DESY-CMS Tracker Upgrade Meeting

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Optimum Value of Vsf

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ROC Calibration:

Vsf [1 value for all 4160 pixels]

Vcal

(Input)

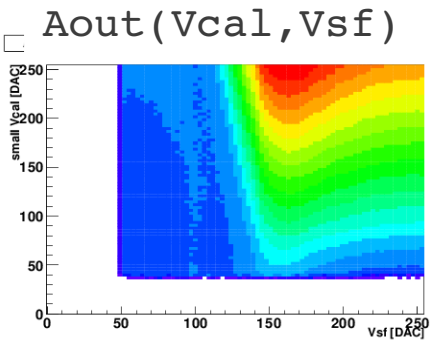
Aout

(Output)

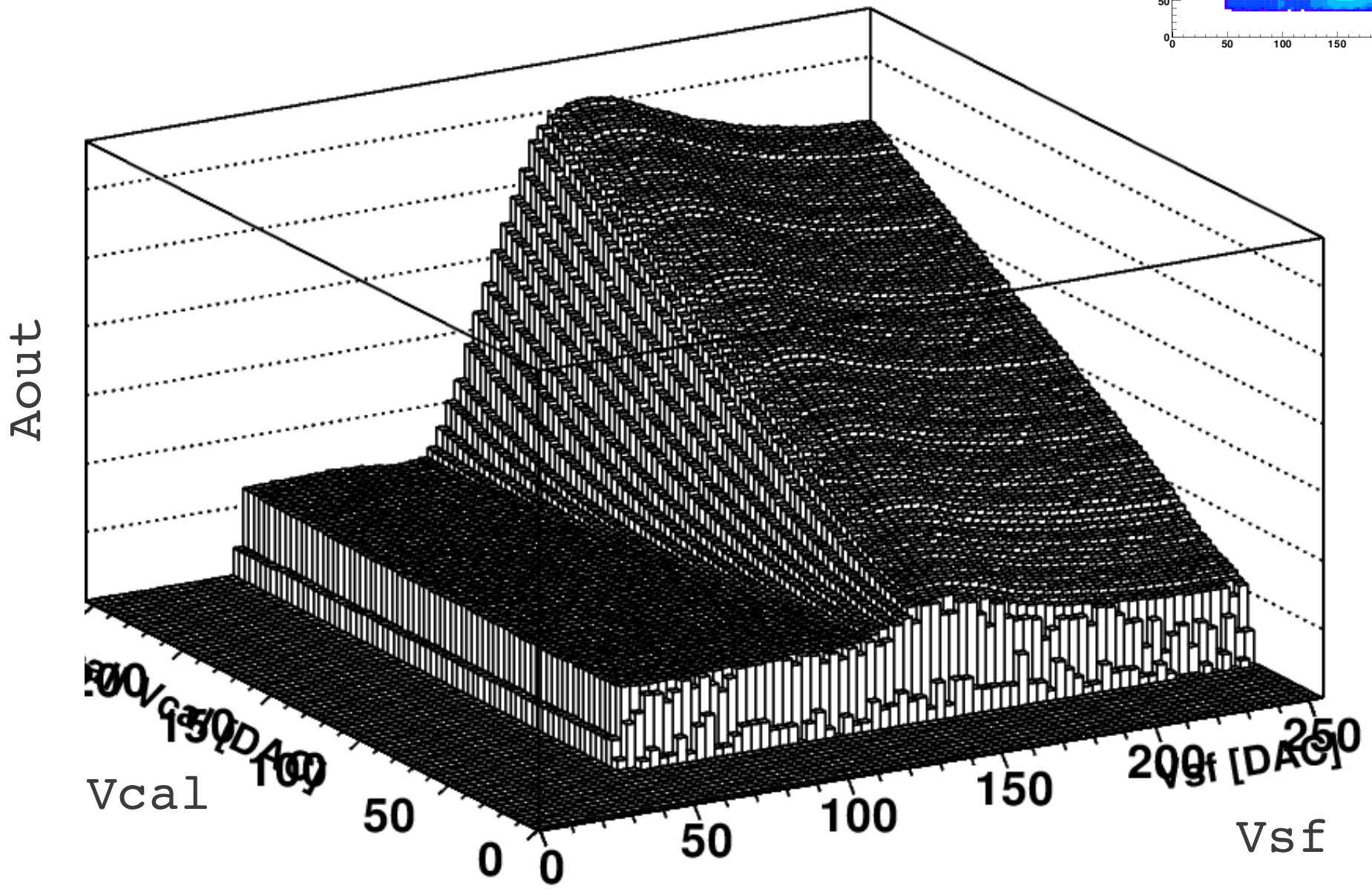
We study the calibration as a function of Vsf:

We want the best value to run the chip

ROC Calibration:

