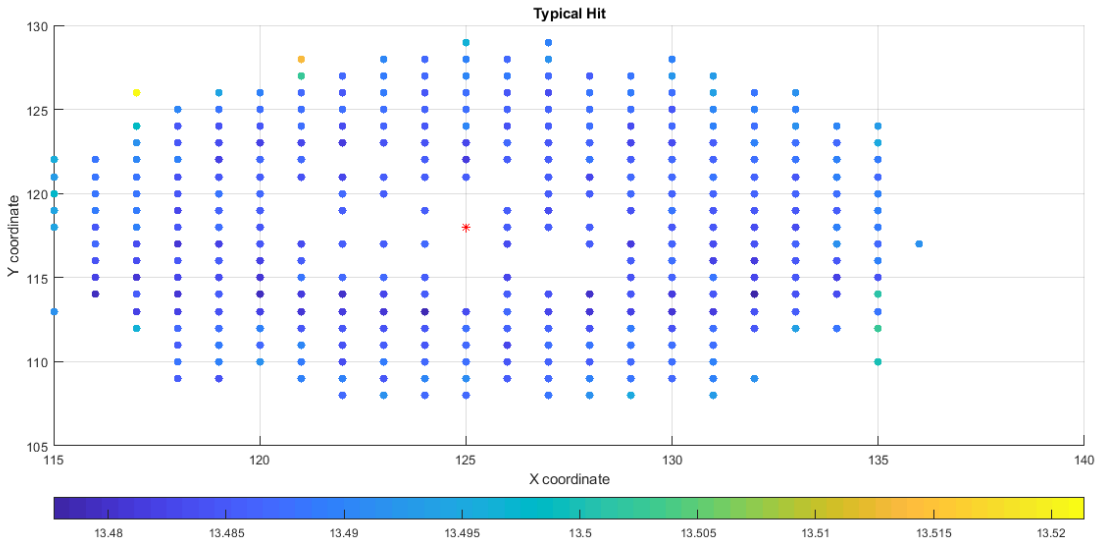
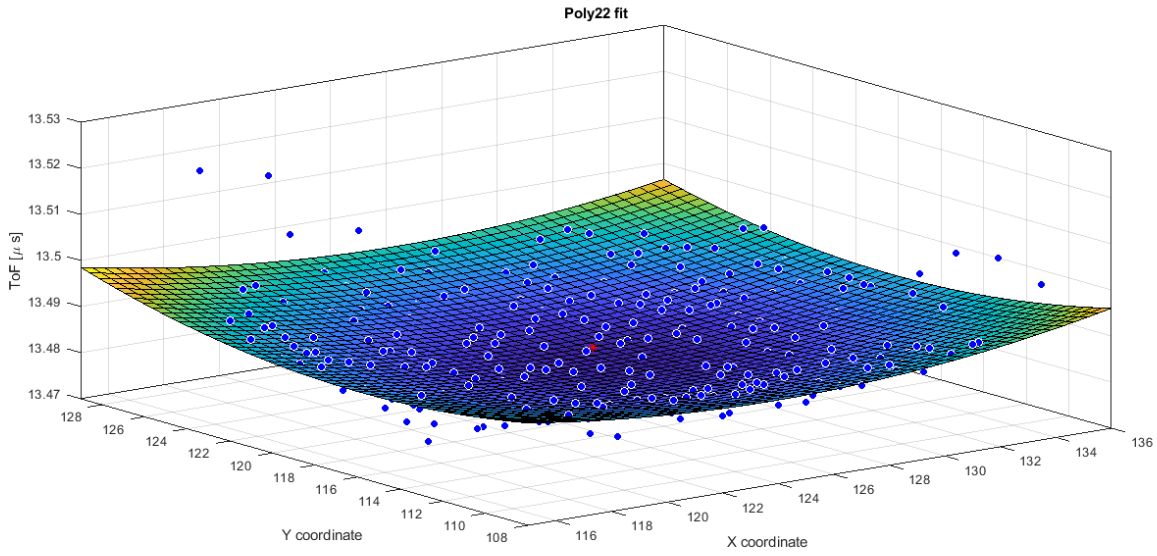
Coincidence Hits

Settings: High Intensity (I3) Low Threshold (135)

