Weekly Report 9/4/2018

Christina Chen
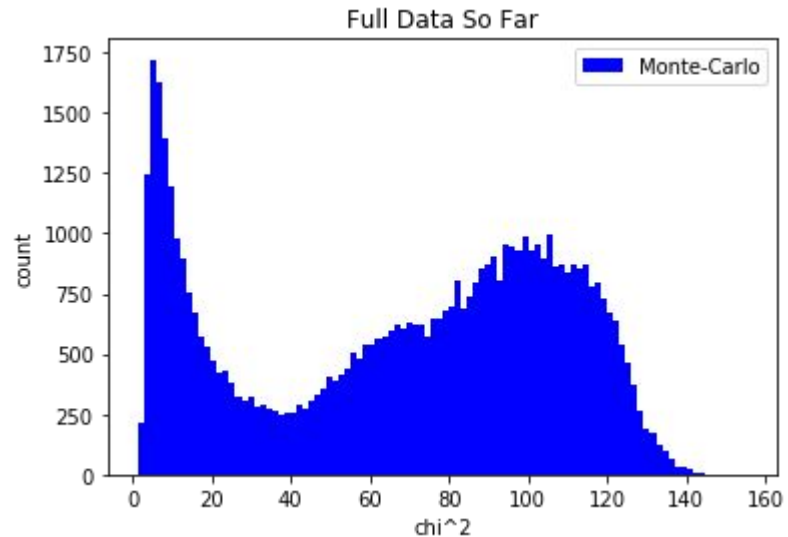
Tasks

- chi^2 histograms (continued) - including position chi^2, energy chi^2
- Proton events classification - excluding the pile-up events that were counted during data discretization
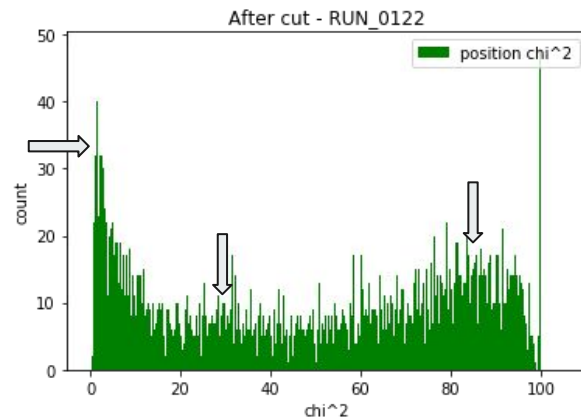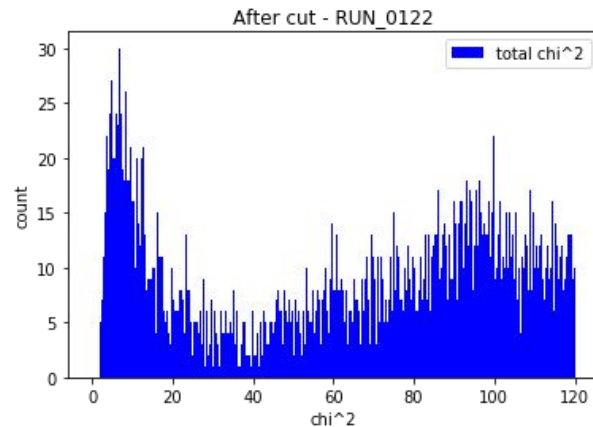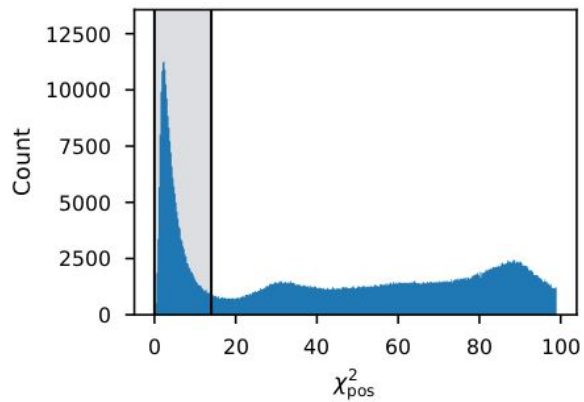
Continuing from last time: total chi^2 histogram

