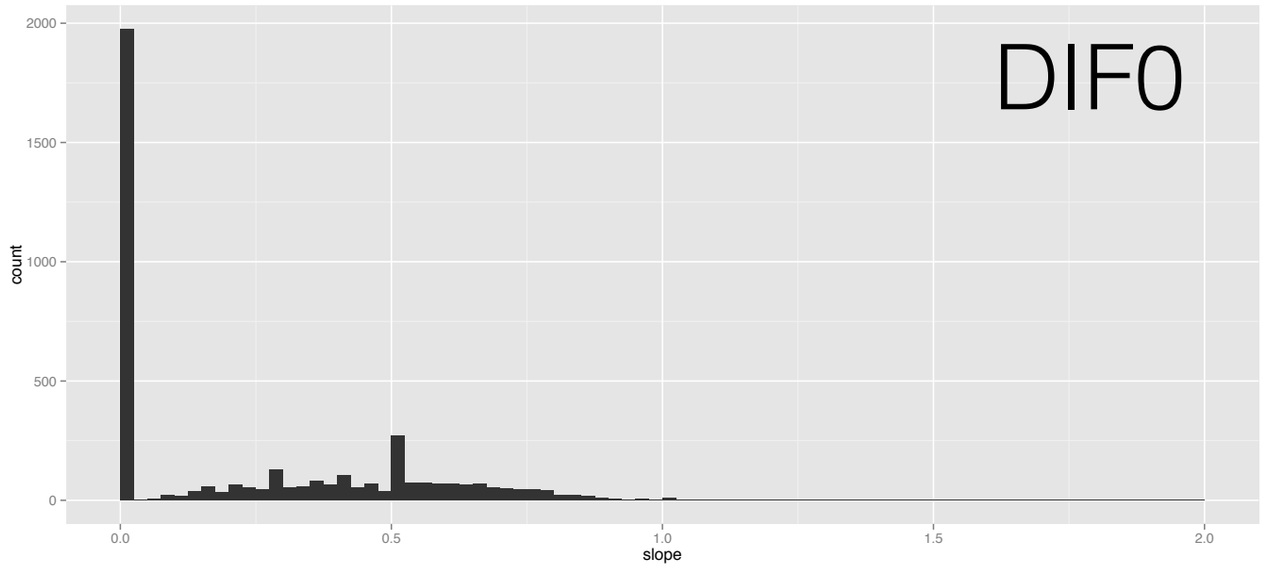


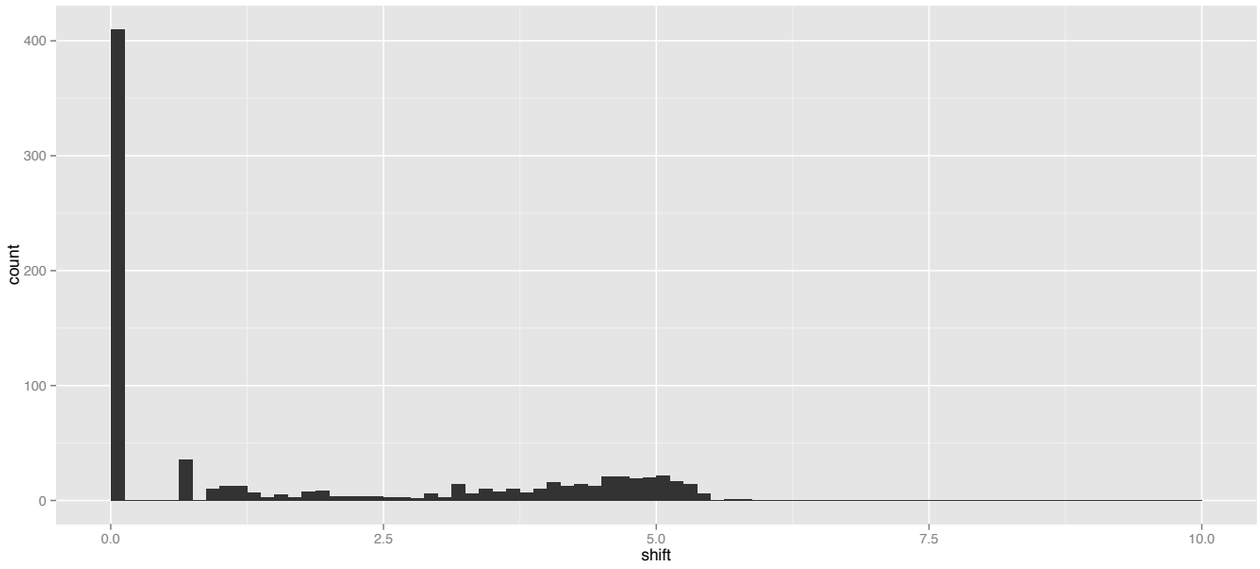