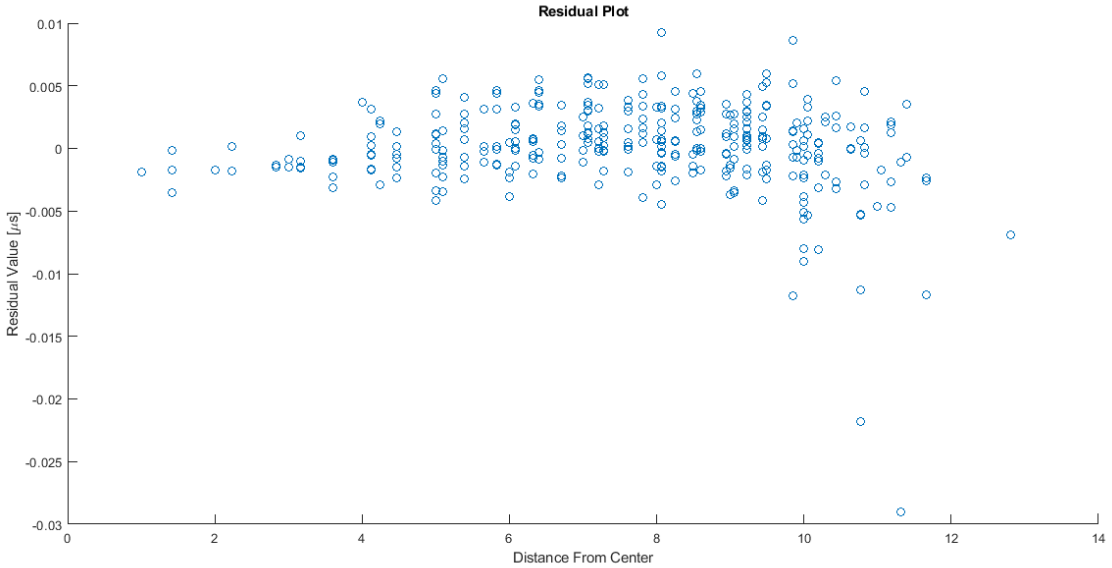


(Fig 1. Shows ToA distribution of a hit. (X,Y) are integer tuples corresponding to screen pixels. Color map is used to display corresponding ToA. Note the circular nature of the distribution. Since edges tend to have higher ToA, it is natural to fit distribution with 2nd degree polynomial f(x,y)).

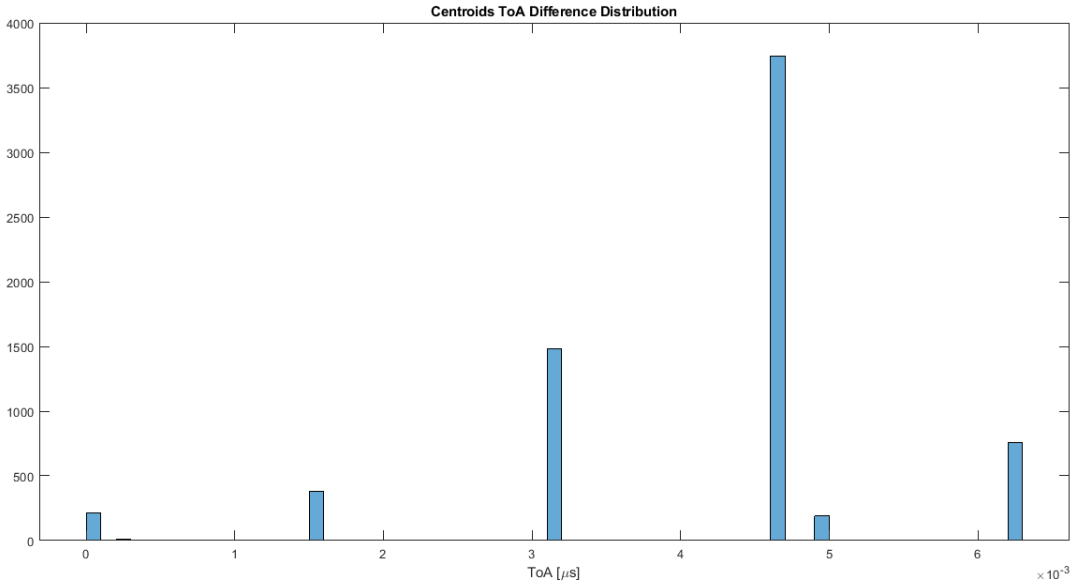


(Fig 2. Shows 2nd degree fit for the previous data after ToT-ToA correction. Each point has an assigned weight depended on (i) ToT and (ii) distance from the center. As will be shown later, ToT dependence plays a major role in improving the uncertainty. Radial dependence (ii) plays less significant role. The minimum of the fit function on the region is used as the ToA value of the cluster.