Mainly to fix the "<500 time bucket index" problem

We need to look at each part of the chi^2 value individually
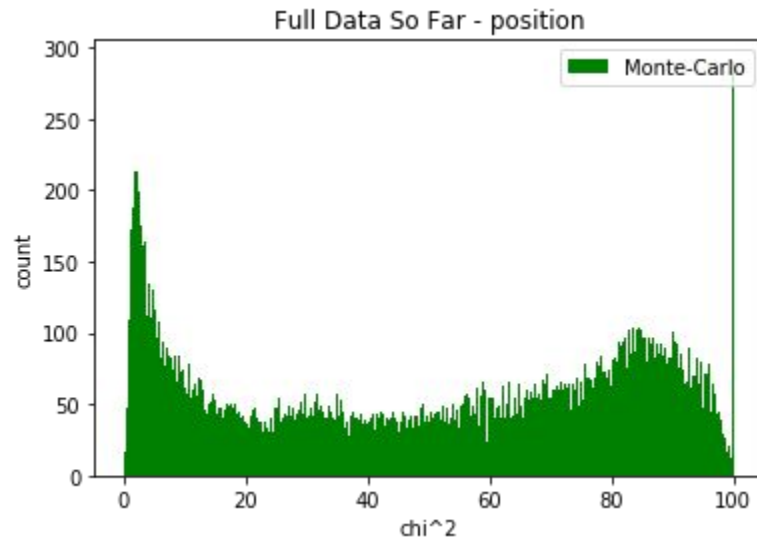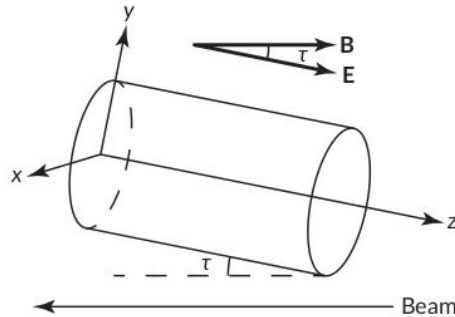

Full Data So Far

Position chi^2

What could be improved?

Josh: 30% of the events were kept

Christina: runs 120 & 122 & 125:
(6349+5827+27300)/(2893+2804+12606) =
46.3%

Full Data So Far - position
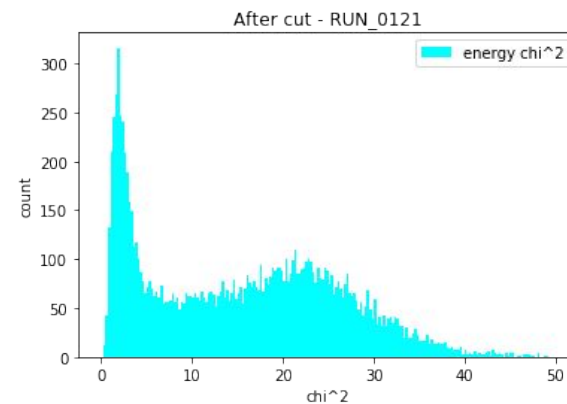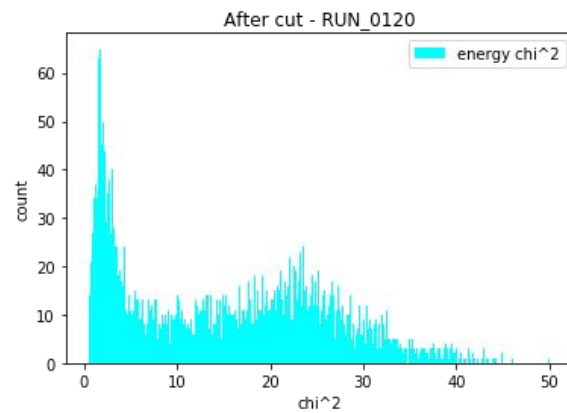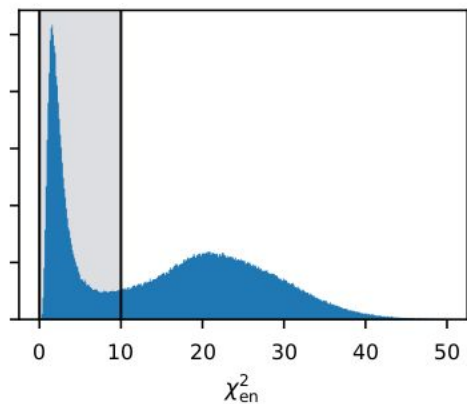
Further reading of Josh's thesis

1. Events with a backwards scattering angle are non-physical and therefore discarded.

(a) Detector coordinate system

2. Events that were not recorded during a production run were excluded.
3. Events that were marked as invalid due to misalignment between the GET and VME DAQ systems (?).

