

Pedestal Analysis

Bernardo Deps Almeida

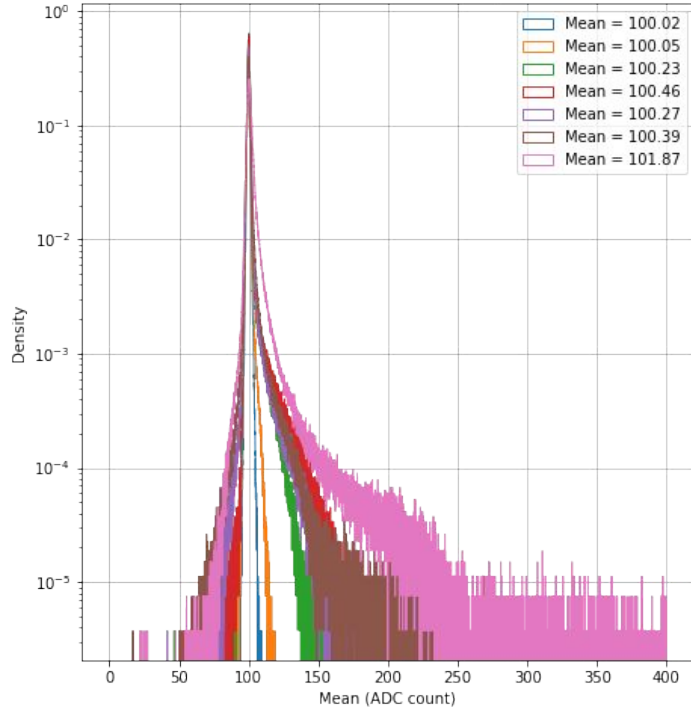
Summary

- Pedestal analysis for Orca Fusion BT, Orca Quest and Thorit
 - Orca Fusion BT: Pedestals [6291, 6297]
 - Orca Quest: Pedestals [6314, 6320]
 - Thorit: Pedestals [6340, 6346]
- Noise Analysis
 - Comparing the Mean and Standard Deviation Maps
 - Visualisation of The Mean and Standard Deviation Evolution over Exposure Time
 - Quadrants Analysis: Diagonal and Cross
 - Quadrants Analysis over Exposure Time
 - Energy Resolution
 - Read Noise [keV]
- Conclusion
- Next Steps

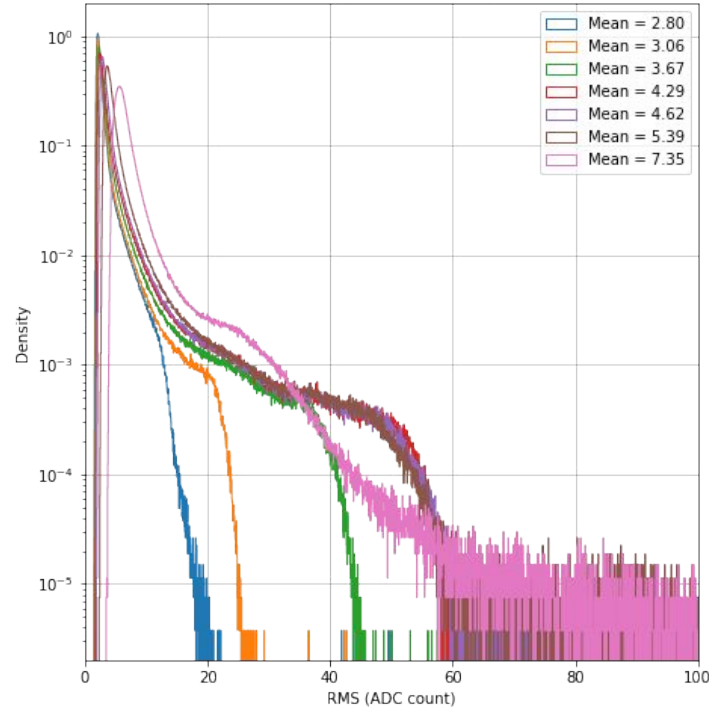
Orca Fusion BT

Stochastic Image Analysis - Orca Fusion BT 15440

Histogram - Mean Image



Histogram - STD Map



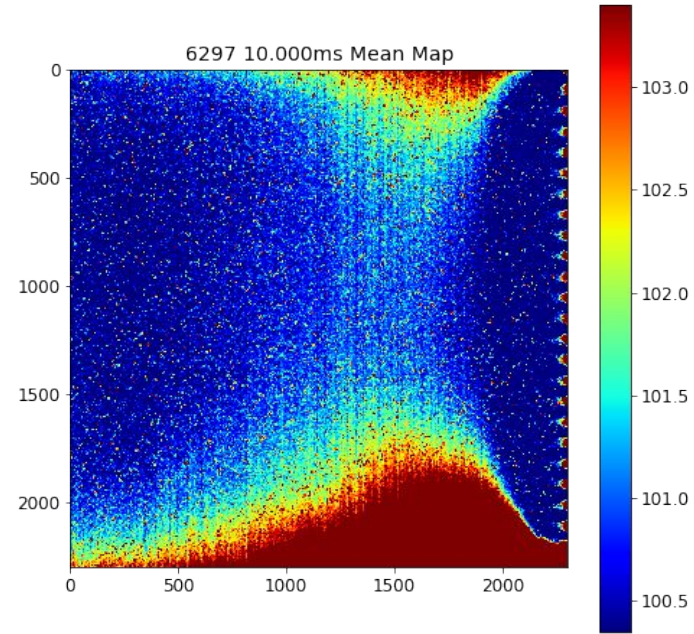
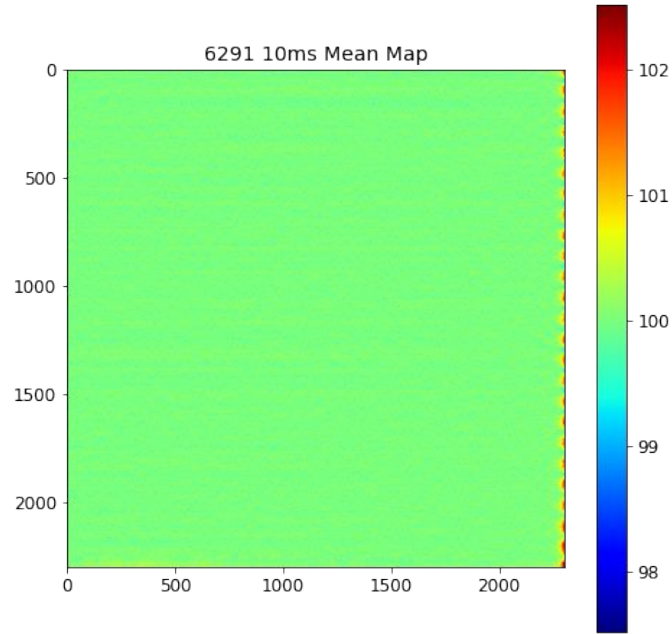
Exposure Times:
10, 30, 100, 300, 1k, 3k,
10k ms

The STD almost
doubled(5.39) in 3k ms

The Mean still around
100 ADC.

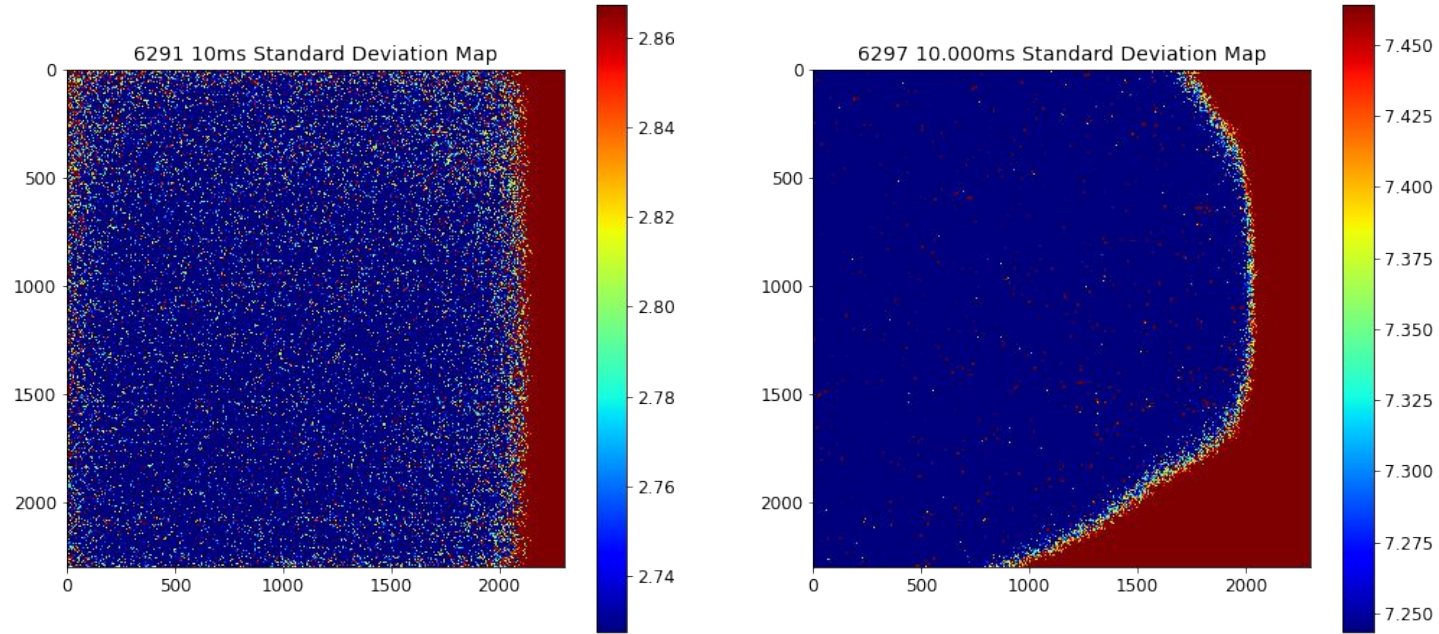
Orca Fusion BT: Mean Map

Stochastic Image Analysis - Orca Fusion BT 15440



Orca Fusion BT: Standard Deviation Map

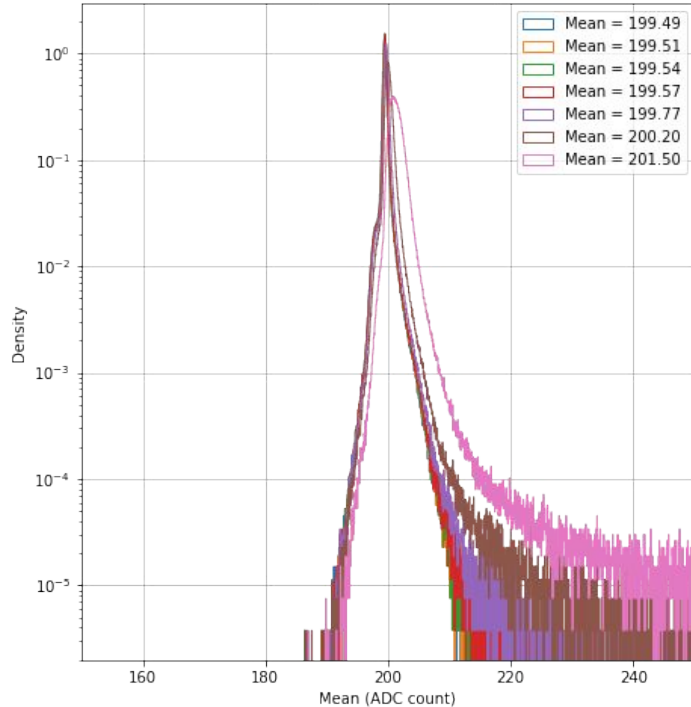
Stochastic Image Analysis - Orca Fusion BT 15440