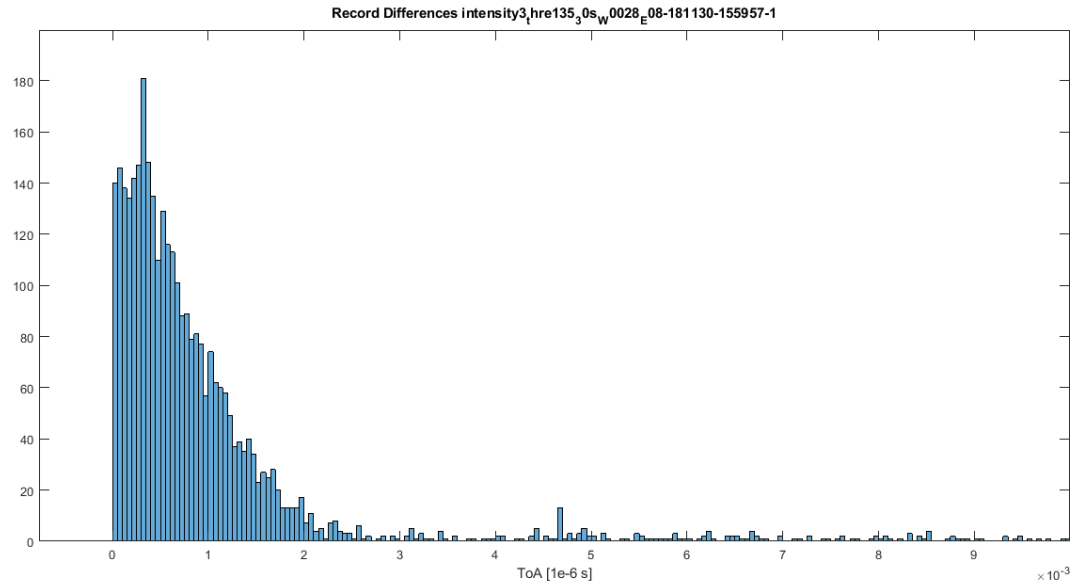
Note that we expect to get concave up function. If the fit turns out to be of other type, centroid ToA value is used for the cluster.)



(Fig 3. Shows the residual plot (fit – measurement) of the above fit as a function of radial distance from the center. As expected, pixels far away from center tend to be underestimated. This occurs due to our choice of 2nd degree fit. Flatter functions might improve residuals.)

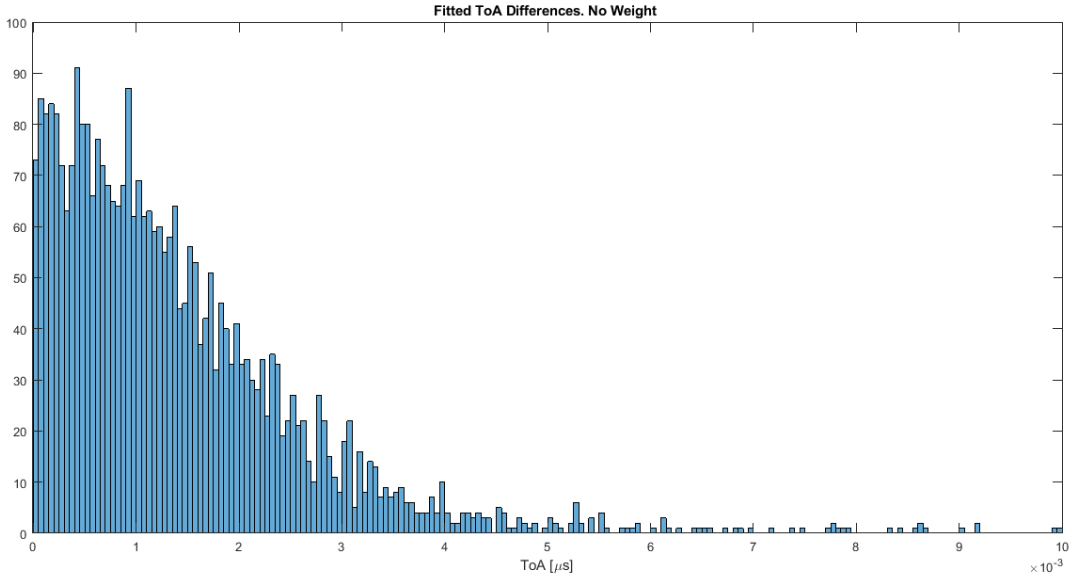


(Fig 4. Shows $|ToA_1 - ToA_2|$ distribution, where ToA was found with centroiding algorythm.)