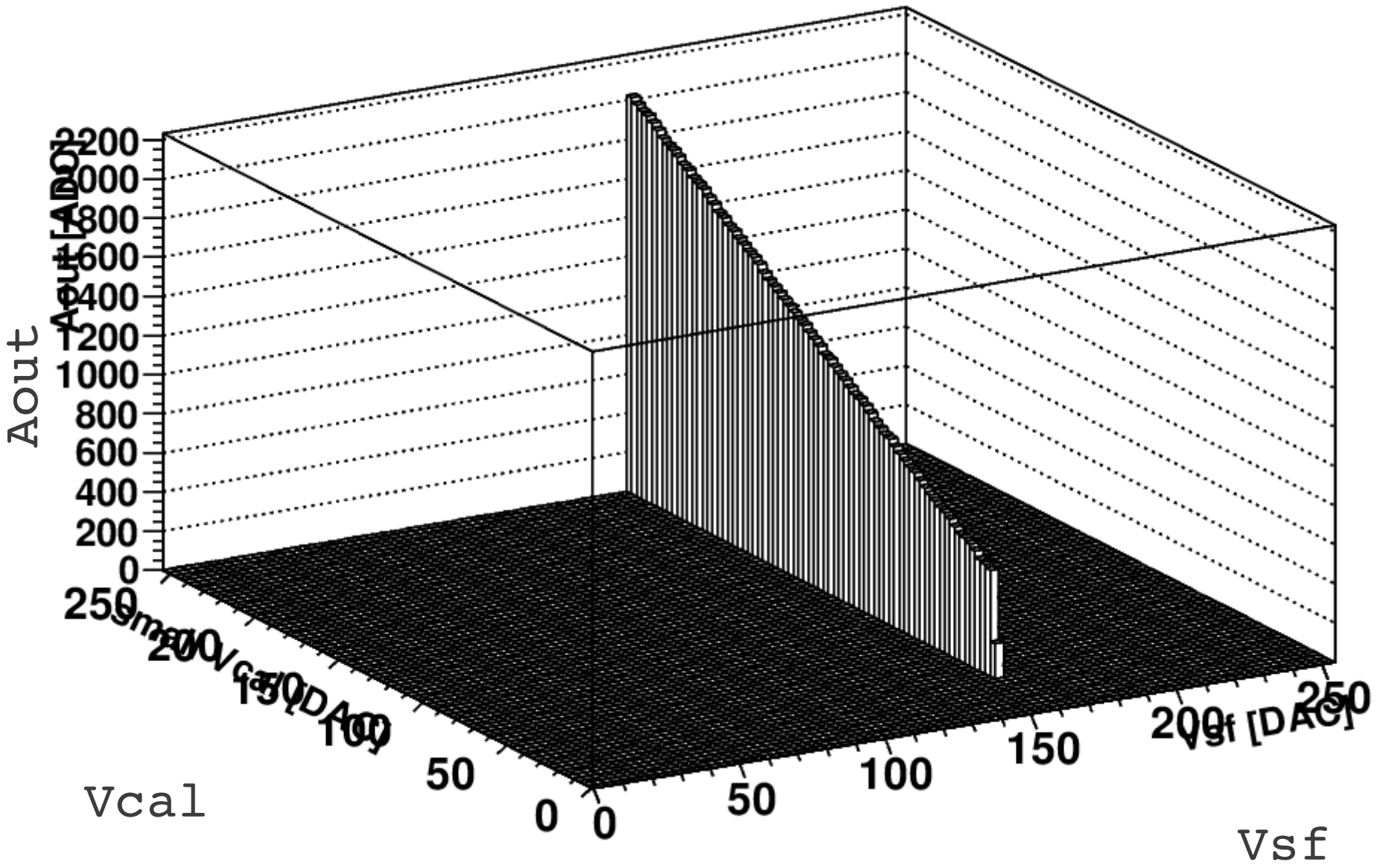


Aout vs Vcal vs Vsf [Given Pixel]

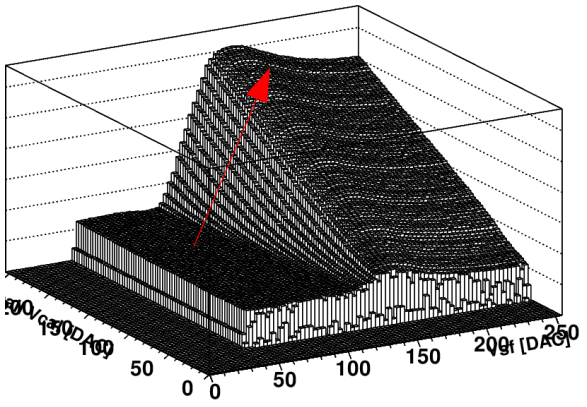


ROC Calibration:

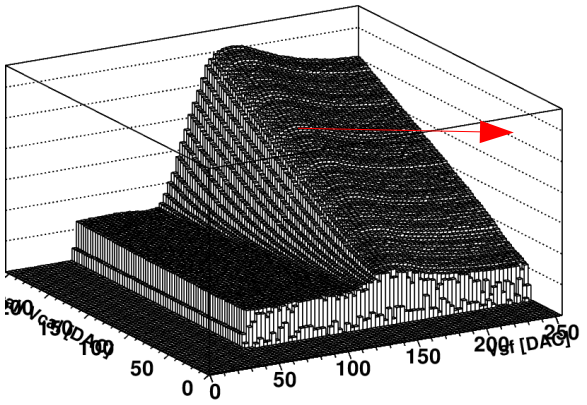
Aout vs Vcal @ Vsf = 160 [this **is** the calibration]