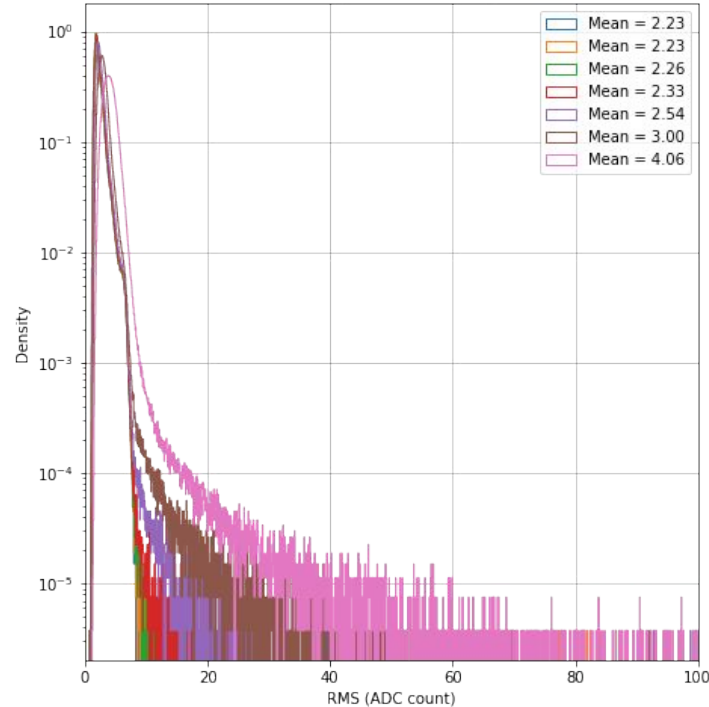
Orca Quest

Stochastic Image Analysis - Orca Quest 15550

Histogram - Mean Image



Histogram - STD Map



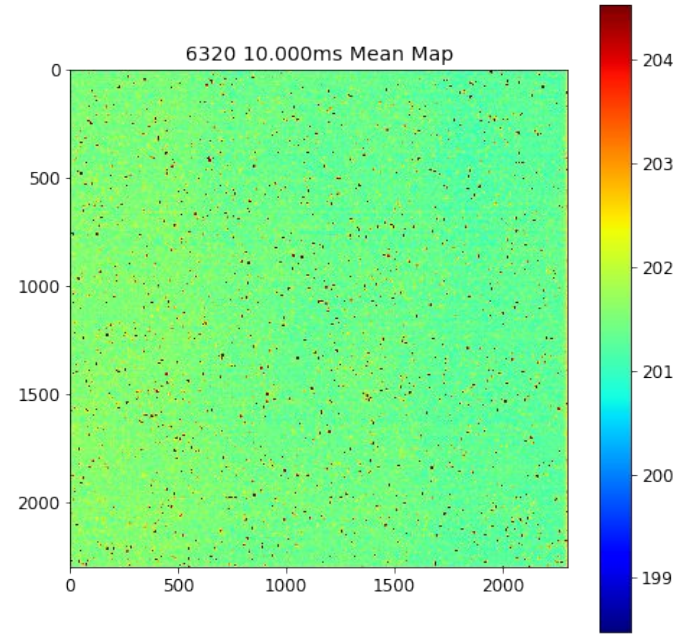
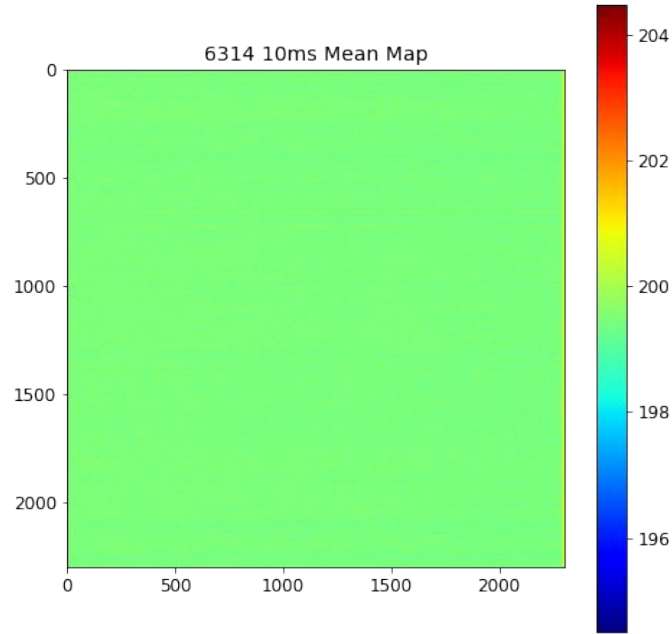
Exposure Times:
10, 30, 100, 300, 1k, 3k,
10k ms

The STD does not
double even in the
highest exposure time

The Mean still around
200 ADC.

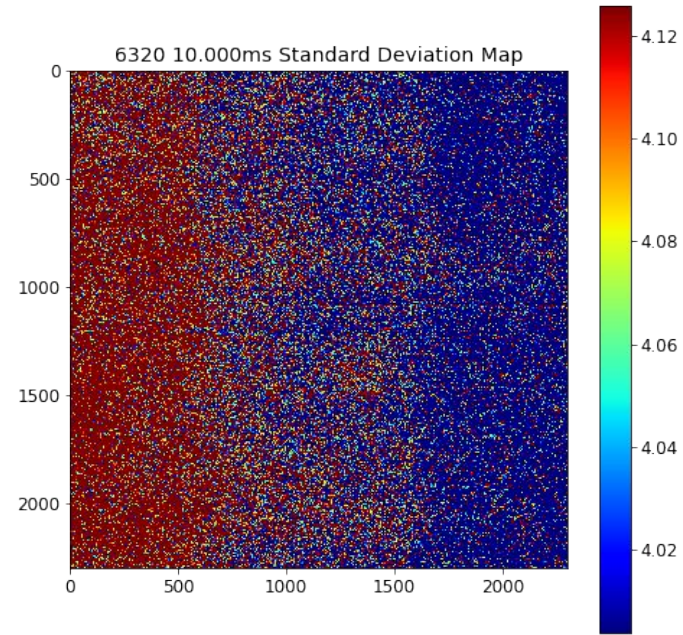
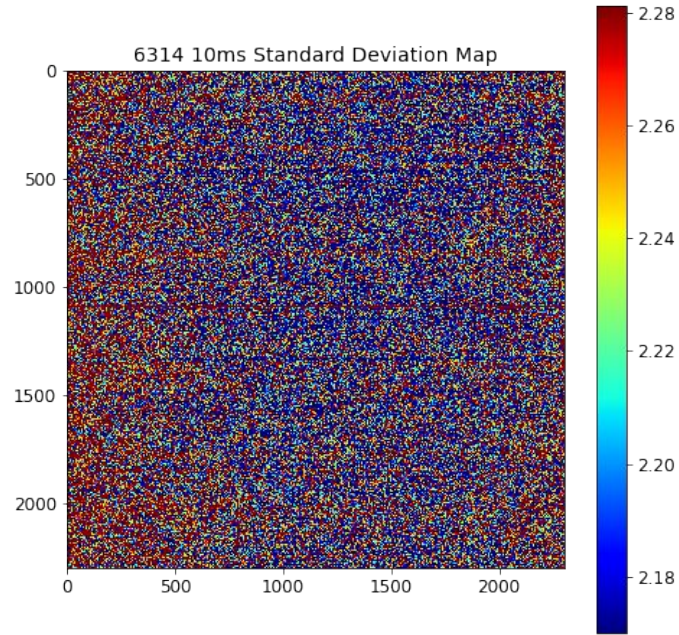
Orca Quest: Mean Map

Stochastic Image Analysis - Orca Quest 15550



Orca Quest: Mean Map

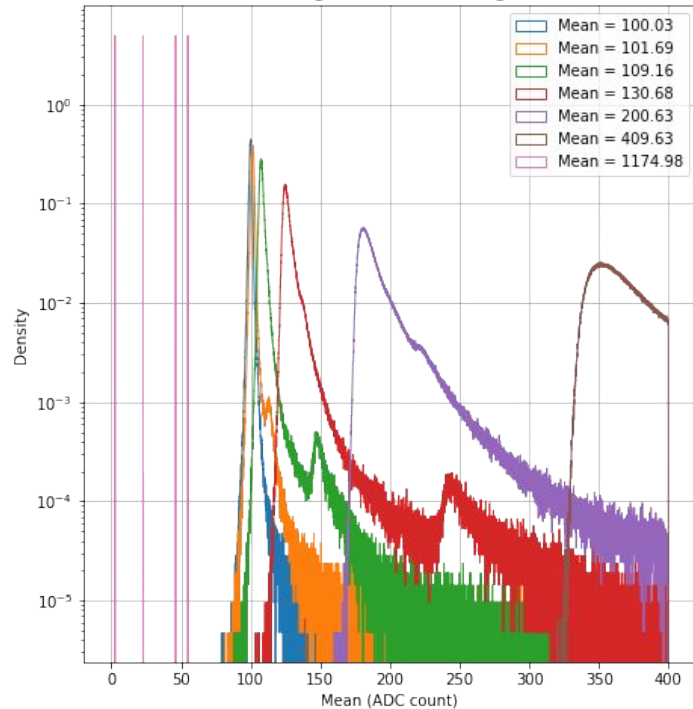
Stochastic Image Analysis - Orca Quest 15550



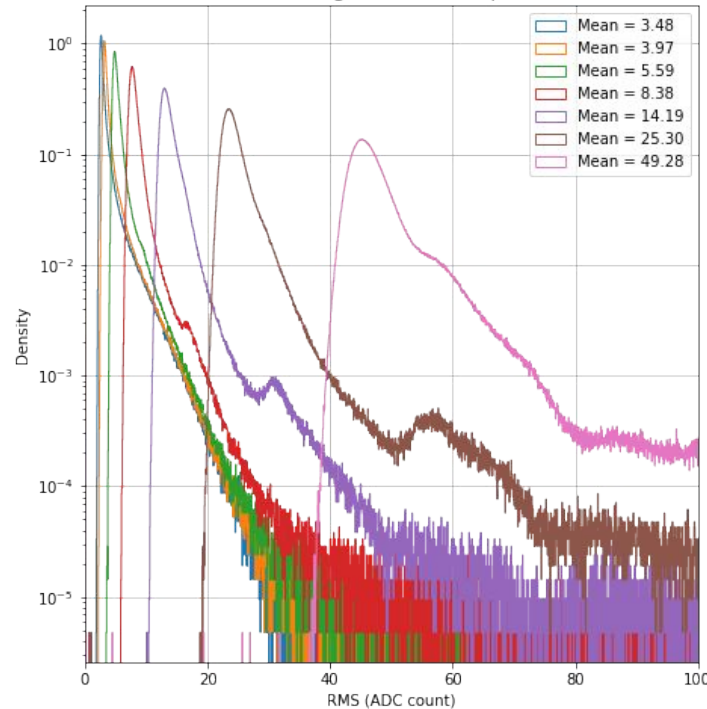
Thorit

Stochastic Image Analysis - Thorit 11440

Histogram - Mean Image



Histogram - STD Map



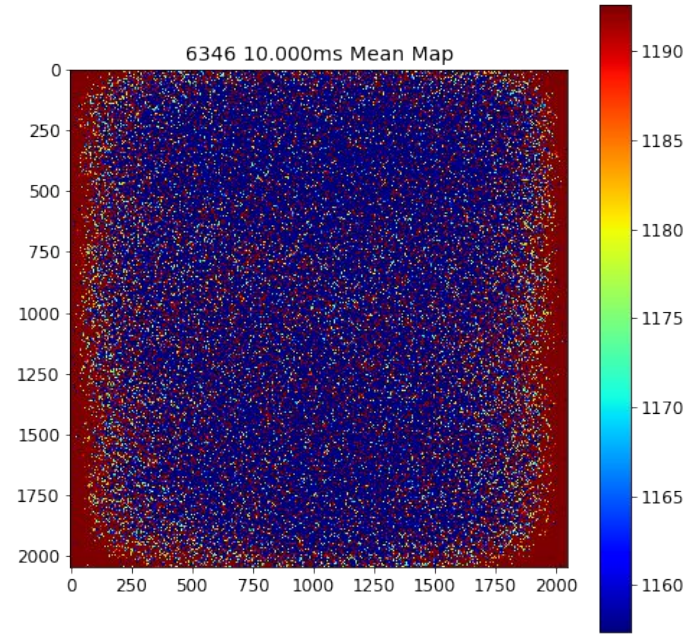
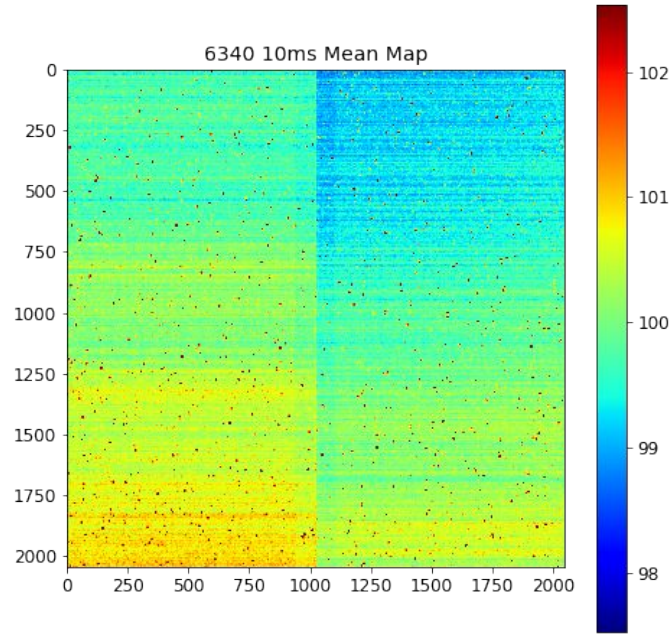
Exposure Times:
10, 30, 100, 300, 1k, 3k ,
10k ms

The STD more than doubled in 300ms and reaching more than 14x in the maximum exposure time.

The Mean continued to increase along the exposure time, reaching 10x the initial value for the minimum exposure time.