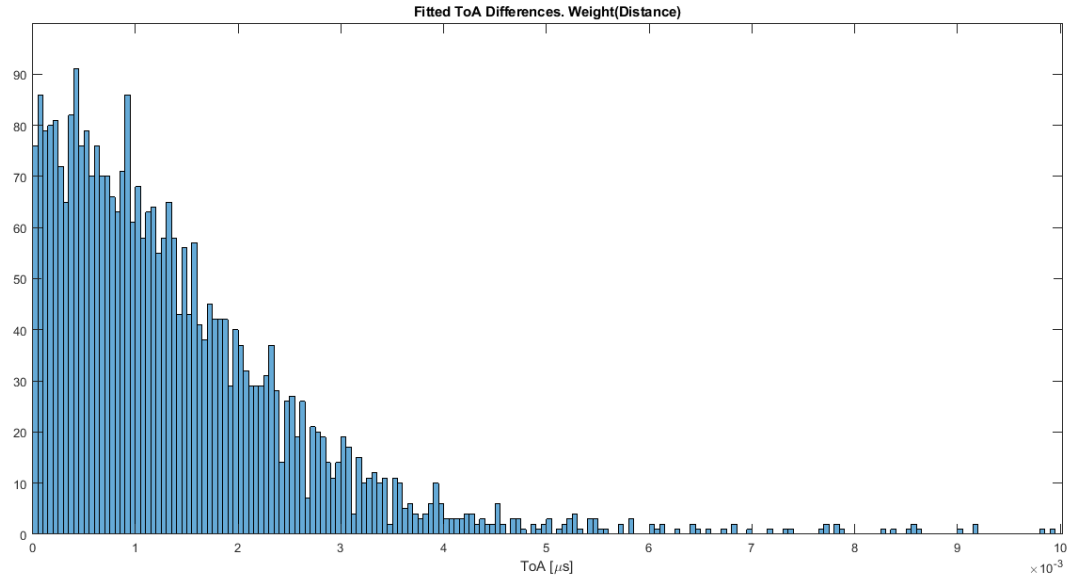


(Fig 5. Shows $|ToA_1 - ToA_2|$ distribution, where ToA was found as a min of 2nd degree fittin function.)