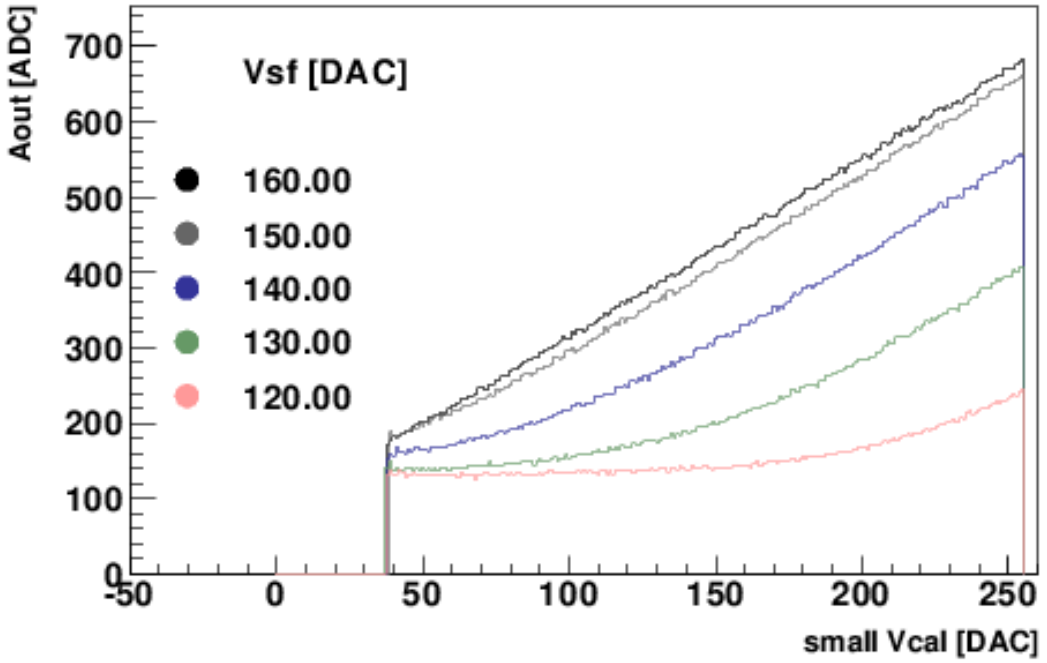


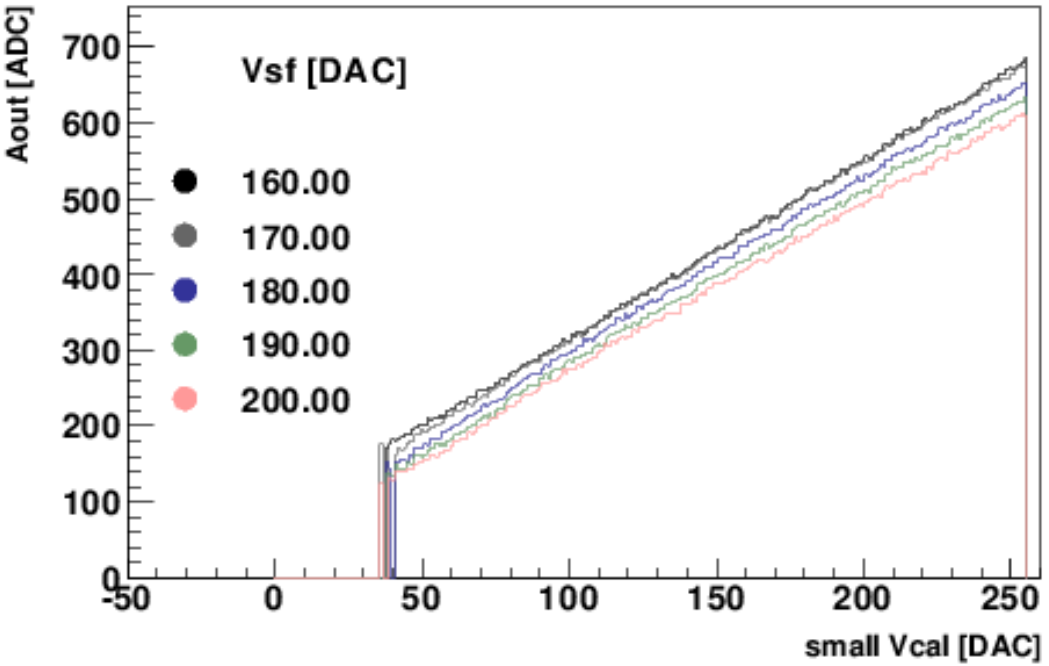
ROC Calibration:



Around the "ridge" (Aout is max) the calibration slope is linear and varies "little" with Vsf.

