Studies regarding the performance of the New Small Wheel of the ATLAS muon spectrometer

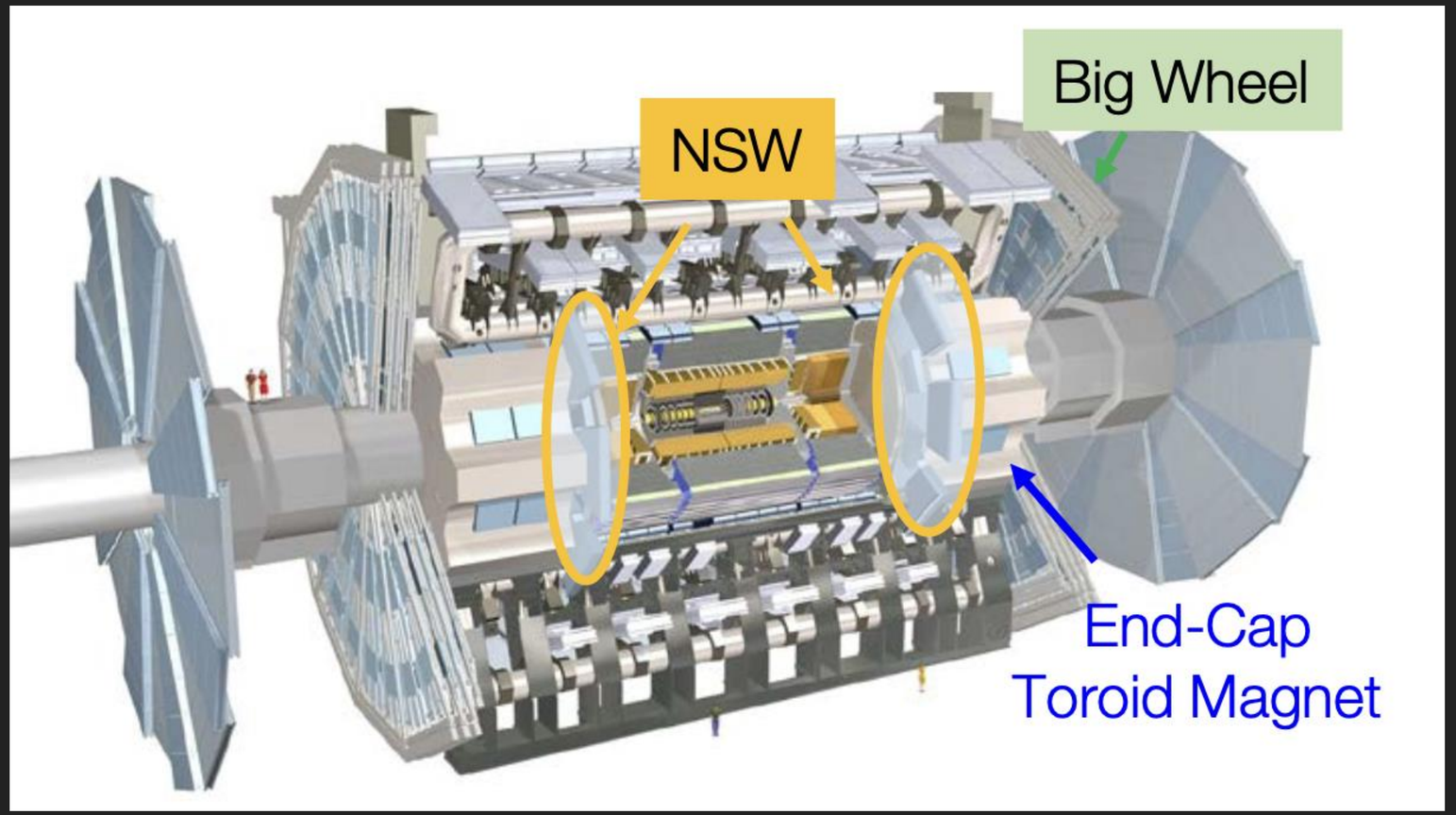
Harriet Bufan Shi, University of Michigan