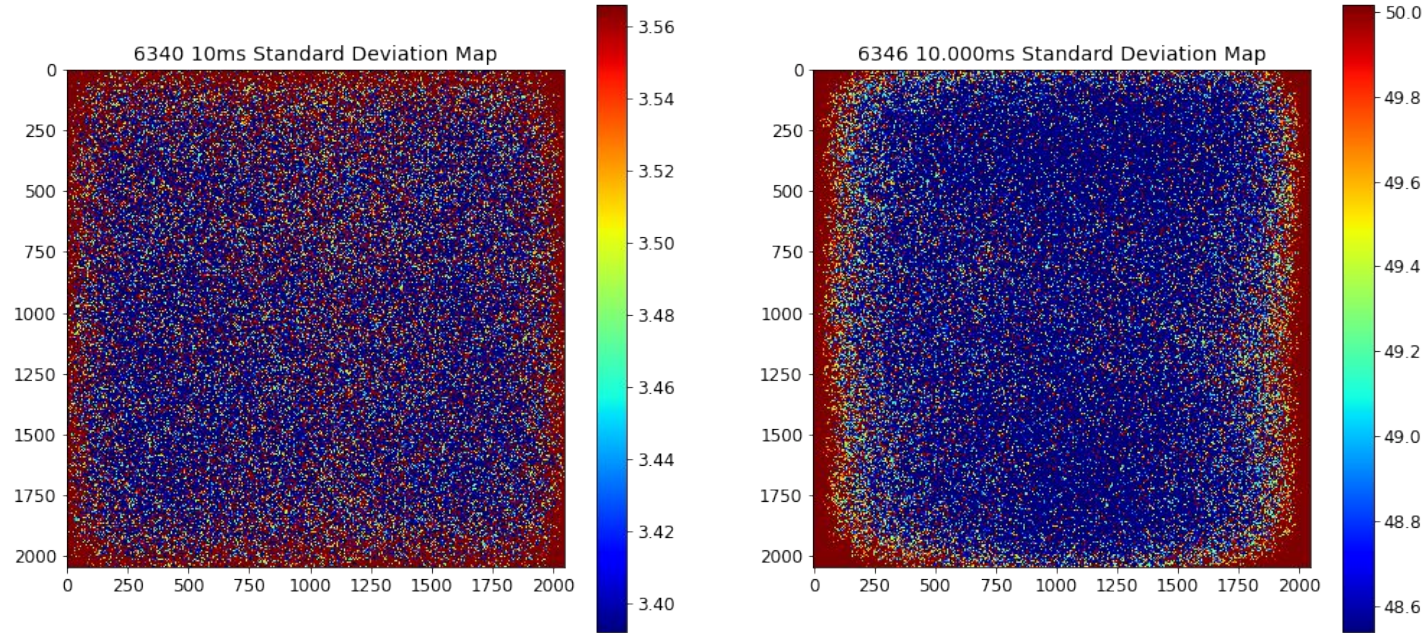
Thorit: Mean Map

Stochastic Image Analysis - Thorit 11440

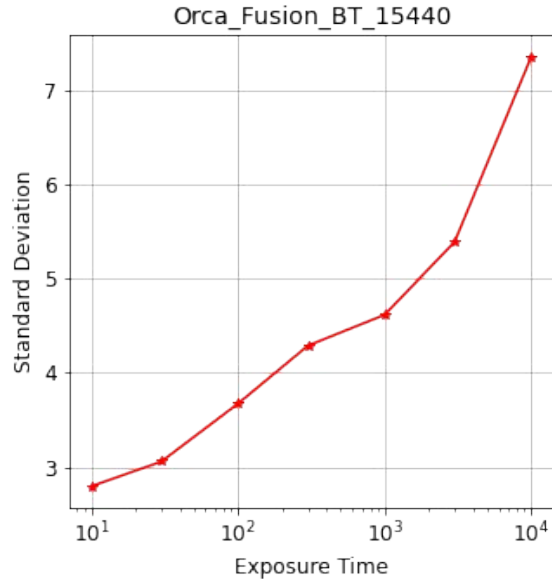


Thorit: Standard Deviation Map

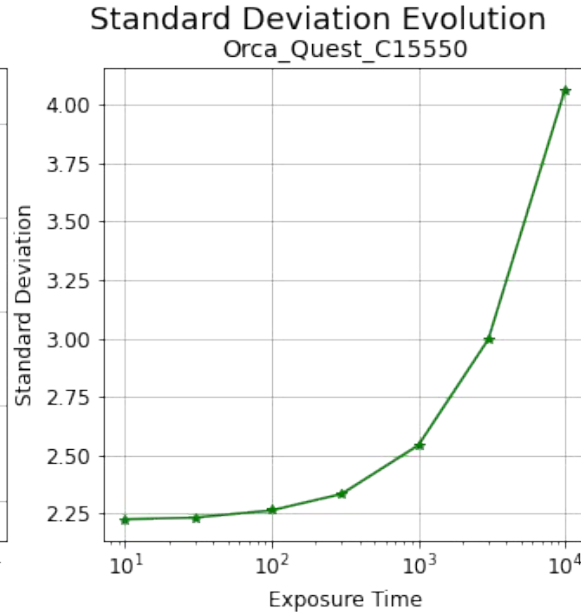
Stochastic Image Analysis - Thorit 11440



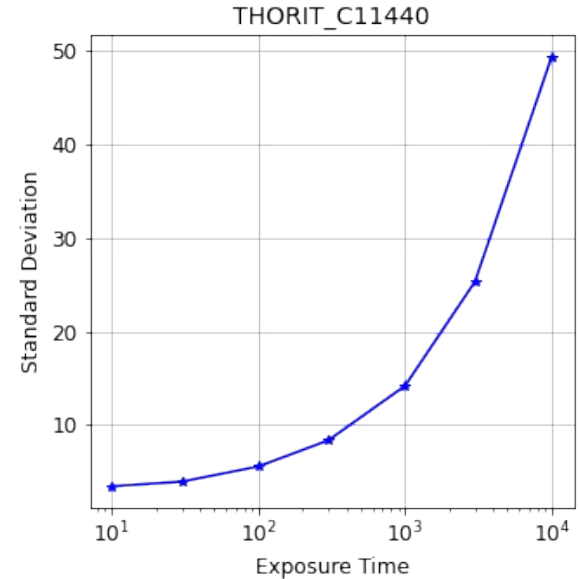
Standard Deviation Evolution over Exposure Time



Min 2.80 | Max 7.35

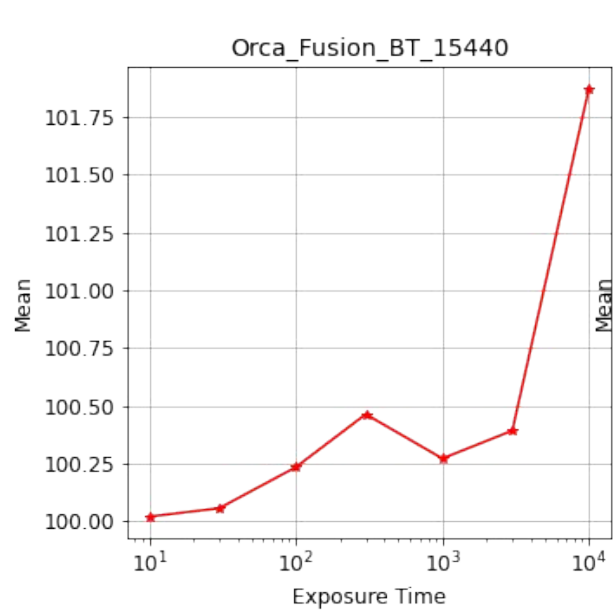


Min 2.36 | Max 4.09

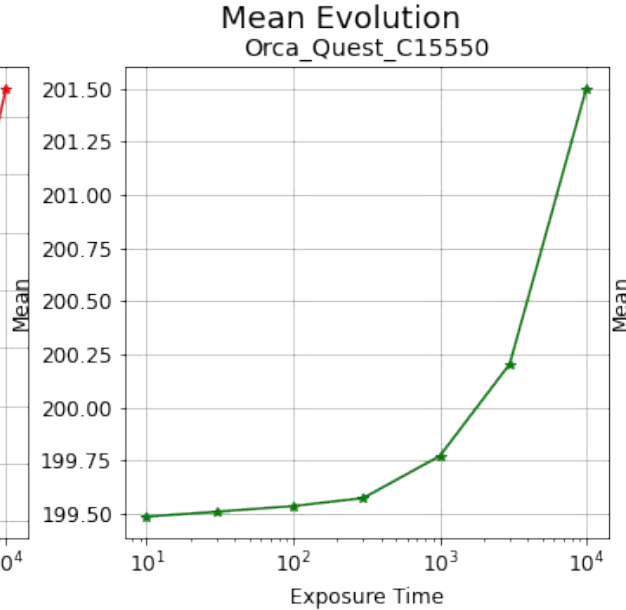


Min 3.48 | Max 49.28

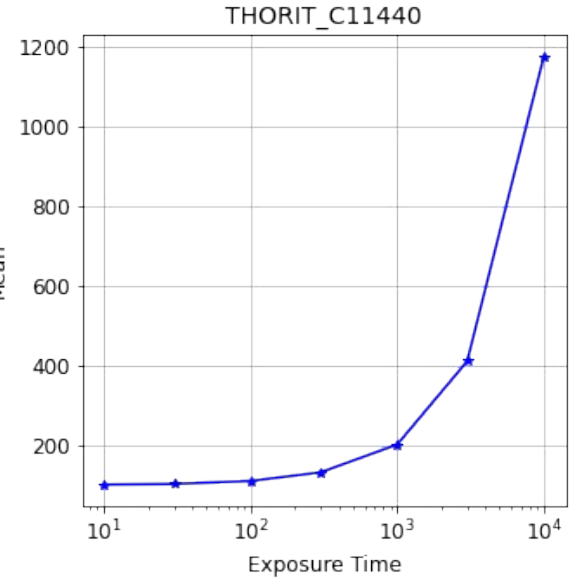
Mean Evolution over Exposure Time



Min 100.02 | Max 101.87



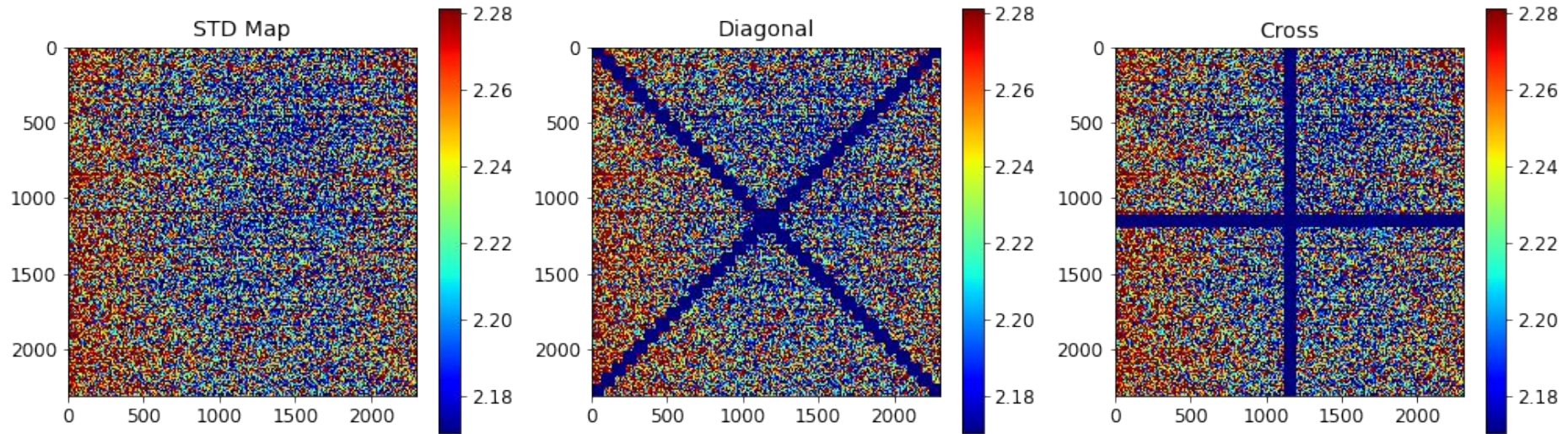
Min 199.49 | Max 201.50



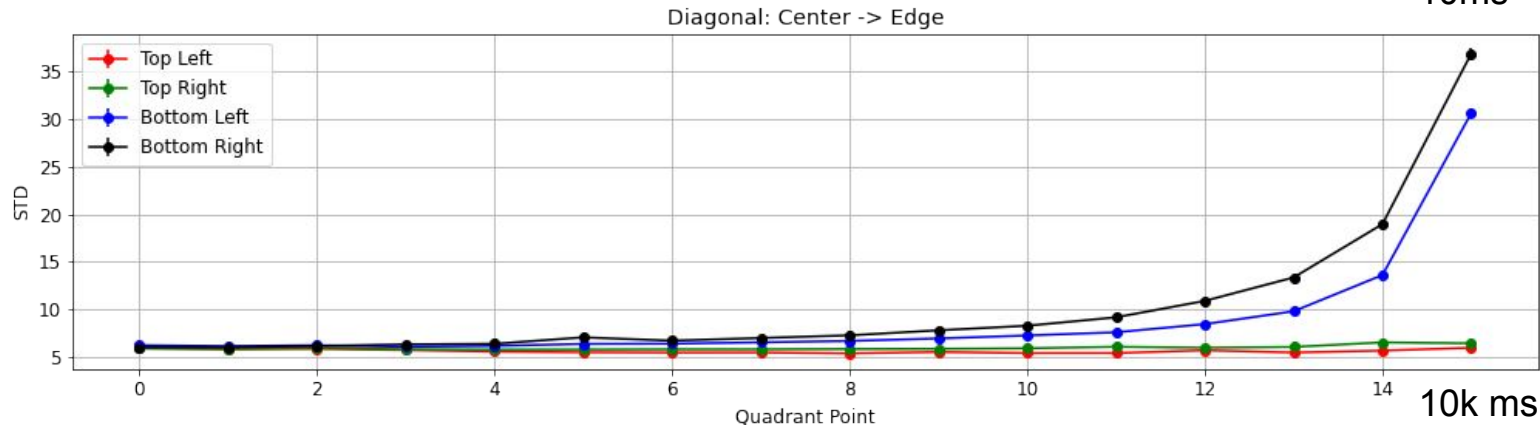
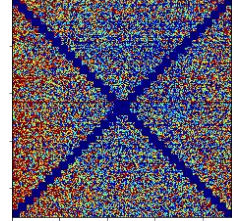
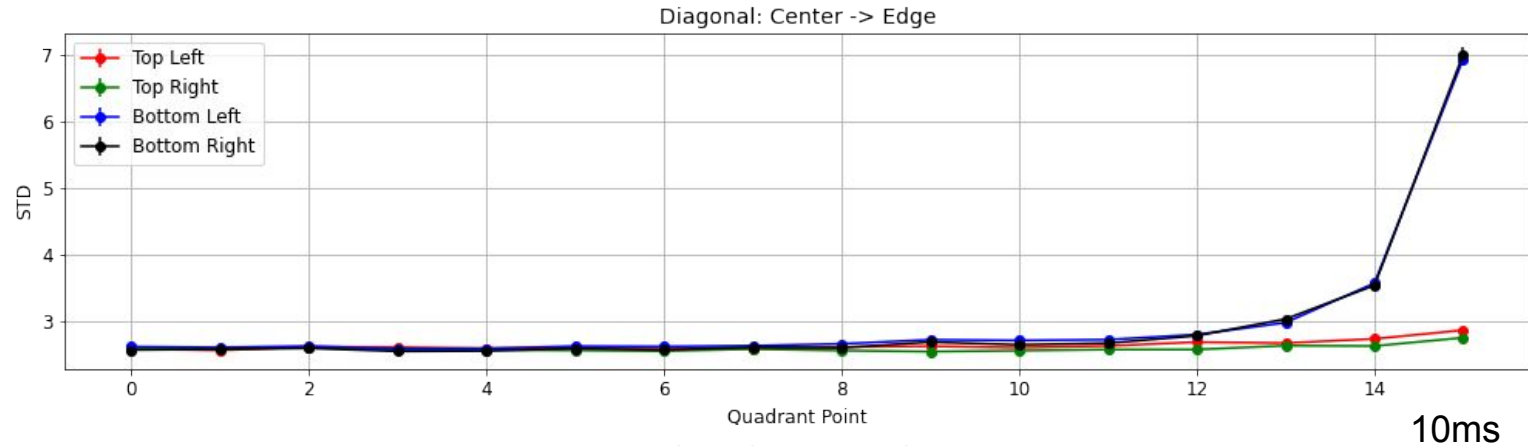
Min 100.30 | Max 1174.98