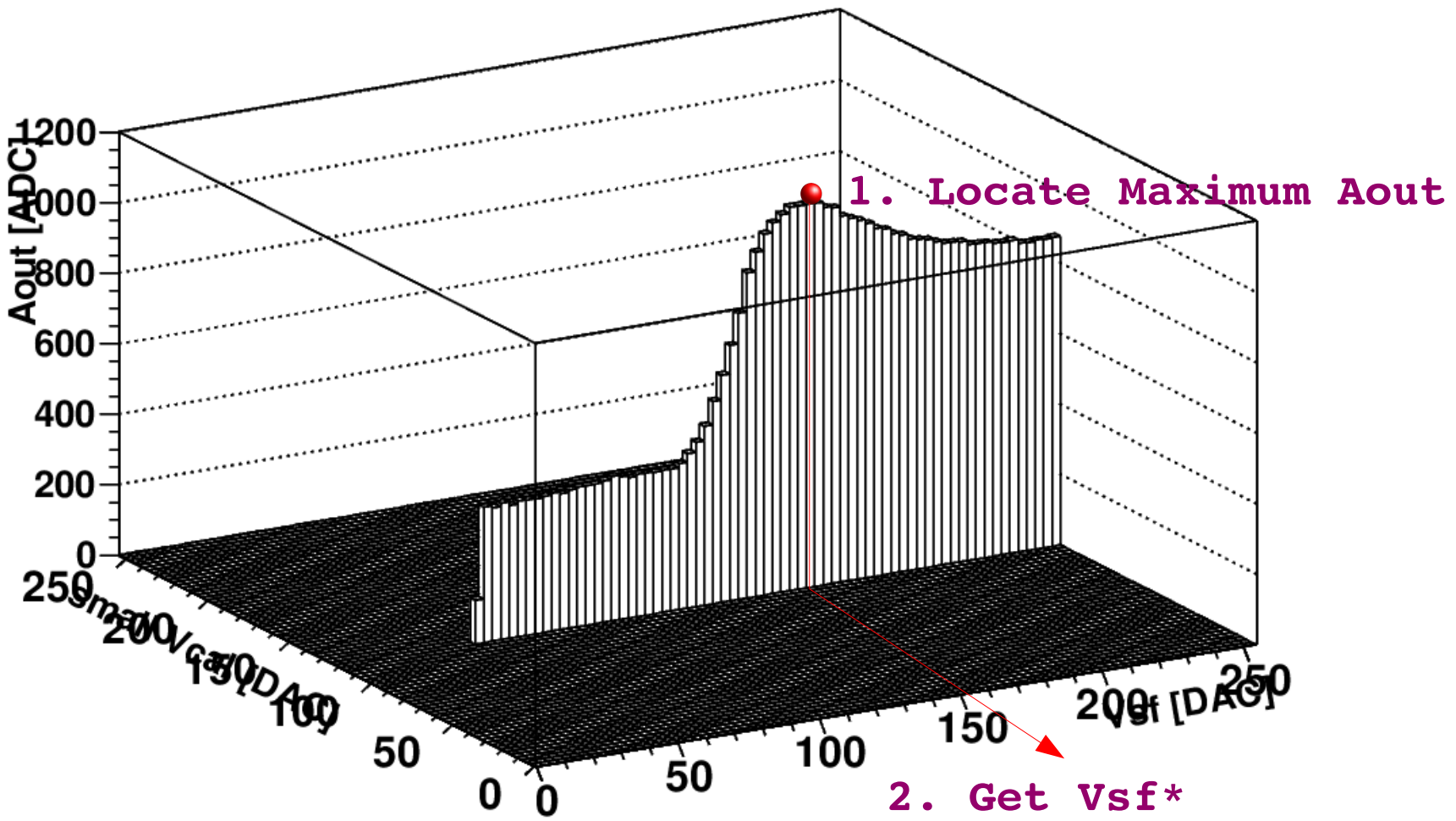




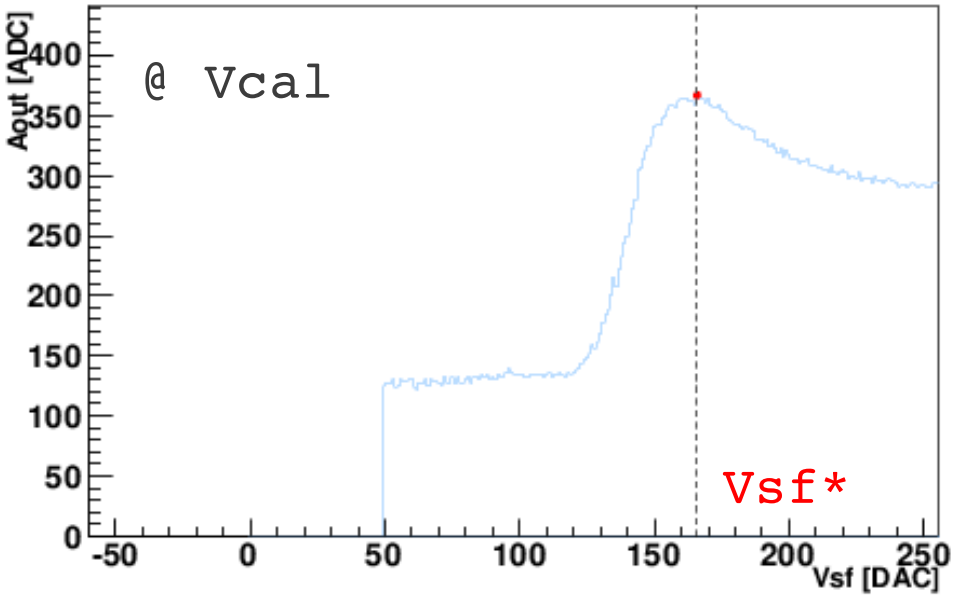


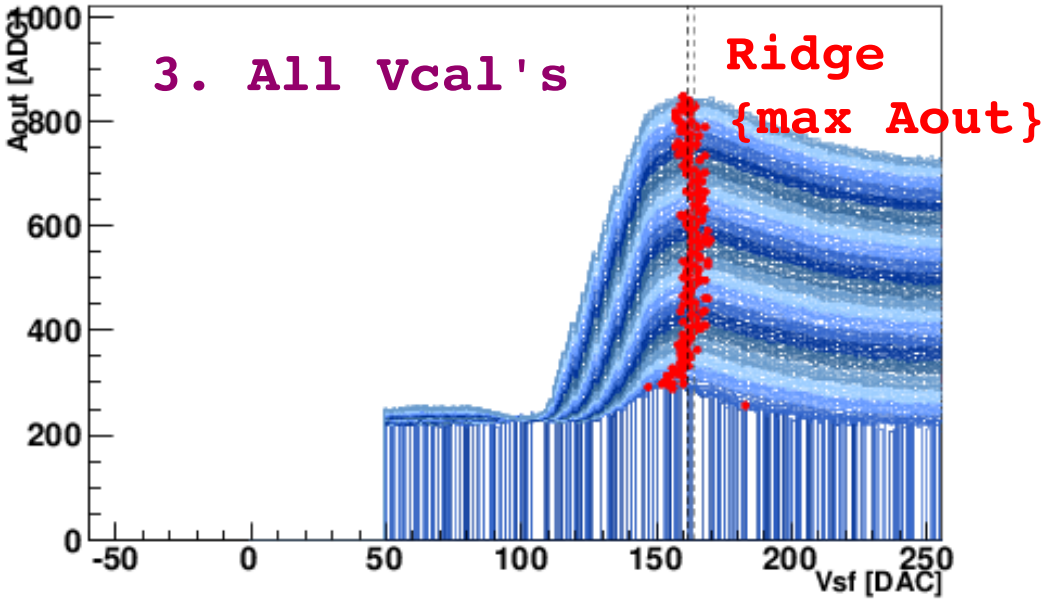
Finding the Ridge: [Ridge Alogorithm]

Aout vs Vsf @ Vcal = 120