Energy chi^2

After cut - RUN_0120

After cut - RUN_0121

Proton Classification

Added the code for excluding pile-up events

However, bulkDiscretize.py shows no event (except for those who does not exist) got deleted for most runs

```
#check if the z-coordinate is located within the length detector
try:
    for point in xyzs:
        if (point[2] > DETECTOR_LENGTH):
            raise ValueError('event is not physical') #disregard the non-physical events
except ValueError:
    logger.exception('Event index %d deleted: non-physical evet', evt_index)
    continue
```

Detector length?

```
Discretized event 0
event does not exist 493
Discretized event 1000
event does not exist 1294
Discretized event 2000
Discretized event 3000
Discretized event 4000
event does not exist 4007
Discretized event 5000
Discretized event 6000
Discretized event 7000
Discretized event 8000
event does not exist 8250
Discretized event 9000
Data discretization complete.
(9695, 8000)
```

"The active volume of the AT-TPC is formed by an open-ended cylinder of epoxy-coated fiberglass with length 1 m and radius 28 cm."
- Josh

Our detector length parameter is 1250.0 (mm)

What if we feed in cleaned data to the trained model?

Deleted the points & events using the criteria introduced last week: time bucket index, distance from spiral, neighbors, and number of data points

```
Event deleted: non-physical evet
9691
Event deleted: non-physical evet
9692
Event deleted: non-physical evet
9695
Data discretization complete.
(4604, 8000)
```
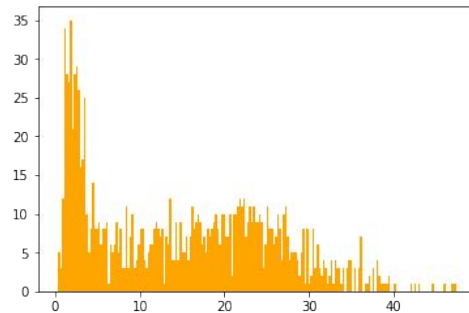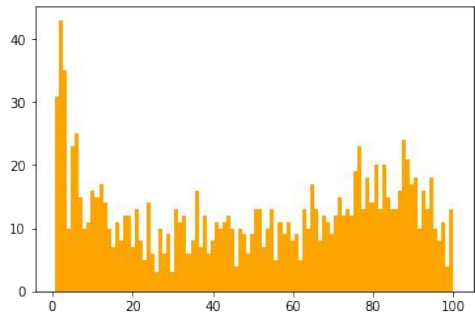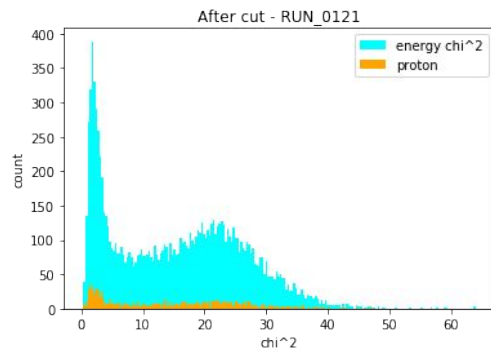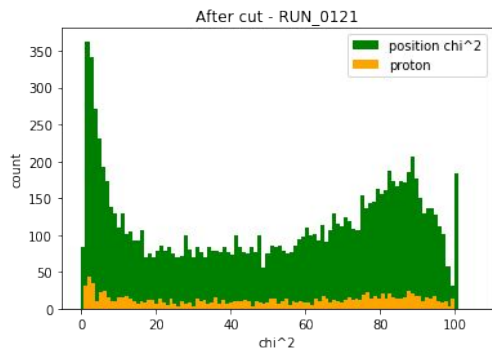
Problem with indices

Created a list "deleted_evtid" to append the indices of each discarded event

```python
for i in range(len(deleted_evtid)):
    for j in range(len(proton_evts)):
        if proton_evts[j] >= deleted_evtid[i]:
            proton_evts[j] += 1
```

Results - Run 0121

Results - Run 0123