Quadrants Analysis

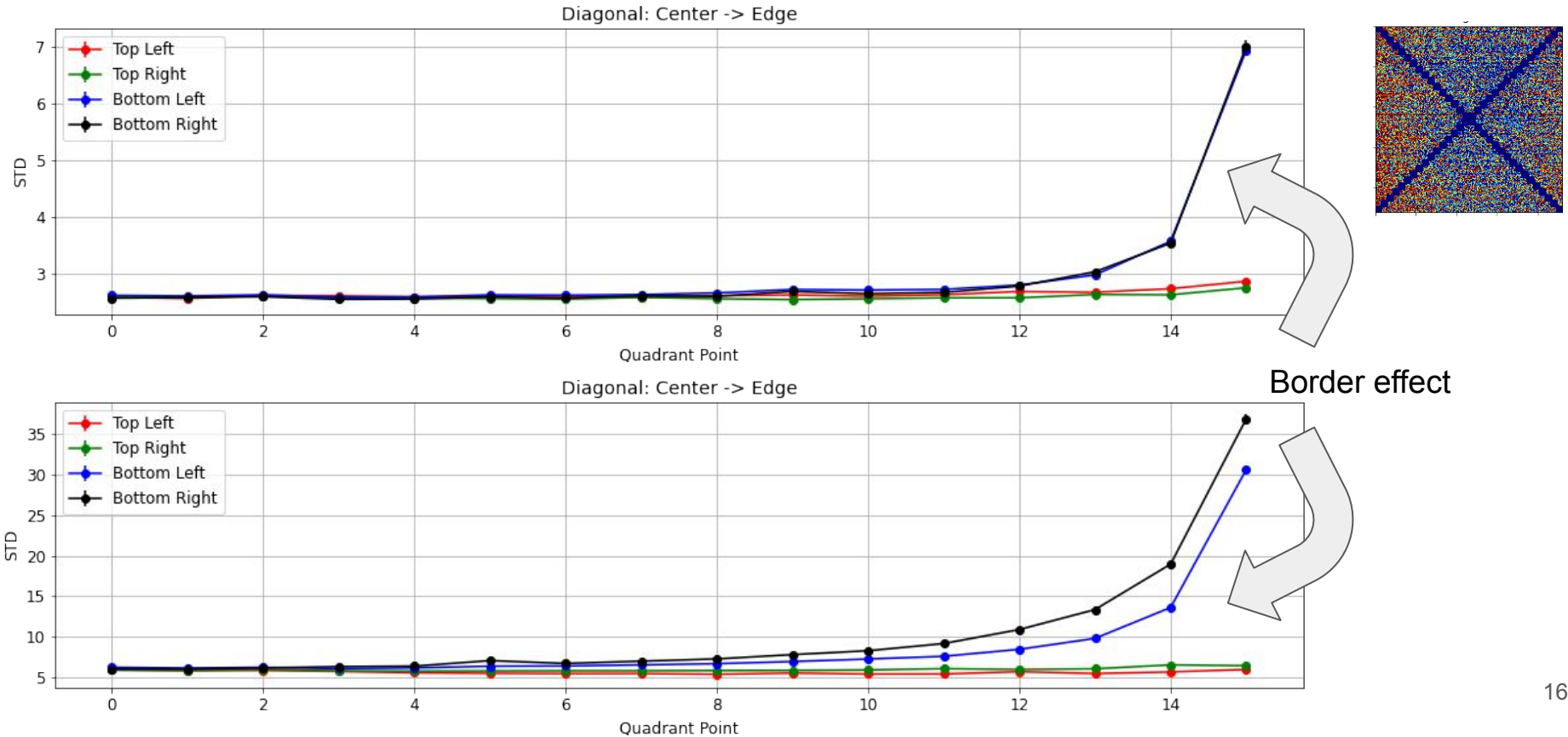
histograms_Run06314 - Quadrant Analysis



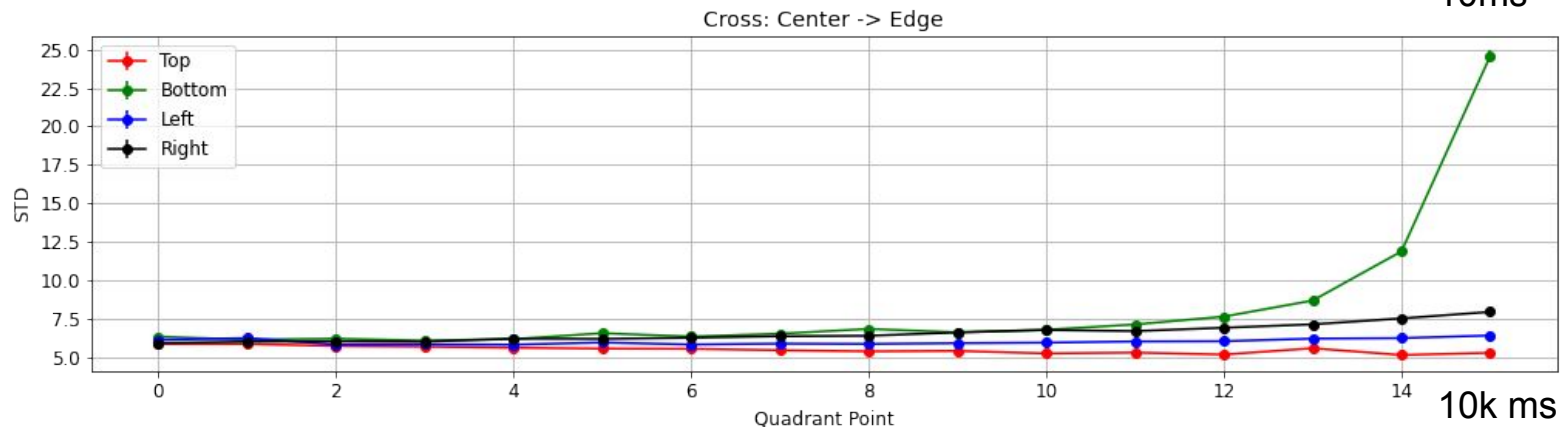
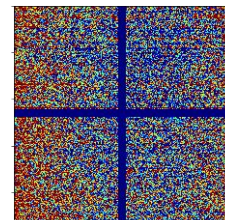
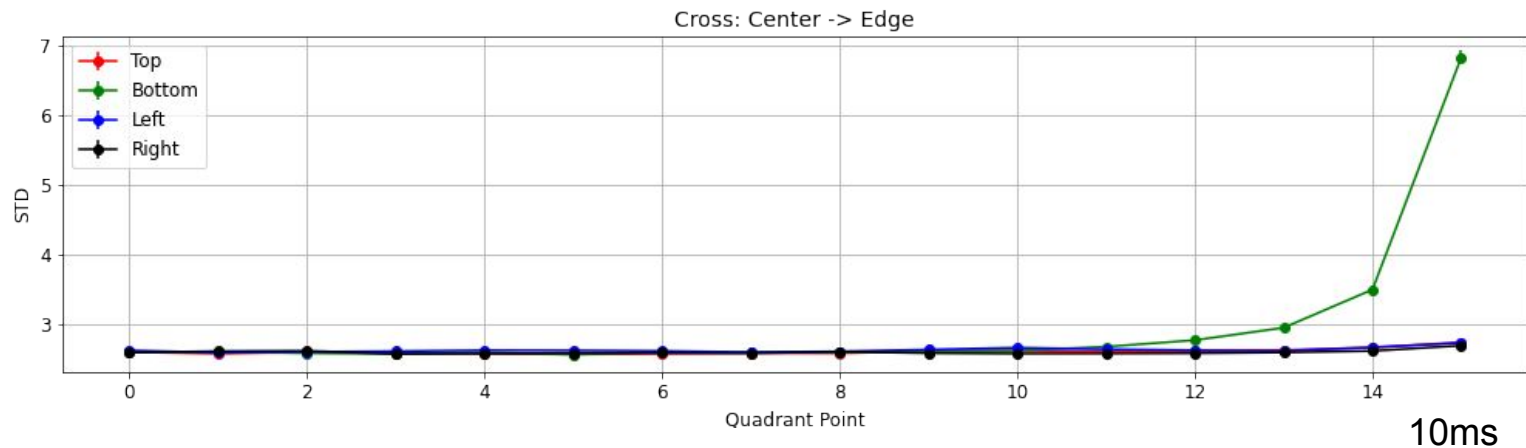
Orca Fusion BT: Diagonal