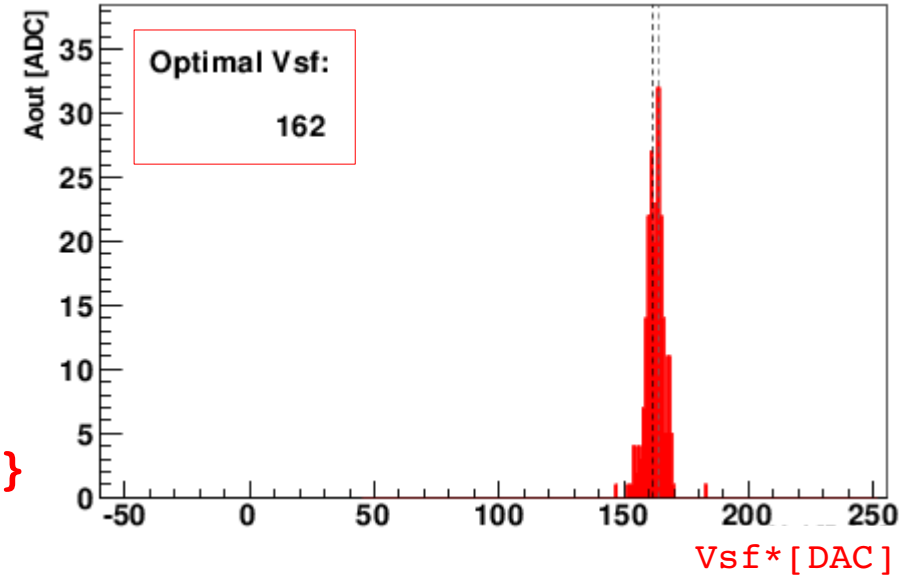


Finding the Ridge: [Ridge Alogorithm]





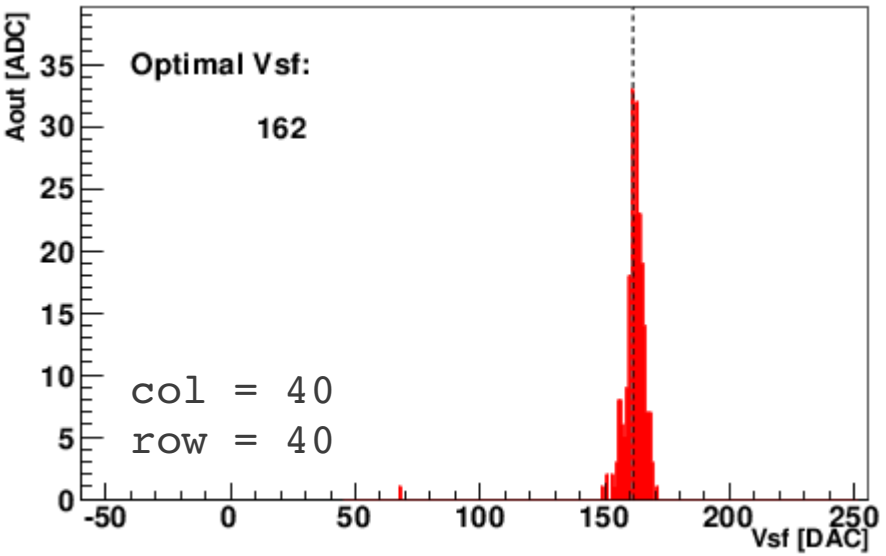
4. Take Mean of Vsf* dist. [= Optimal Vsf]

