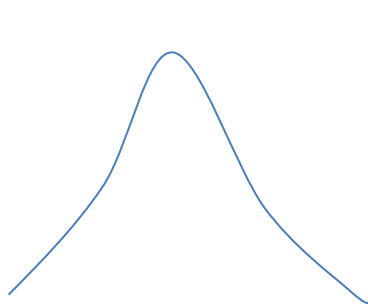


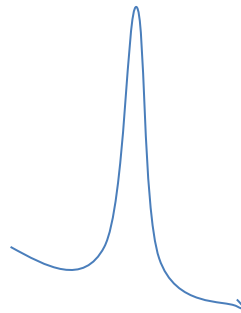
## Using kurtosis to identify RFI in complex visibility data

Kurtosis is a measure of how closely a series of values matches a Gaussian distribution

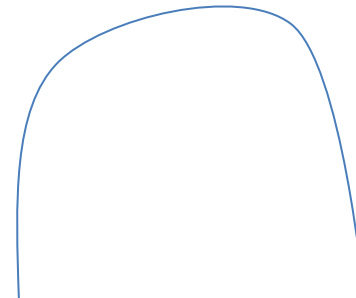
RFI typically manifests itself as a strong pulse of energy that lies on top of the galactic and instrumental noise that possesses a Gaussian profile (see roughly prepared drawings of intensity distributions for a signal stream below)



Gaussian  
natural signals  
Kurtosis  $\sim 1$



RFI spike  
Kurtosis  $\sim 100$



Other things  
Kurtosis  $\sim -10$

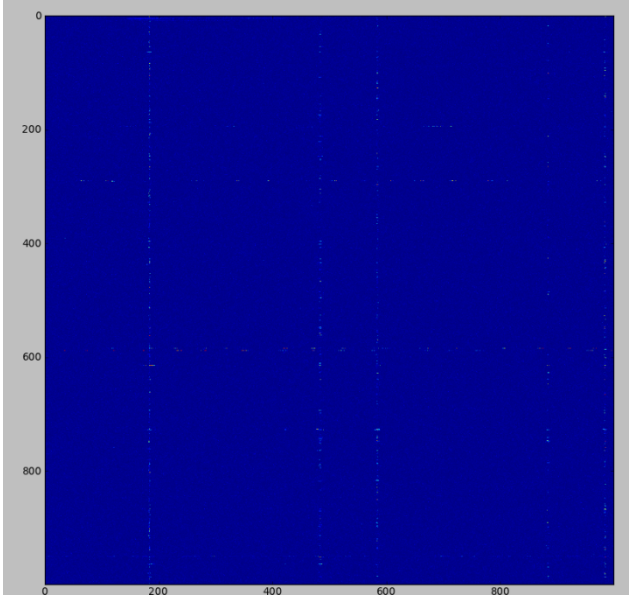
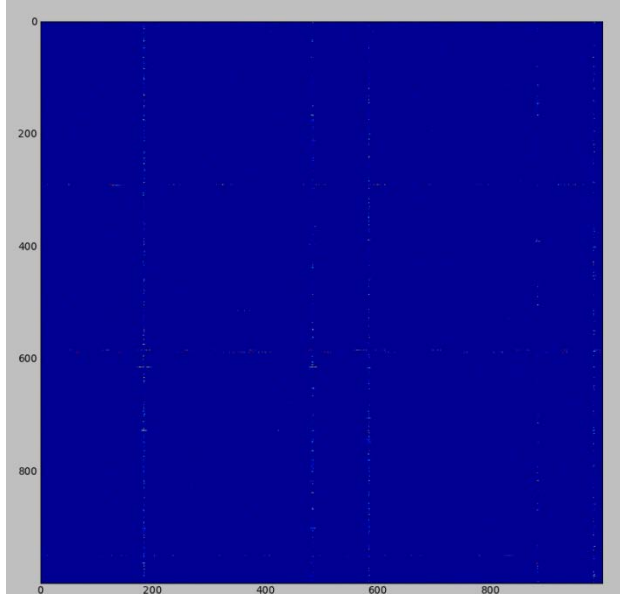
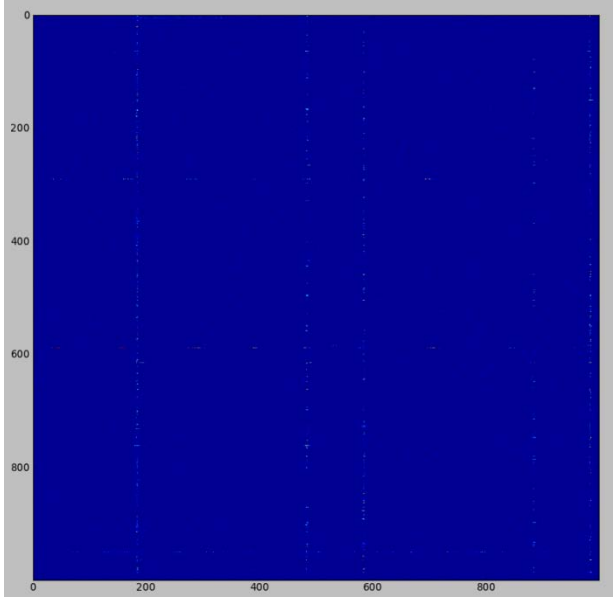
`Scipy.stats.kurtosis` allows one to evaluate the kurtosis of a stream of values very easily.