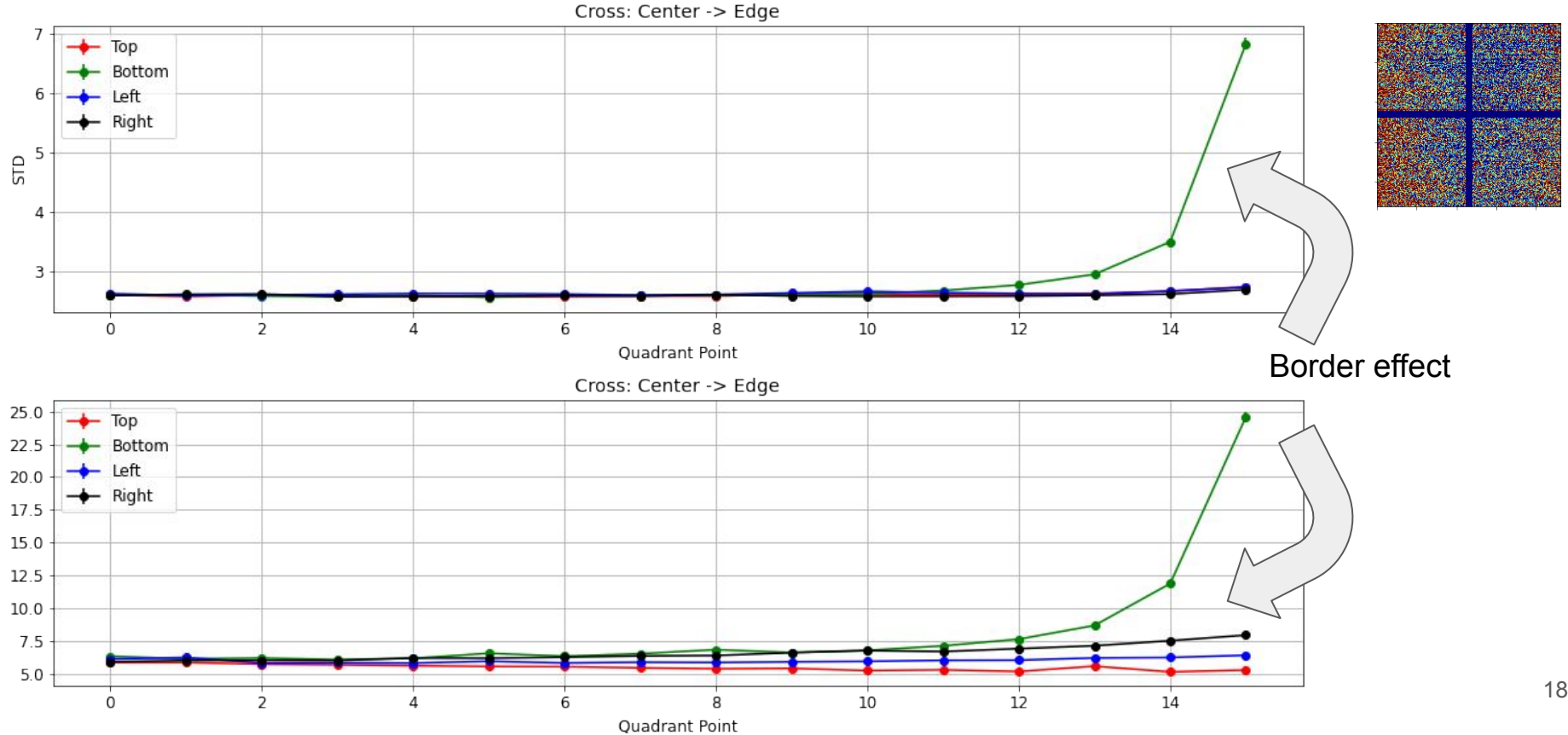
Orca Fusion BT: Diagonal



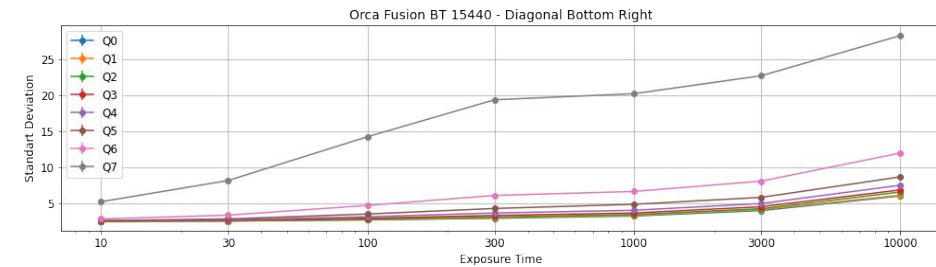
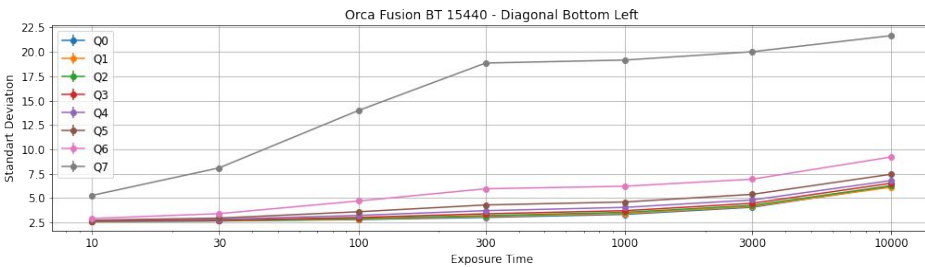
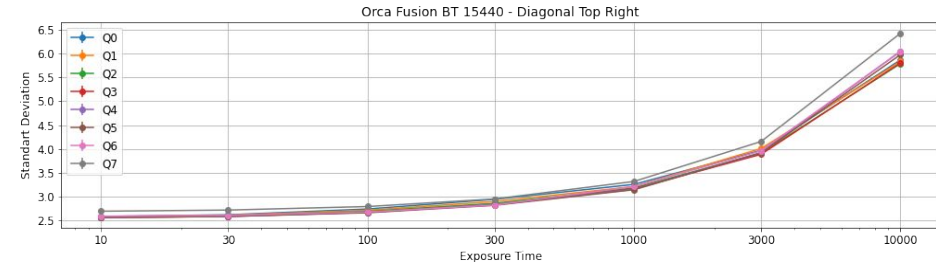
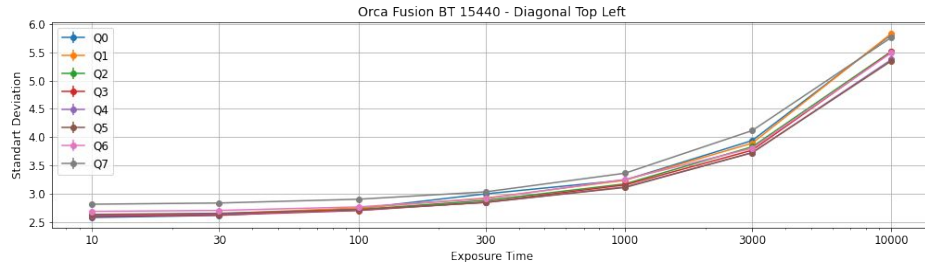
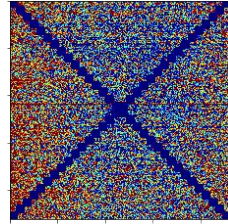
Orca Fusion BT: Cross



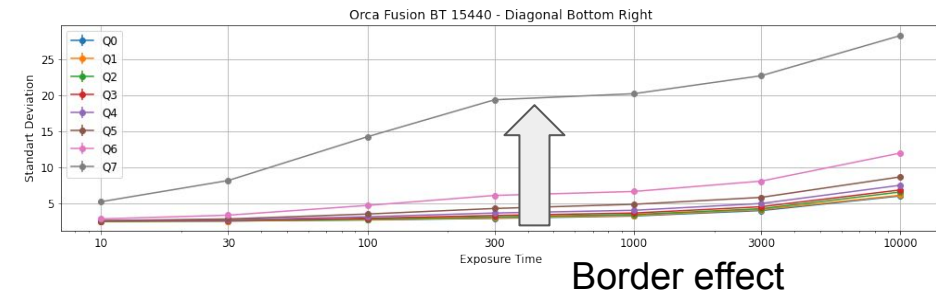
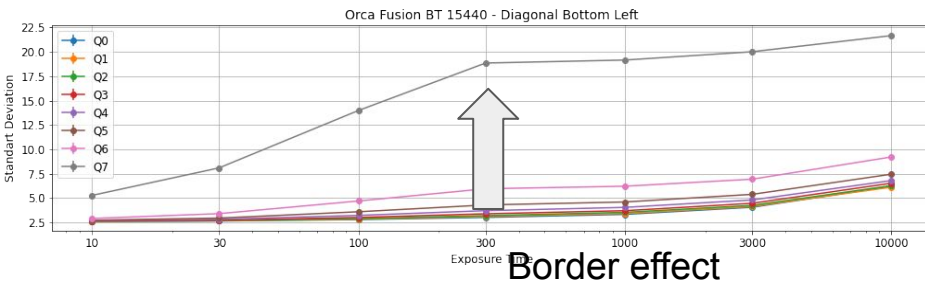
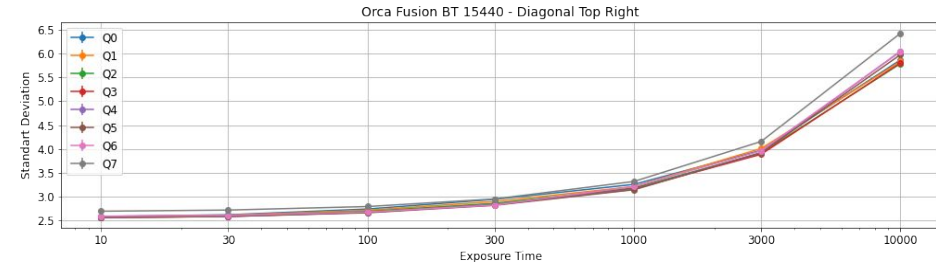
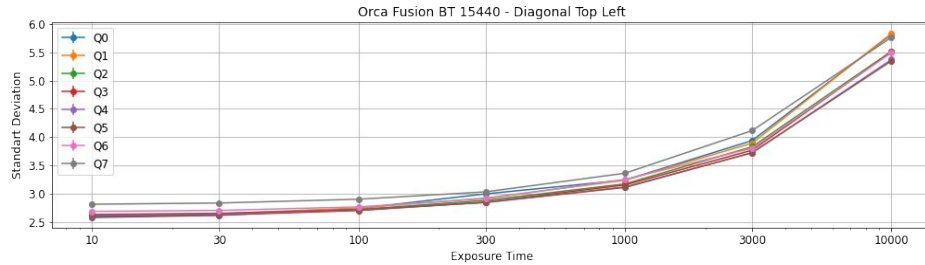
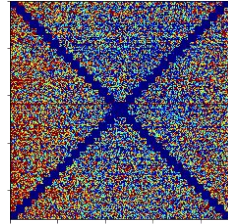
Orca Fusion BT: Cross



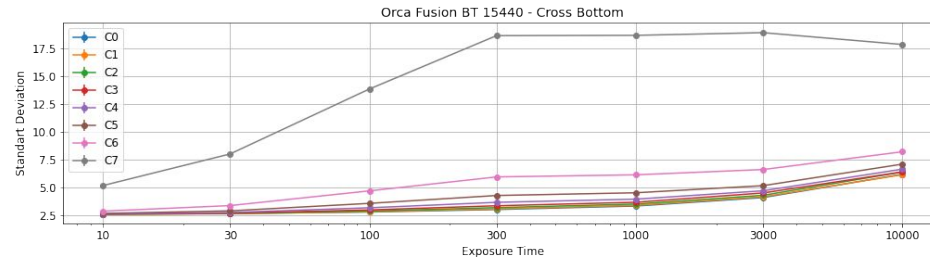
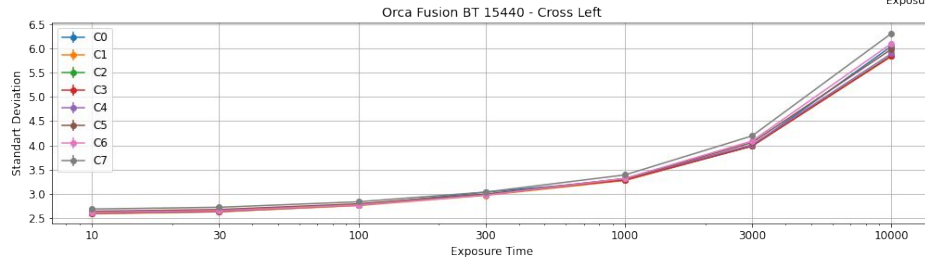
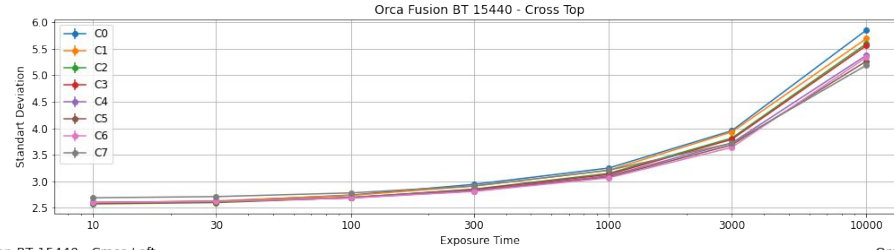
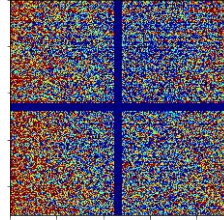
Orca Fusion BT: Diagonal over Exp. Time



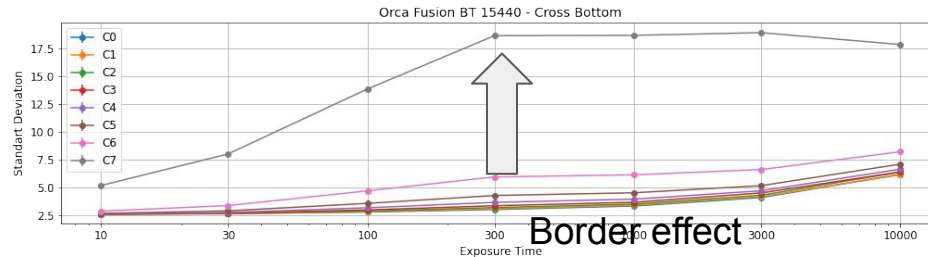
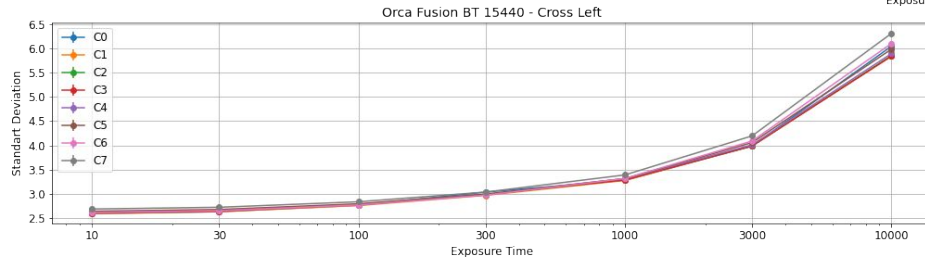
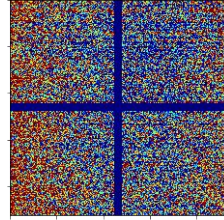
Orca Fusion BT: Diagonal over Exp. Time



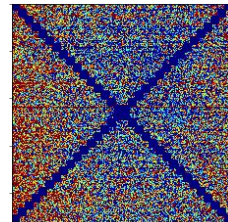
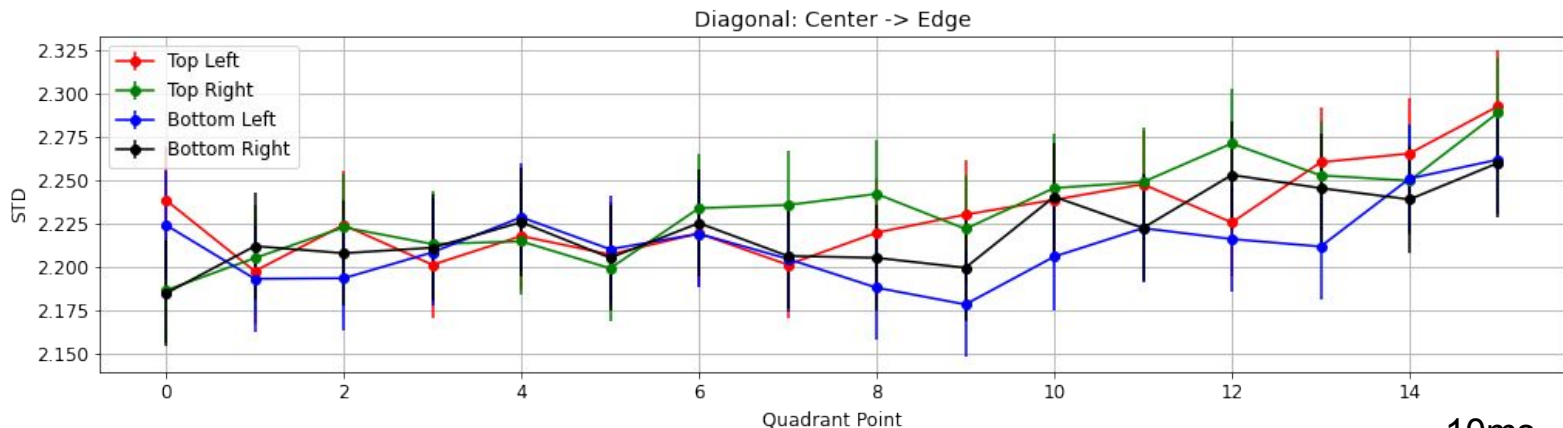
Orca Fusion BT: Cross over Exp. Time