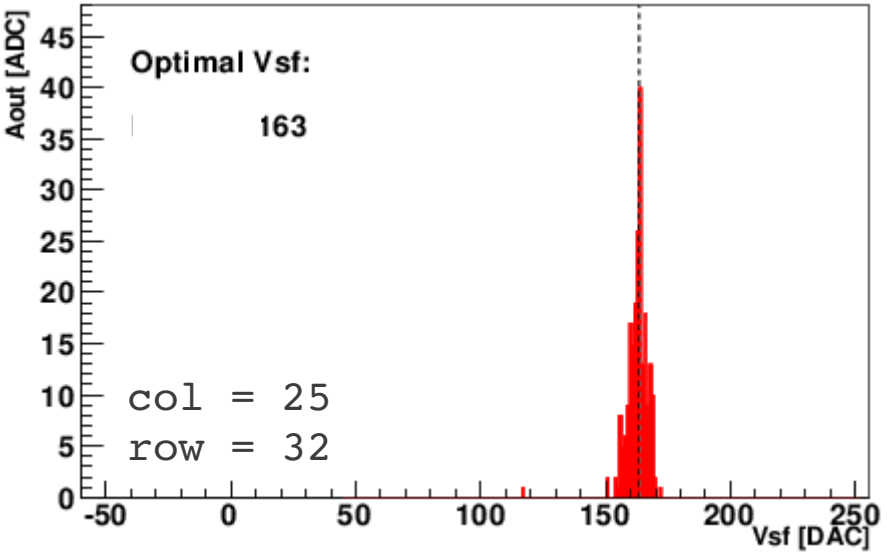


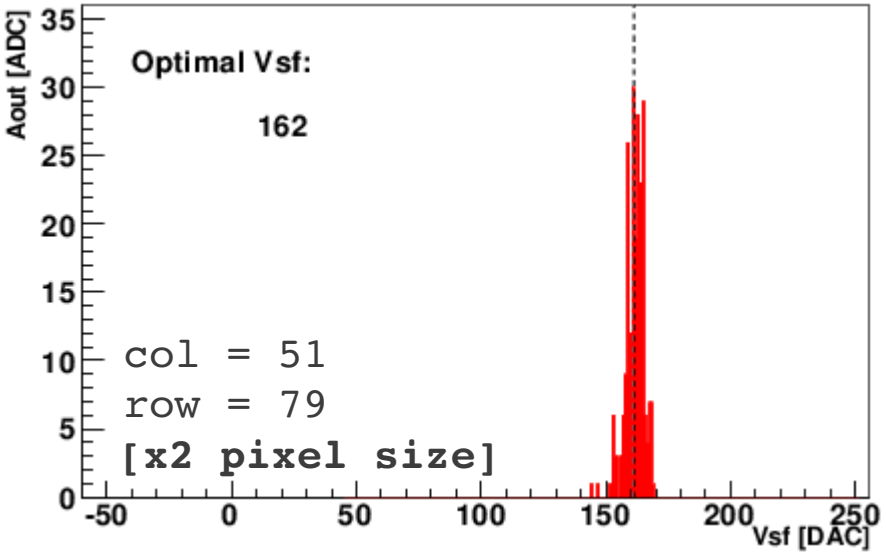
This **pixel** is optimized for Vsf = 162

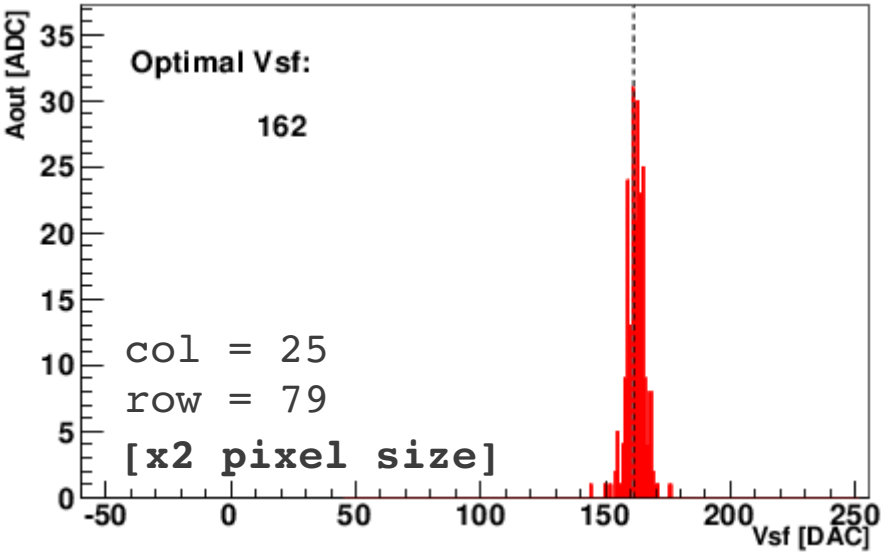
Finding the Ridge: [Ridge Alogorithm]

Some other pixels:



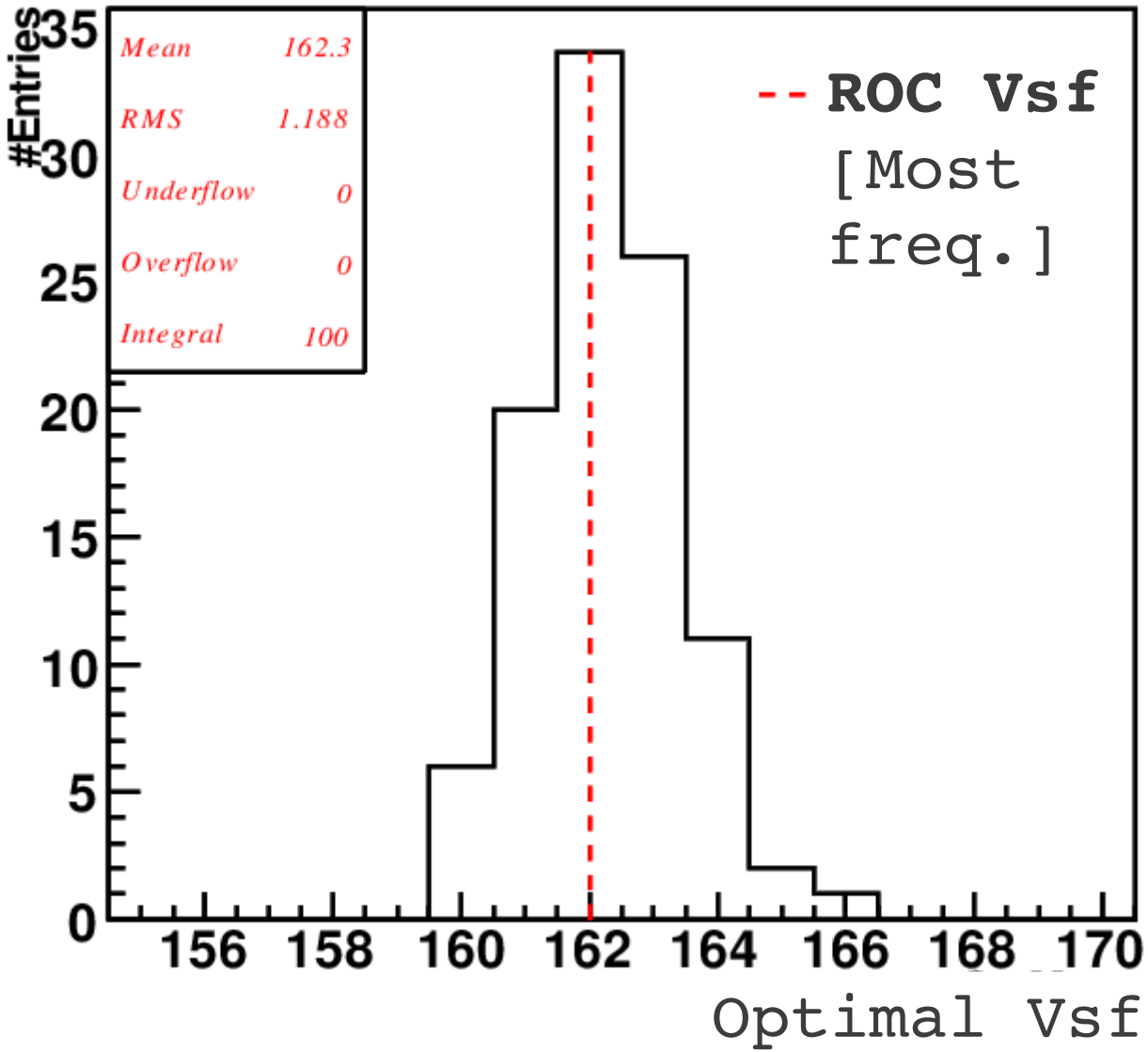






Defining optimum Vsf for ROC:

100 tested pixels:



Use this ROC at Vsf = 162

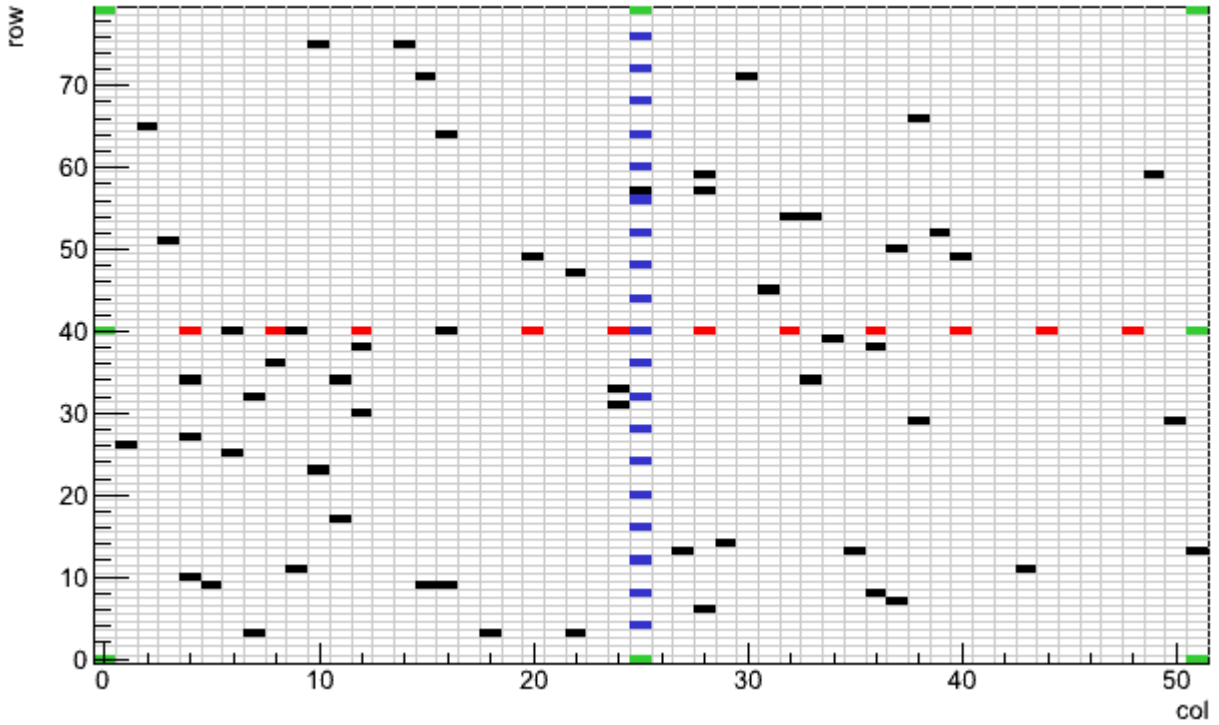
note:

97% of pixels tested have Optimum Vsf's within ±2 units from ROC Vsf.