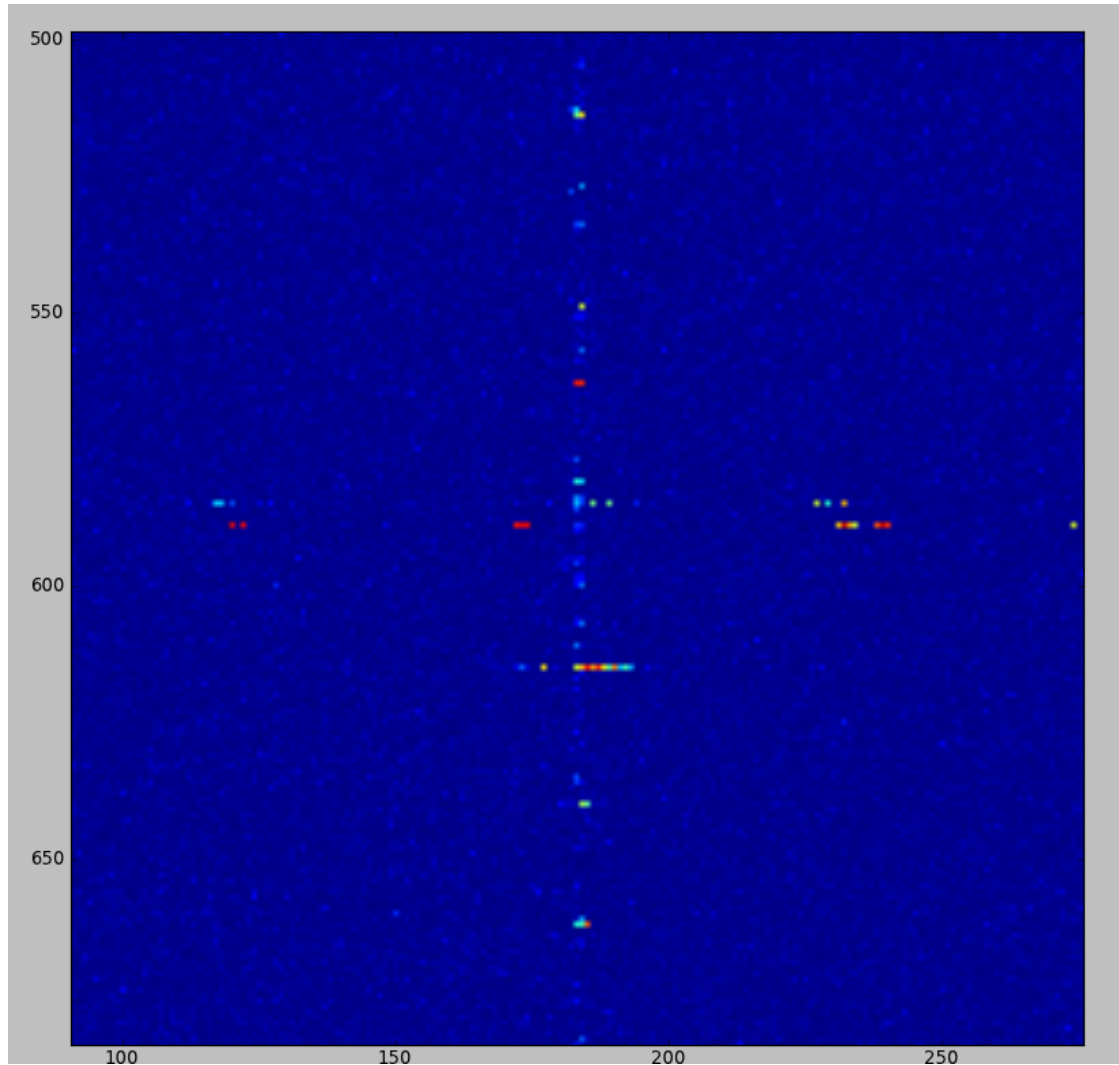
Cross correlations can be evaluated for kurtosis values by very easily by using the `scipy.stats.kurtosis` function instead of `np.mean(x)`.

A heatmap of kurtosis values can be generated for all three baselines after sigma clipping the data to see how much impulsive RFI has been eliminated.

Kurtosis analysis won't check 50% duty cycle impulses, steady RFI or excess random noise in amplifiers.

On the next slide, see kurtosis heatmaps for all three baselines. The blue color represents values close to 1, indicating that my sigma clipping filter is good at getting rid of impulse RFI.





Magnification of the region around 55.250 MHz shows high kurtosis for analog TV carrier meteor pings