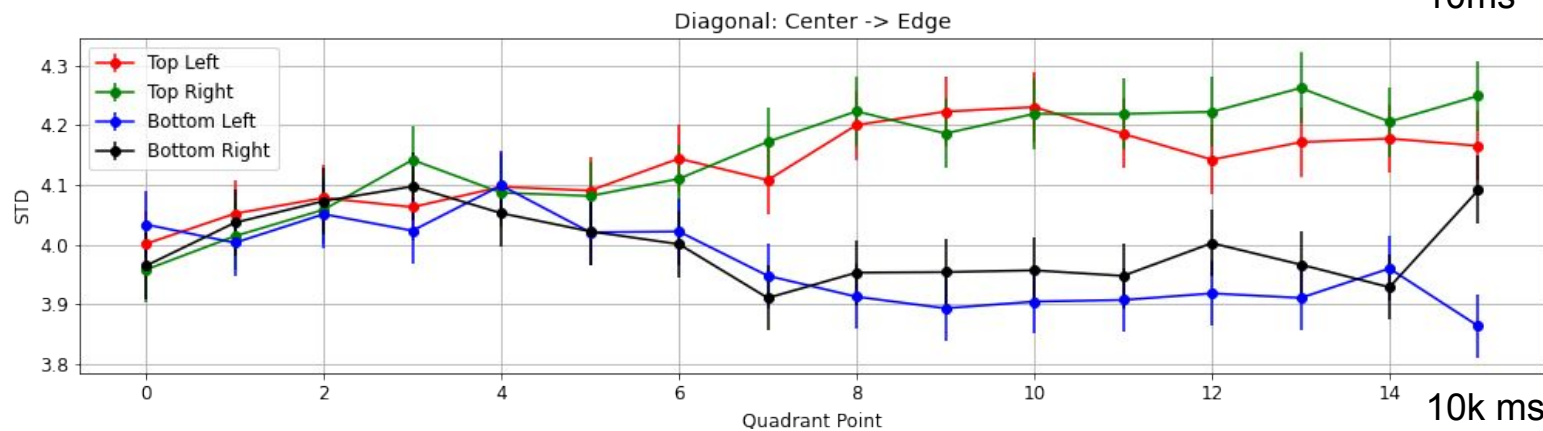
Orca Fusion BT: Cross over Exp. Time



Orca Quest: Diagonal

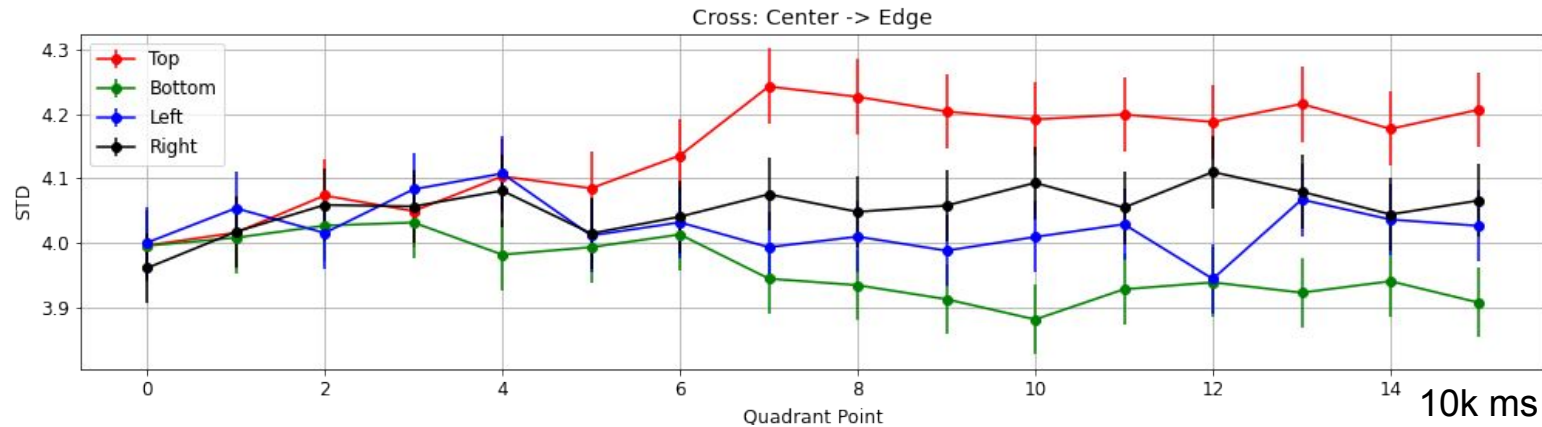
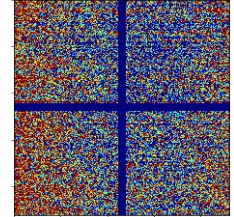
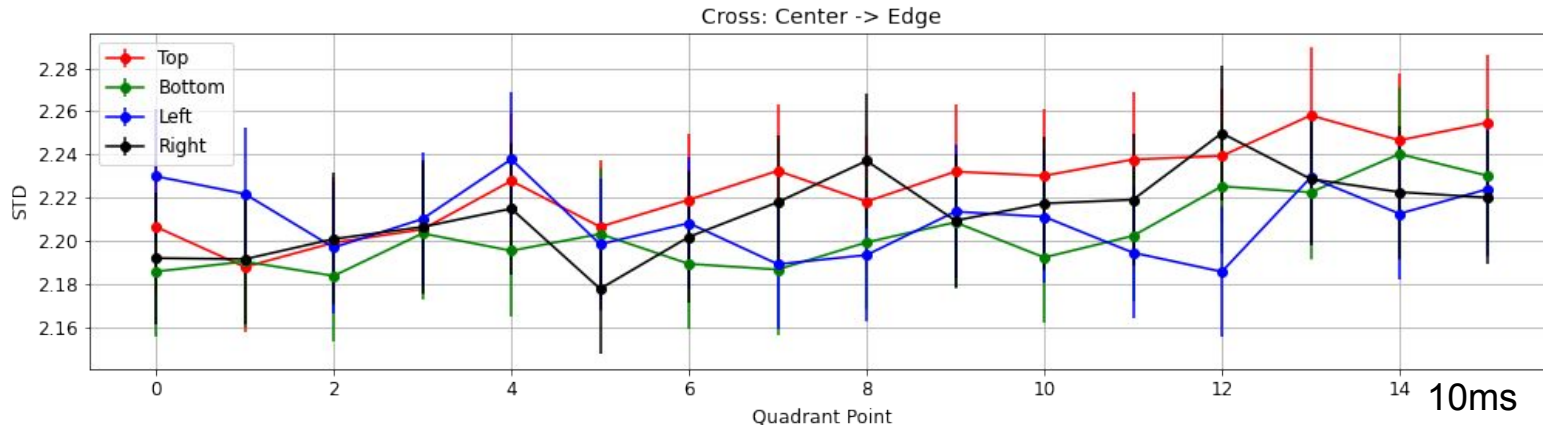


10ms

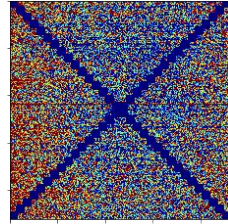


10k ms

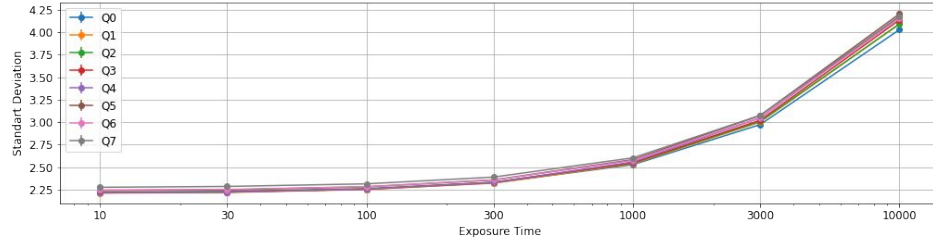
Orca Quest: Cross



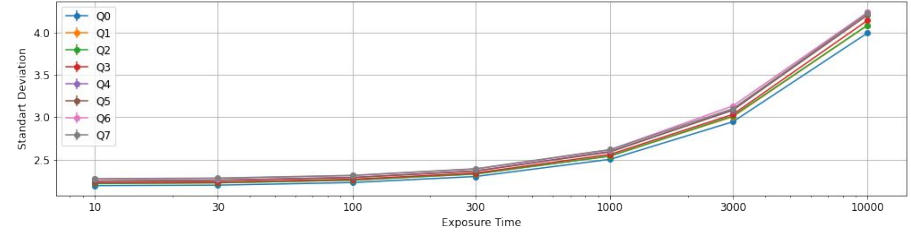
Orca Quest: Diagonal over Exp. Time



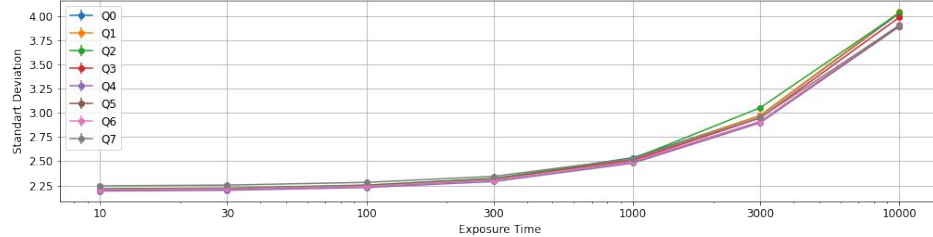
Orca Quest C15550 - Diagonal Top Left



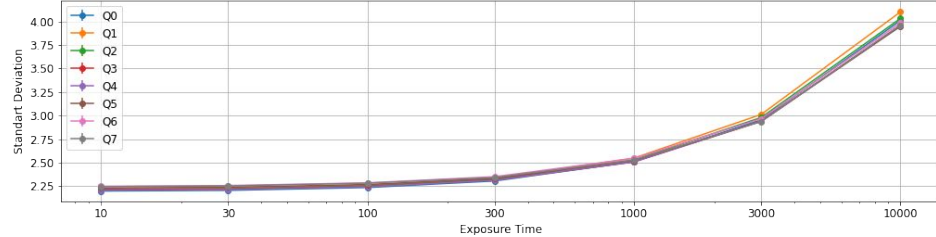
Orca Quest C15550 - Diagonal Top Right



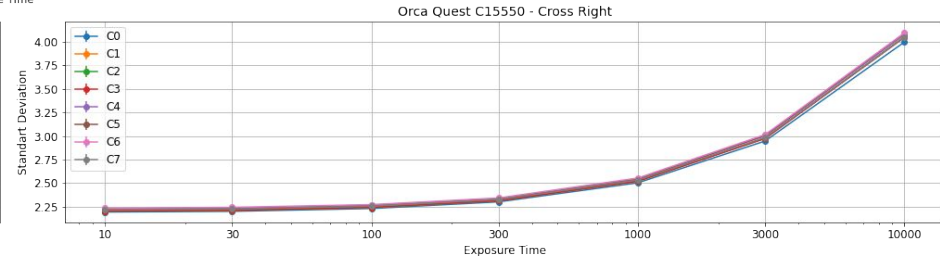
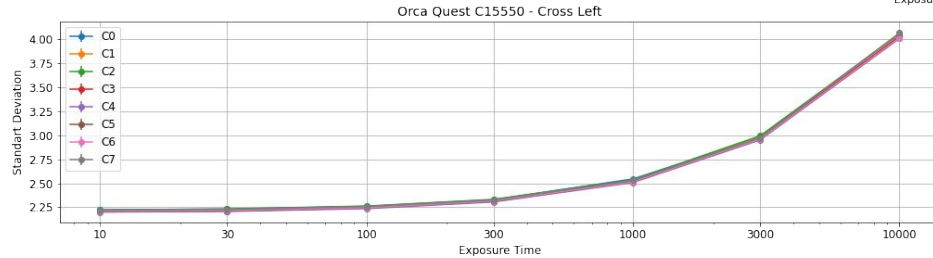
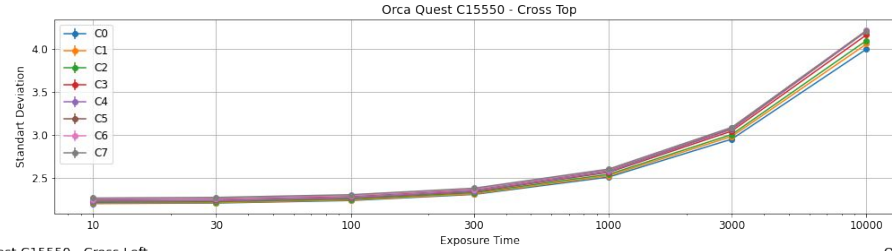
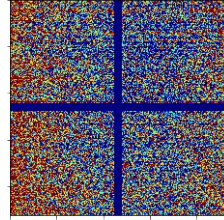
Orca Quest C15550 - Diagonal Bottom Left