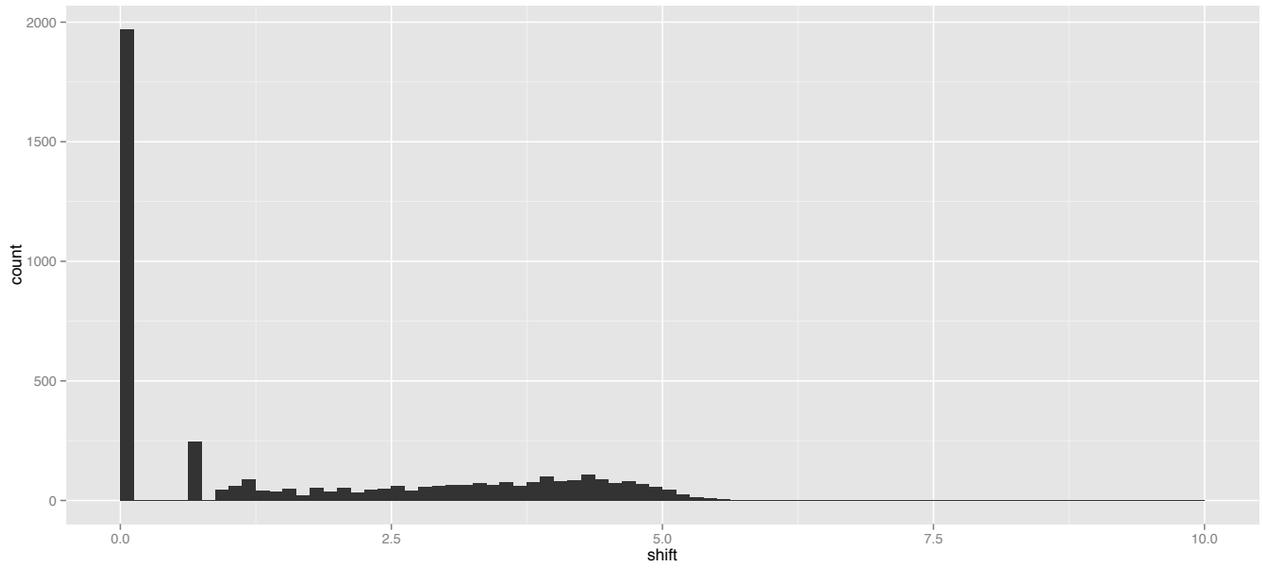


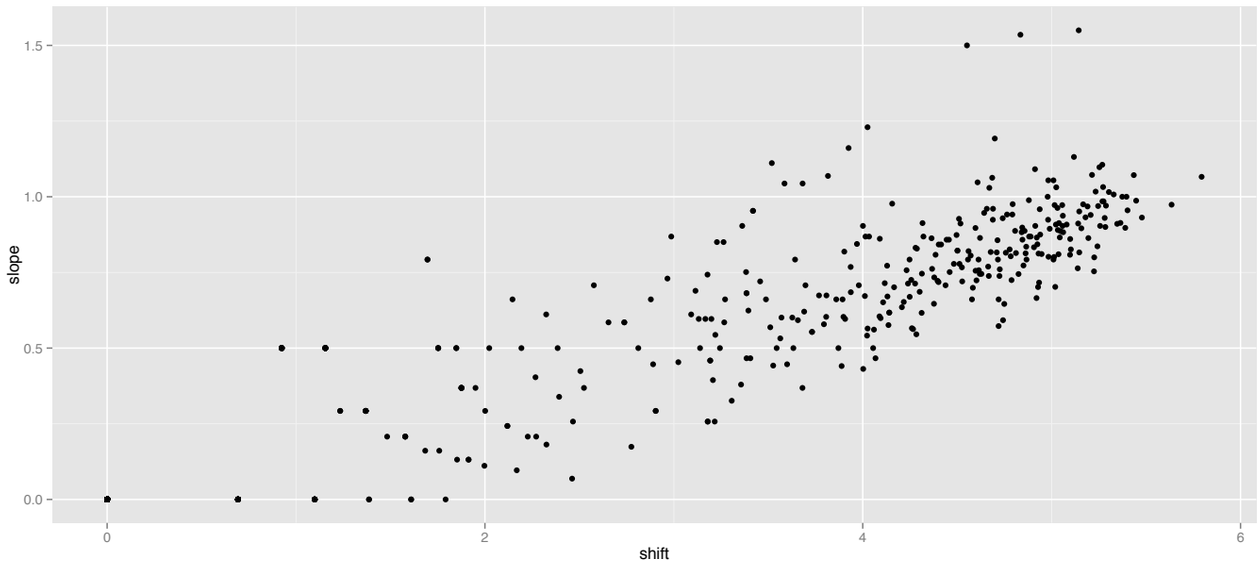
100GeV pi+ run280, full statistics in DIFs