Possible quality cut:
Reject ROCs where <90% of pixels are within ±2 of ROC Vsf.

Optimum Vsf dependences:

100 tested pixels:



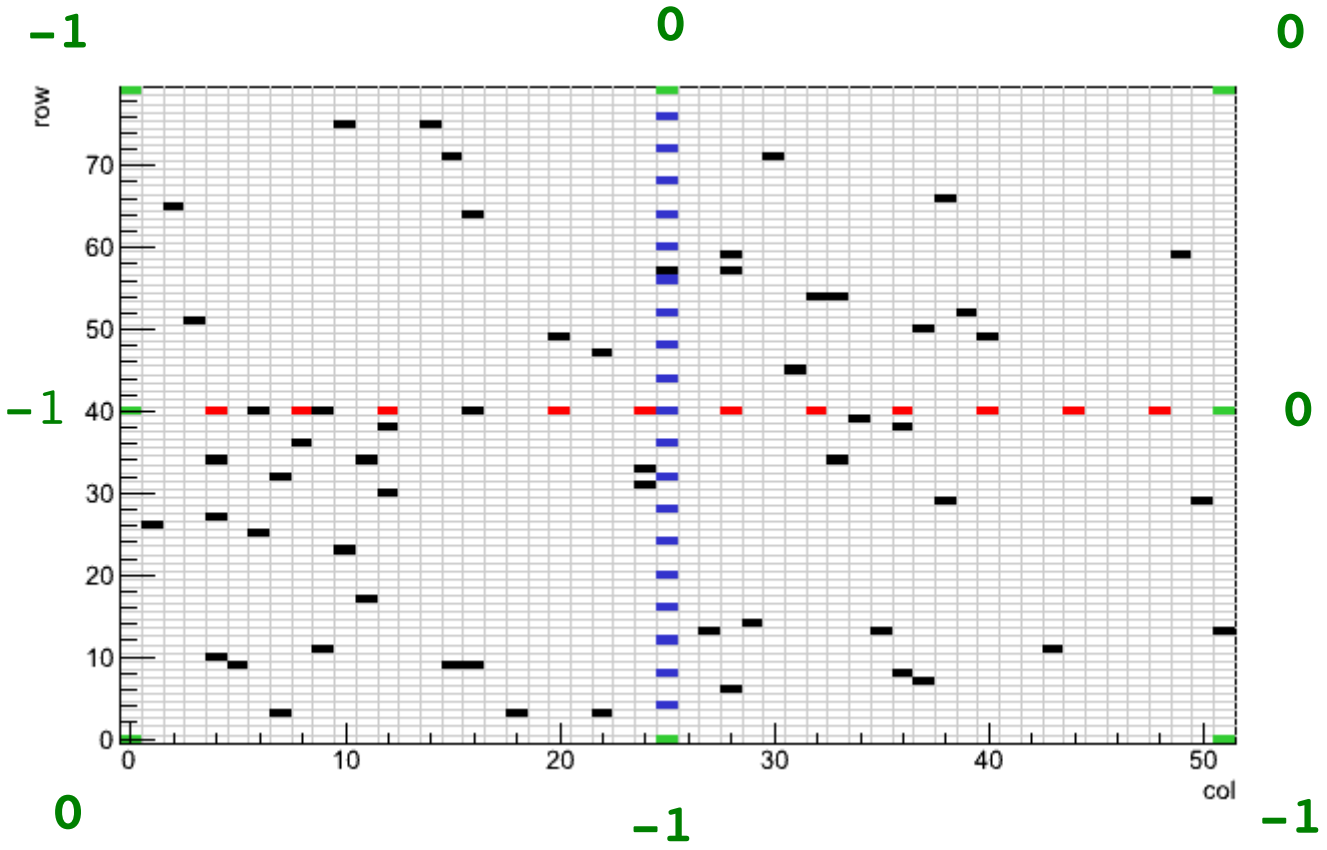
- row = 40 ; vary col
- col = 25 ; vary row
- extremes;
- random

col dependence [Optimum Vsf @ Pixel – ROC Vsf]:
0 -1 1 0 1 1 1 1 1 -1 0 -2 2 0

row dependence [Optimum Vsf @ Pixel – ROC Vsf]:
-1 -1 0 -1 2 0 1 0 1 2 1 1 0 1 3 3 2 4 1 2 0

Optimum Vsf dependences:

pixels at the extremes:



No dependence on the optimum Vsf as a function of col, row, extremes.

Conclusions:

1. An alogorithm which determines the Optimum Pixel Vsf has been developed.

   No dependence on Optimum Pixel Vsf as a function of pixel location observed.

2. We can then define an Optimum **ROC** Vsf.

   Most [97%] of pixels have their Optimum Pixel Vsf within ±2 units of Optimum ROC Vsf.

   Possibly use as criteria for rejecting ROC's [more testing needed].

Outlook:

1. More testing.

2. Show numerically that “ridge” is indeed best Vsf to operate ROC.