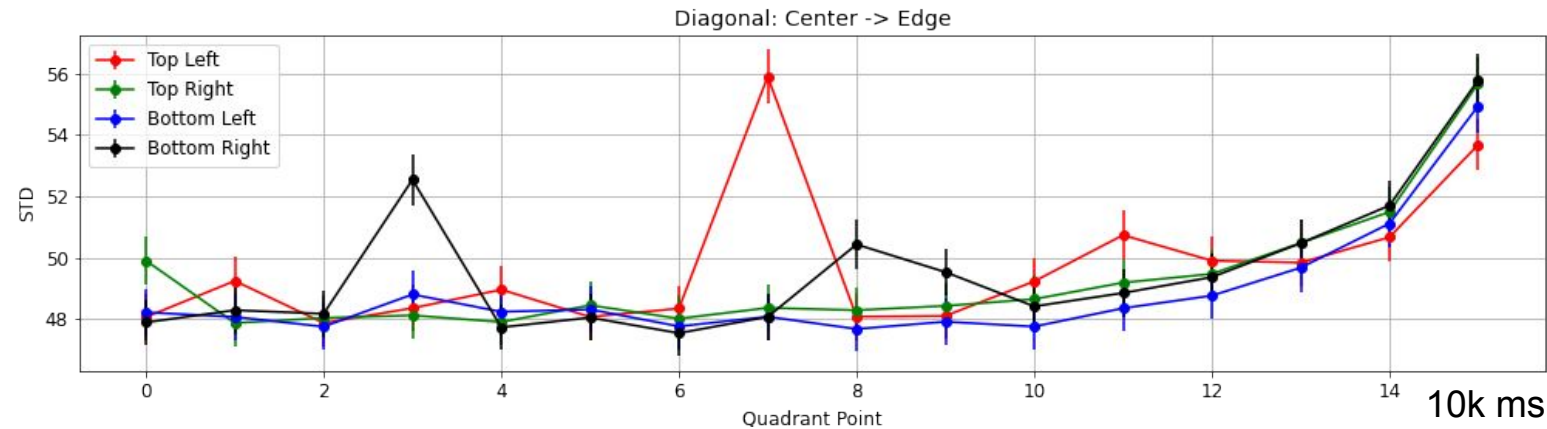
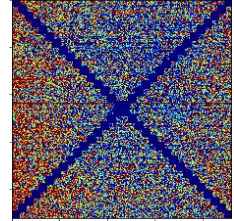
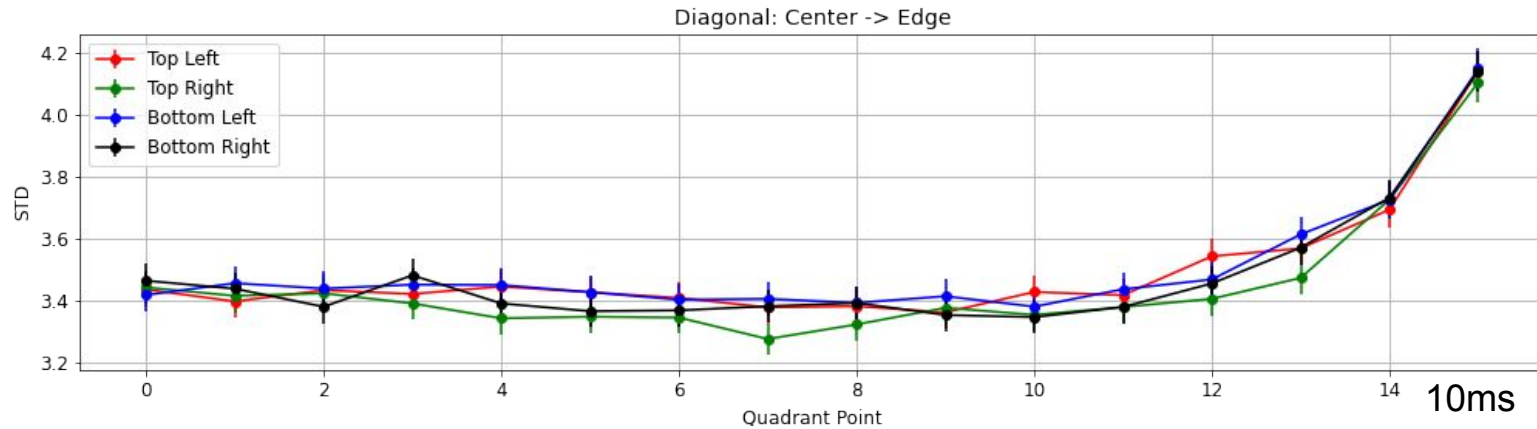
Orca Quest C15550 - Diagonal Bottom Right



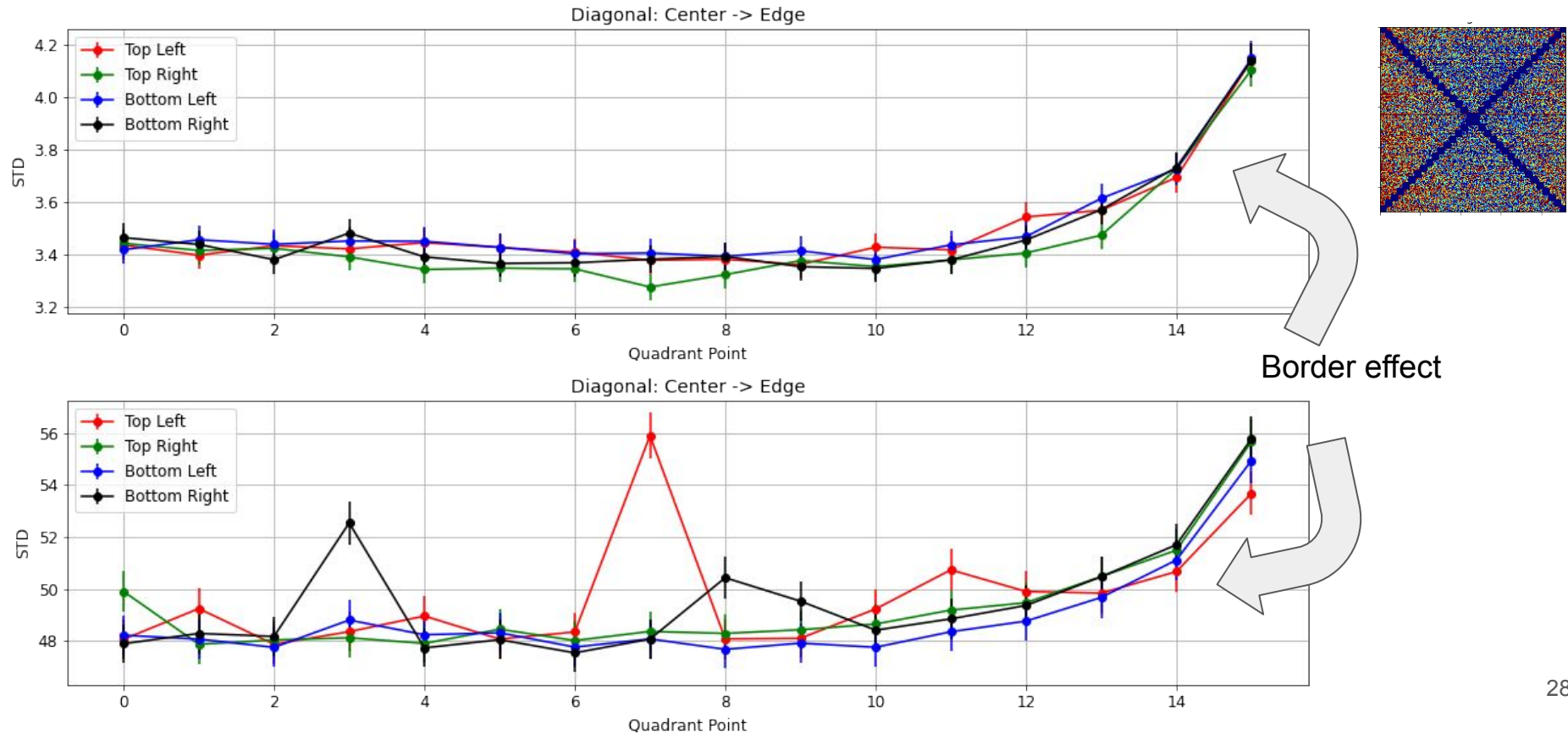
Orca Quest: Cross over Exp. Time



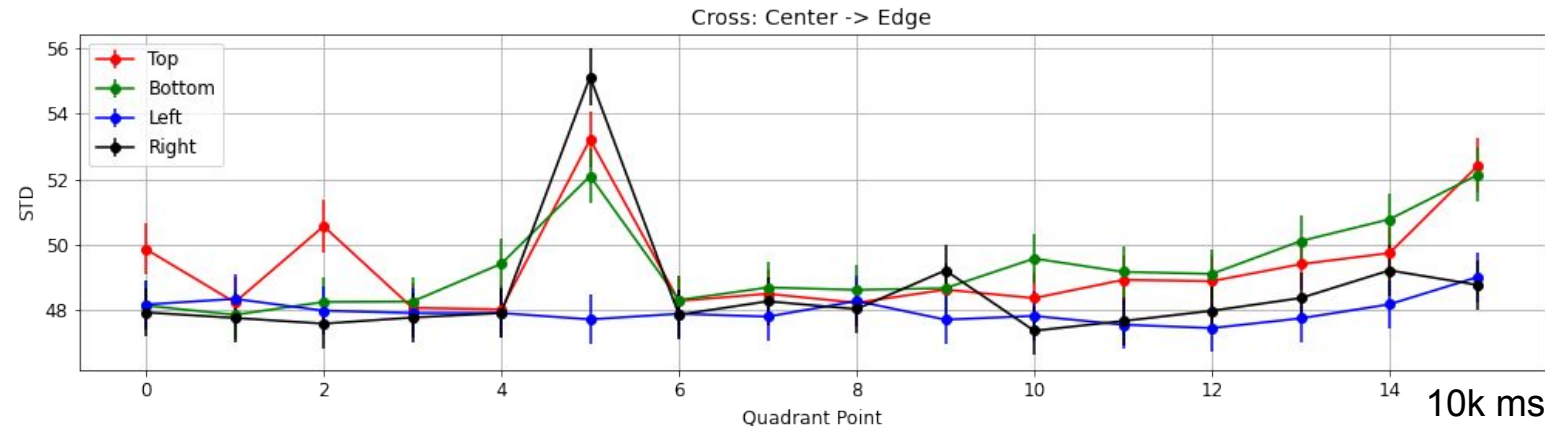
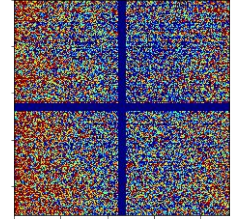
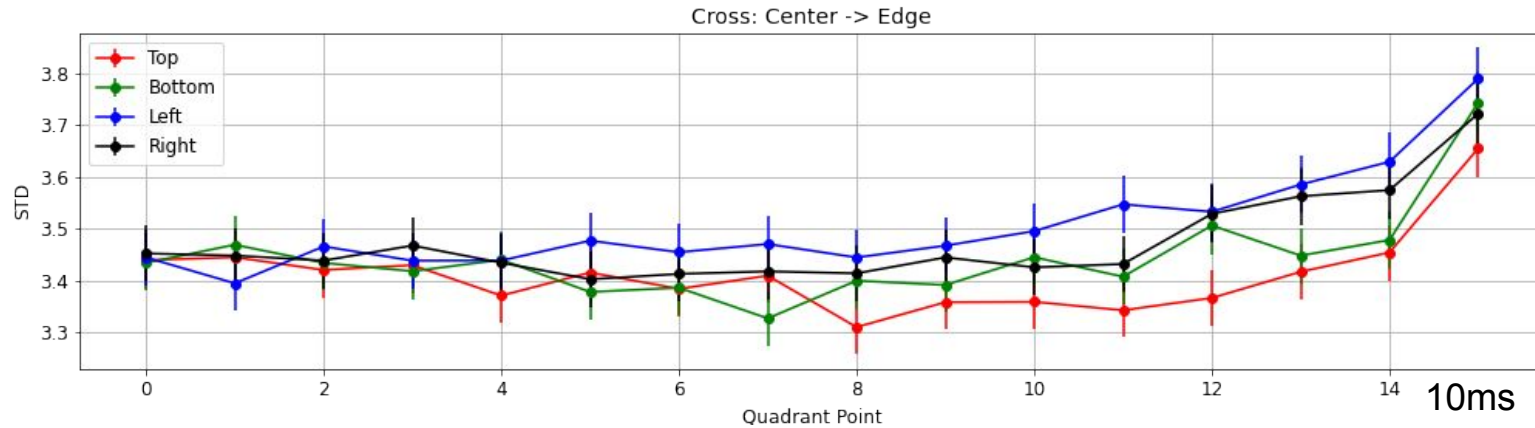
Thorit: Diagonal