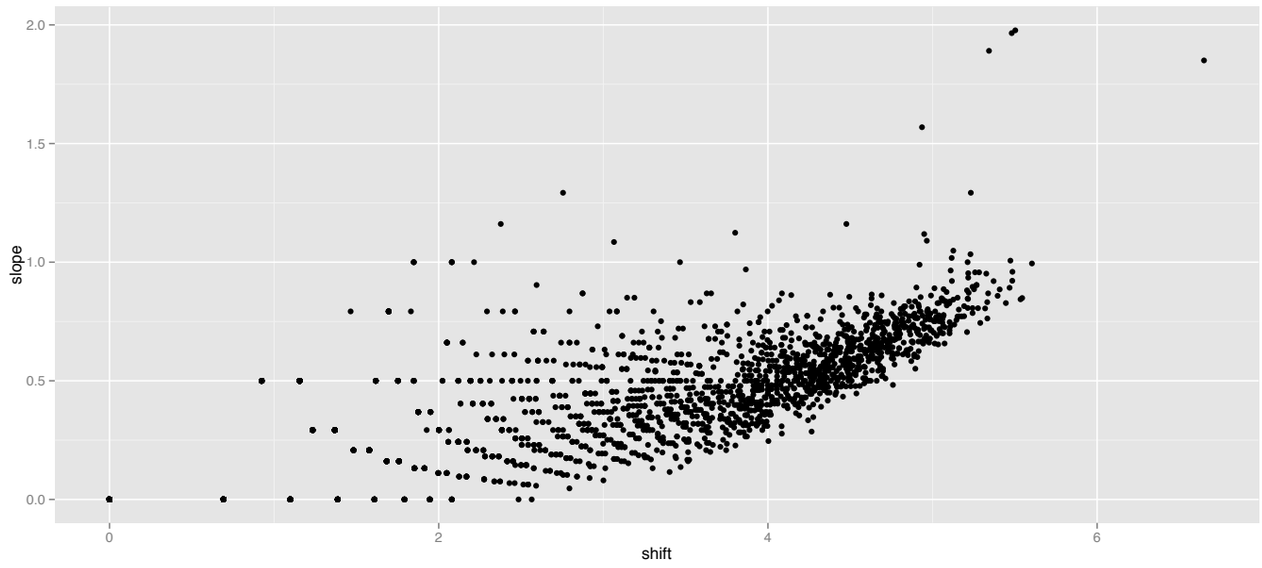












100GeV pi+ run280, full statistics in DIFs