Statistical Noise Baseline in AC6 Data

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This report describes the procedure taken to calculate the statistical noise baseline in the AC6 data. The motivation for this analysis is to estimate how often (or fraction of the time) that a cross-correlation (CC) above a certain threshold is due to random chance is not physically connected. This will help identify where in the Cumulative Distribution Function (CDF) plots the coincident events are just due to random chance and not anything truly physical.

**Count Binning Procedure**

The general approach here is to first bin AC6-A (since it has more 10 Hz data) dos1 counts at a similar magnetospheric location and condition. The binning was implemented by looping over every day with AC6A 10 Hz data, binning the counts by Lm\_OPQ, MLT\_OPQ, and AE. The AE data was appended to the file using minute cadence AE files. The binned counts were saved into its own file in the data/binned\_counts/ folder. Here is an example filename that designates what bin’s counts are in contained whithin “AC6\_counts\_4\_L\_5\_9\_MLT\_10\_300\_AE\_400.csv”. I defined bins in L, MLT, and AE. Currently, the bin edges are:

* L = {4, 5, 6, 7, 8},
* MLT = {0, 1, 2, 3,… 14}
* AE = {100, 200, 300, 400, 500}

These files were created for convenience sake. It is much easier to loop over these smaller files than loop over all of the AC6A count files for each bin.

**The Statistical Baseline**

The overall approach here is to calculate a range of baselines with a few assumptions to give a range of plausible baselines.

Then for each bin I CCd data in three different regimes with varying realism, random-random, microburst-random, and microburst-microburst CCs.

The first step