

Desktop Studies

The first desktop study performed was with PAD board number seven, which was wiped clean using alcohol and placed under plastic to create a semi-isolated state. 1800 volts was placed on the board. Over the 41 hour run, there were 1100 triggers, 21 of which were spikes.

The next desktop study was again with the PAD board, was sealed in an acrylic chamber. High voltage was not connected to the board. Over the 47 hour run, there were 368 total triggers, 67 of which were spikes.

The third desktop study was with a square of EMEC spacer which was placed between two copper plates. The entire setup was sealed within the acrylic chamber. High voltage was set to 1800 volts. There was significant trouble with the DAQ board during this run (trigger settings within the program would drop) and little useful data was gathered. Over the 53 hour run, there were 942 triggers, 32 of which were spikes.

The final desktop study was with a square of the Hex Cell spacer which was baked for 44 hours and then placed between two copper plates. The entire setup was sealed within the acrylic chamber. High voltage was set to 1800 volts. Over the first 24 hours of the run, there were three spikes. The chamber was then opened and a tray containing 80 ml of water was placed within before the chamber was resealed. The experiment was run for another 142 hours. In this time there were 2027 triggers, 889 of which were spikes. By this point, the relative humidity inside the chamber was 85%. The setup was allowed to sit at ground while other experiments were performed. After 13 days, high voltage was reset and run for seven days. At this point, nitrogen gas was connected to the chamber to create a dry environment. The nitrogen ran for another six days before the experiment was completed, at which point the relative humidity within the chamber was 10%. Over the second run of 307 hours, there were 1253 triggers, 631 of which were spikes. There was a clear decrease in the spike rate after the nitrogen gas was connected.

For each study, hourly spike and noise burst rates were found and graphed alongside hourly averages for internal relative and absolute humidity.

If the humidity data from the atmospheric sciences department, located outside the building, is graphed with the HEC Spike data, the peaks in the external humidity line up with the peaks in the spike data. Possible connection to the electronics used to collect this data is being looked into. Further studies are needed to figure out the connection.

We are currently performing another desktop study with a piece of hex cell which has not been baked. Humidity will be added, and then the hex cell spacer will be baked and then retested with and without high humidity.