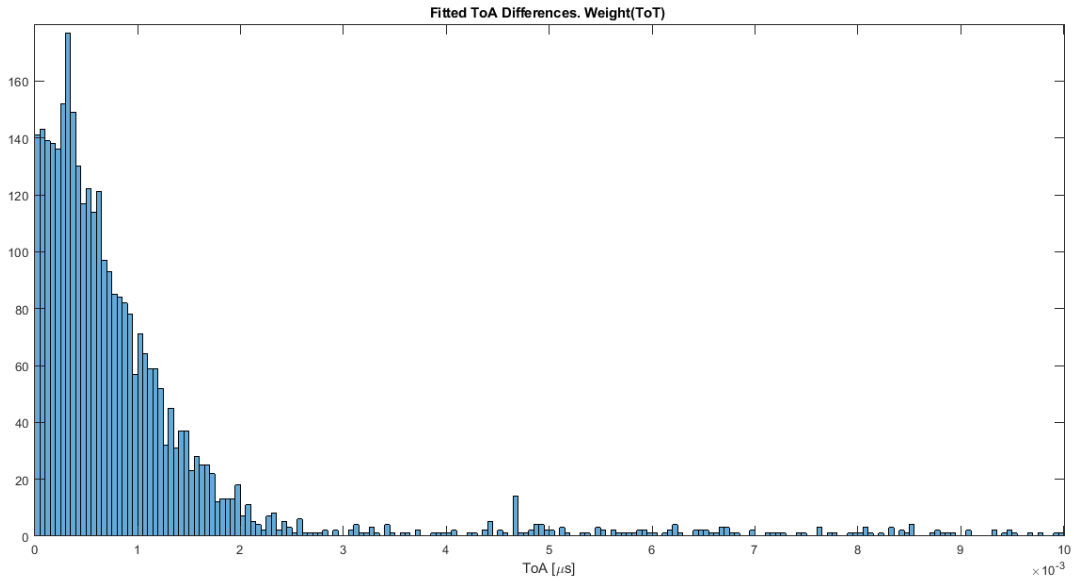
Parameter Dependency



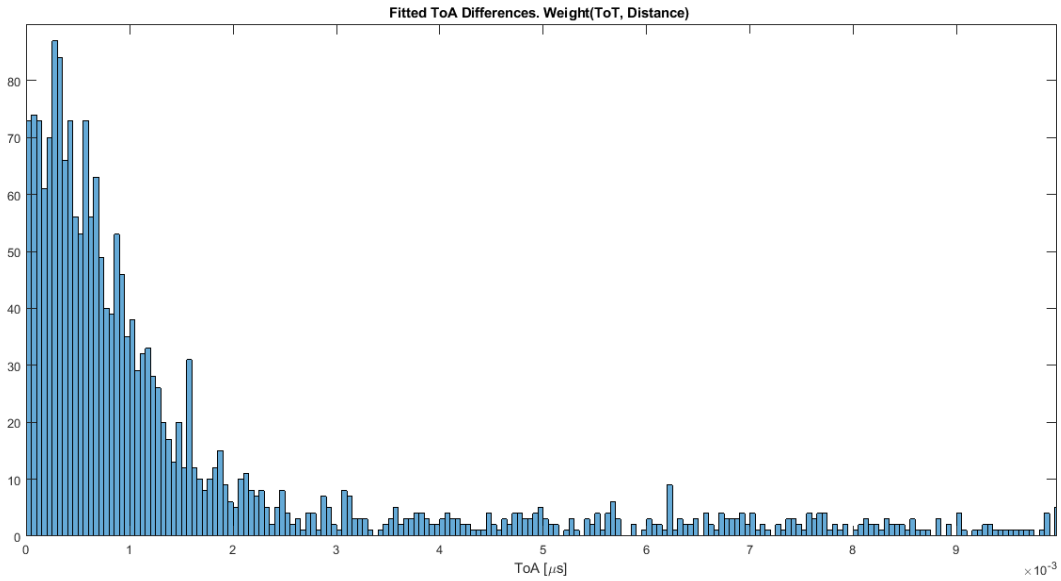
(Fig 6. $|ToA_1 - ToA_2|$ distribution. Constant weight.)



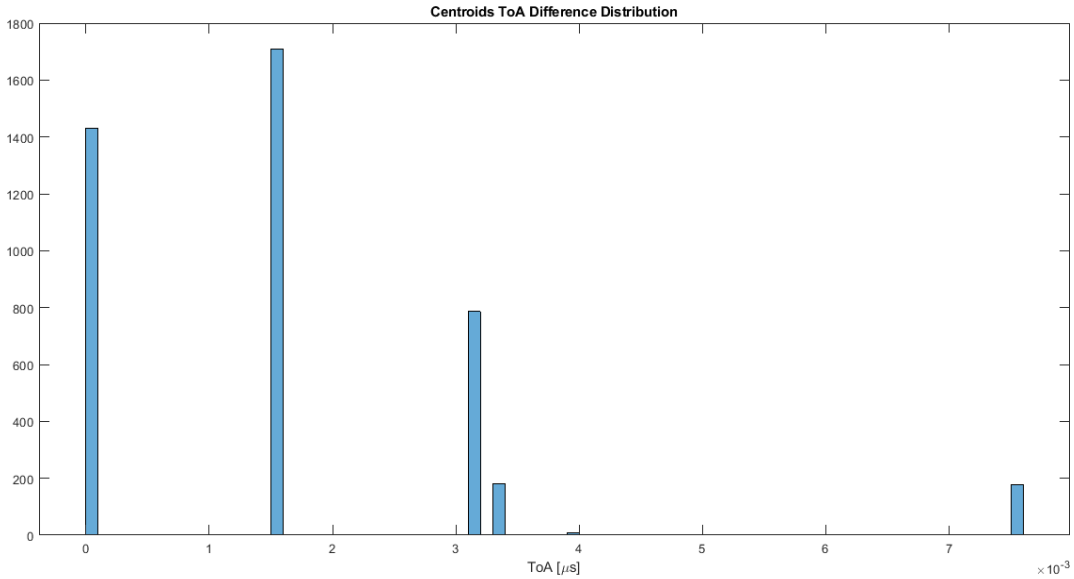
(Fig 7. $|ToA_1 - ToA_2|$ distribution. Weight varying with radius as a smooth step function from 1 (max weight) to 8 (half weight) pixel units).



(Fig 8. $|ToA_1 - ToA_2|$ distribution. Weight varying with ToT as a smooth step function from 25 (zero weight) to 600 (max weight) 1e-6s (?)).



(Fig 9. $|ToA_1 – ToA_2|$ distribution. Weight(ToT, Distance). Higher threshold (195)).



(Fig 10. $|ToA_1 – ToA_2|$ distribution. Centroid. Higher threshold (195)).