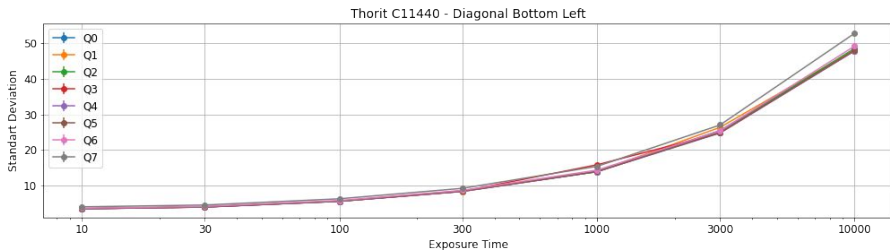
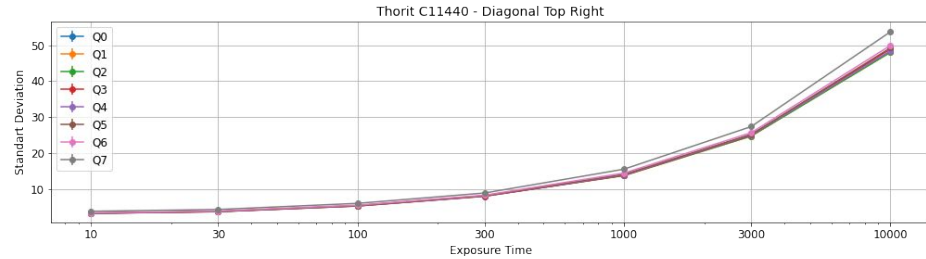
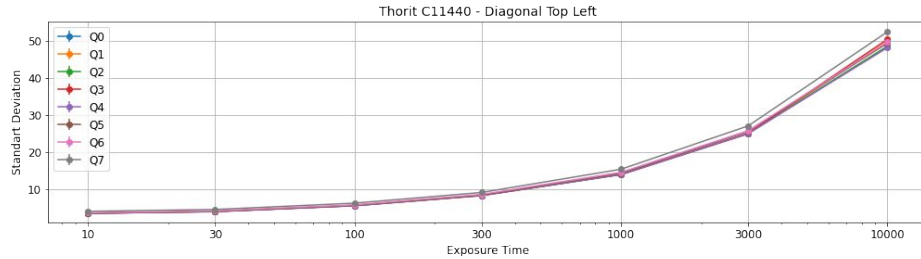
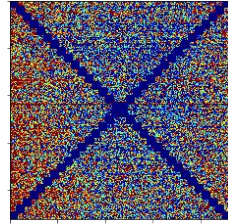
Thorit: Diagonal



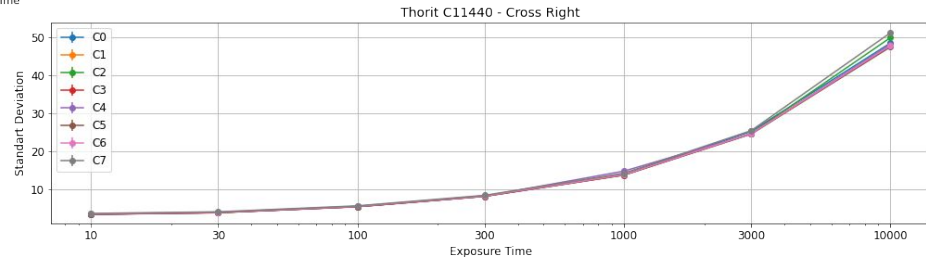
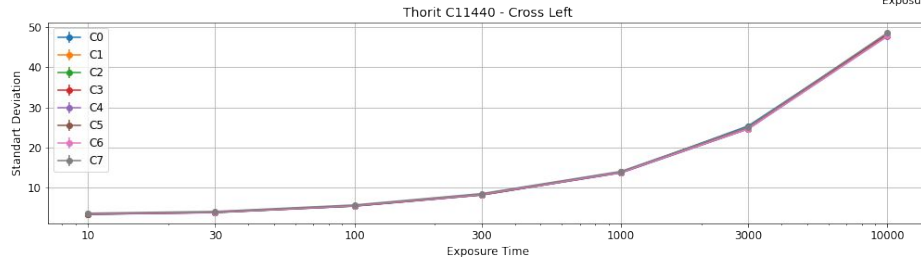
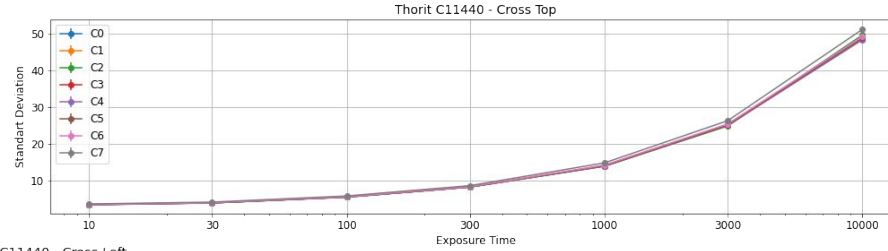
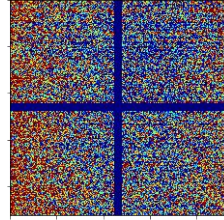
Thorit: Cross



Thorit: Diagonal over Exp. Time

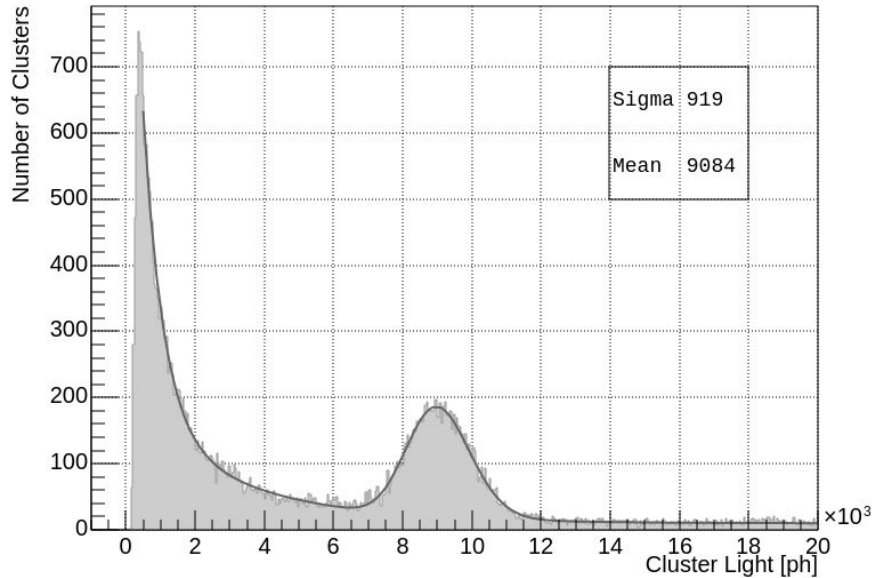


Thorit: Cross over Exp. Time



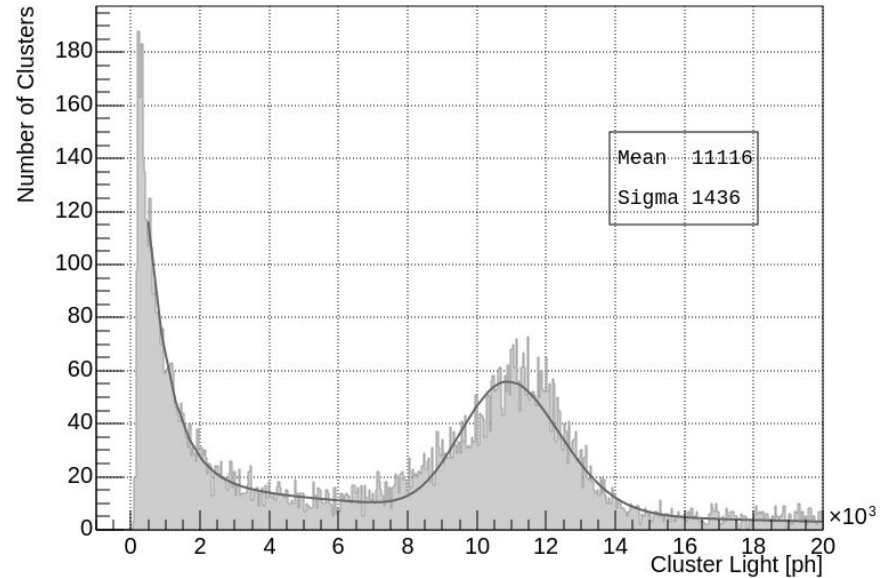
Conversion Factor

Orca Quest



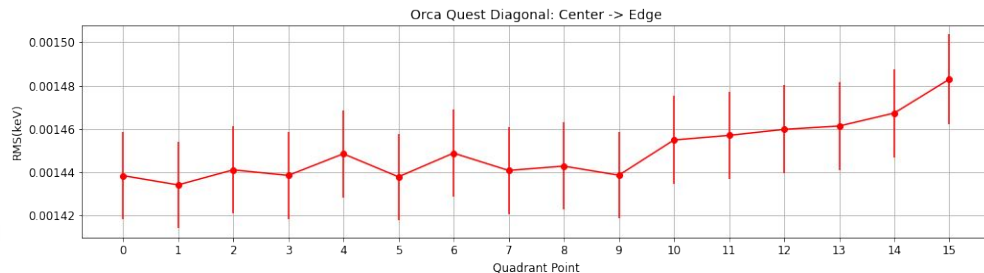
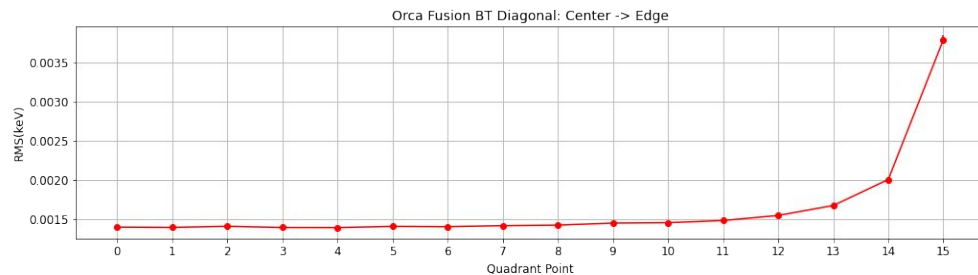
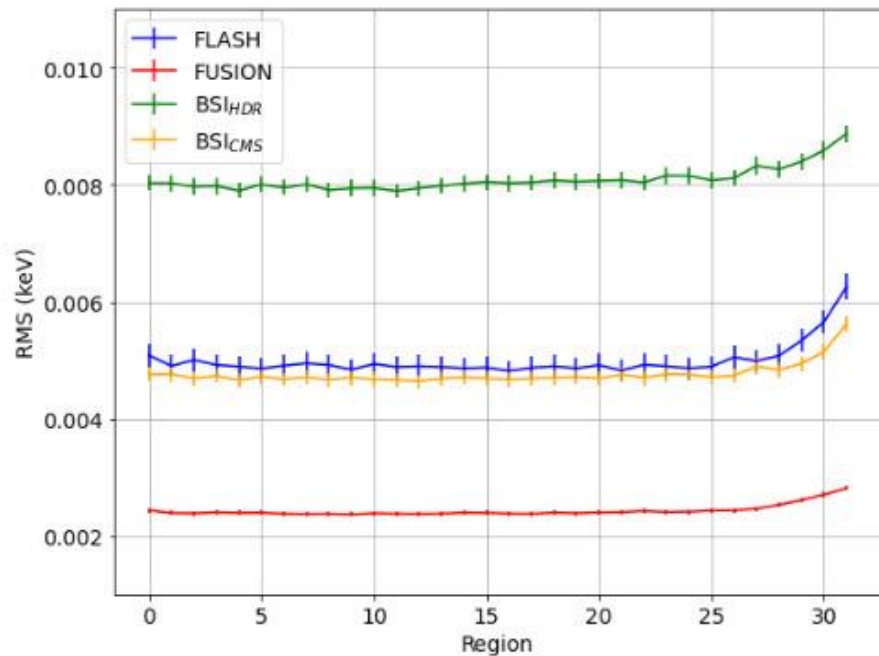
Energy Resolution: 10.11%

Orca Fusion BT



Energy Resolution: 12.9%

Read Noise [keV]



Conclusions

- The sensor Orca Quest had best performance in pedestal images. It has no border effect and the STD did not increase too much even increasing the exposure time. The Energy resolution is 10.11%.
- The sensor Orca Fusion BT had good performance in pedestal images, but its STD doubled at 3k ms and reached 3x the initial value for the maximum exposure time. It also had border effect and the Energy Resolution is 12.9%.
- The sensor Thorit do not presented a good performance in pedestal images, its is noisy since the minimum exposure time and get increasing strongly when the exposure time is increased. The STD also increased more than 14x comparing the 10ms and 10k ms exposure times. I couldn't yet determine its Energy Resolution due some difficulties in carrying out the reconstruction.

Next steps

- Determine the Thorit Energy Resolution.
- Verify if the “GEM1_V” change causes the expected effect to the ^{55}Fe energy distribution (E_sim) for energies below 6 keV.

THANK YOU

GRACIAS ARIGATO SHUKURIA JUSPAXAR DANKSCHEEN TASHAKKUR ATU SUKSAMA EKGHMET GRAZIE MEHRBANI BOLZIN MERCY TINGKI BIYAN SHUKRIA YUSPAGADATTAM HUI HATUR G SIKOMO MAKETAJ MINMONCHAR FAKAAGUE AGUYJE EFCHARISTO GOZAIMASHITA MERASTAHMY SAIKO KOMAPSUMNIDA LAH MAAKE ATTO AUSA WABEEJA MAITEKA CHALTU SHACHALHUYA NUHUN SPASSIBO TAVTAPUCH MEDAHAGSE BAUKA