bufan.shi @cern.ch

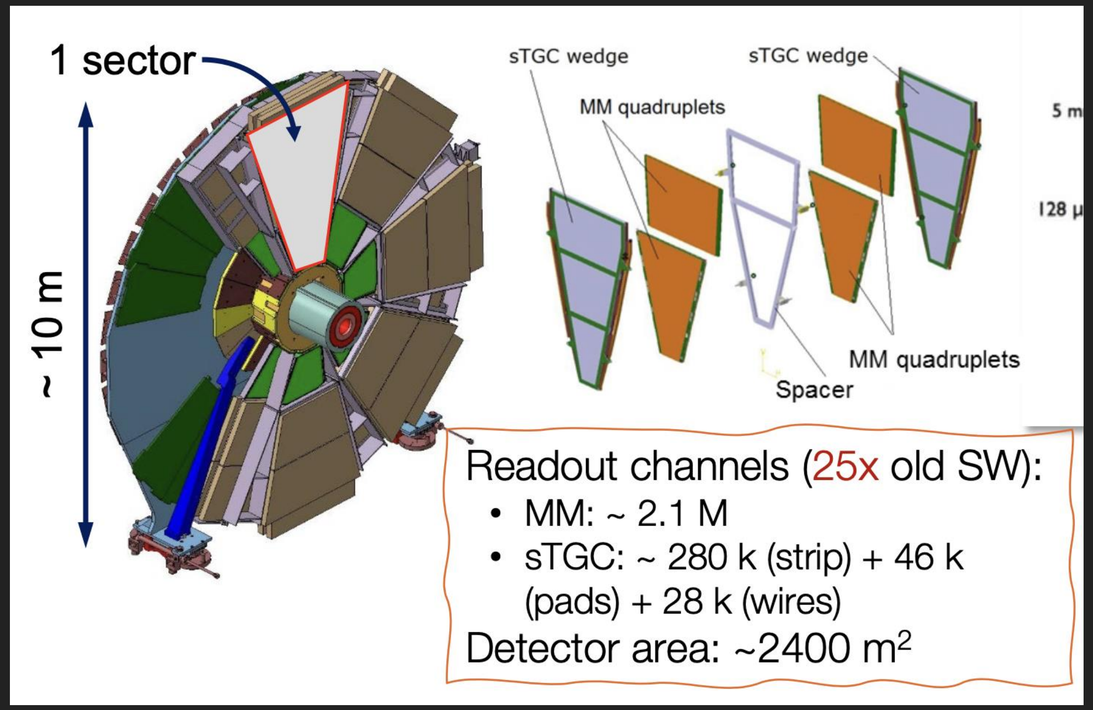
This summer…

- Working on the operation of the New Small Wheel.
- Work with Dr. Liang Guan.

Before we get started…



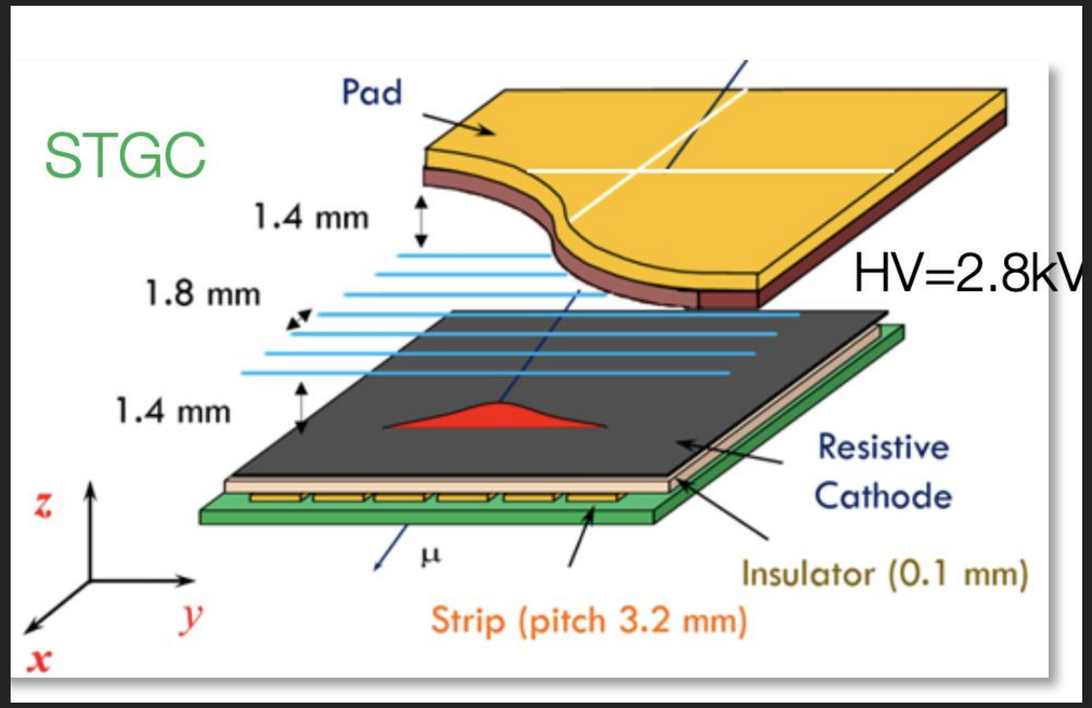
What's inside?



Readout channels (25x old SW):

- MM: ~ 2.1 M
- sTGC: ~ 280 k (strip) + 46 k (pads) + 28 k (wires)

Detector area: ~2400 m^2



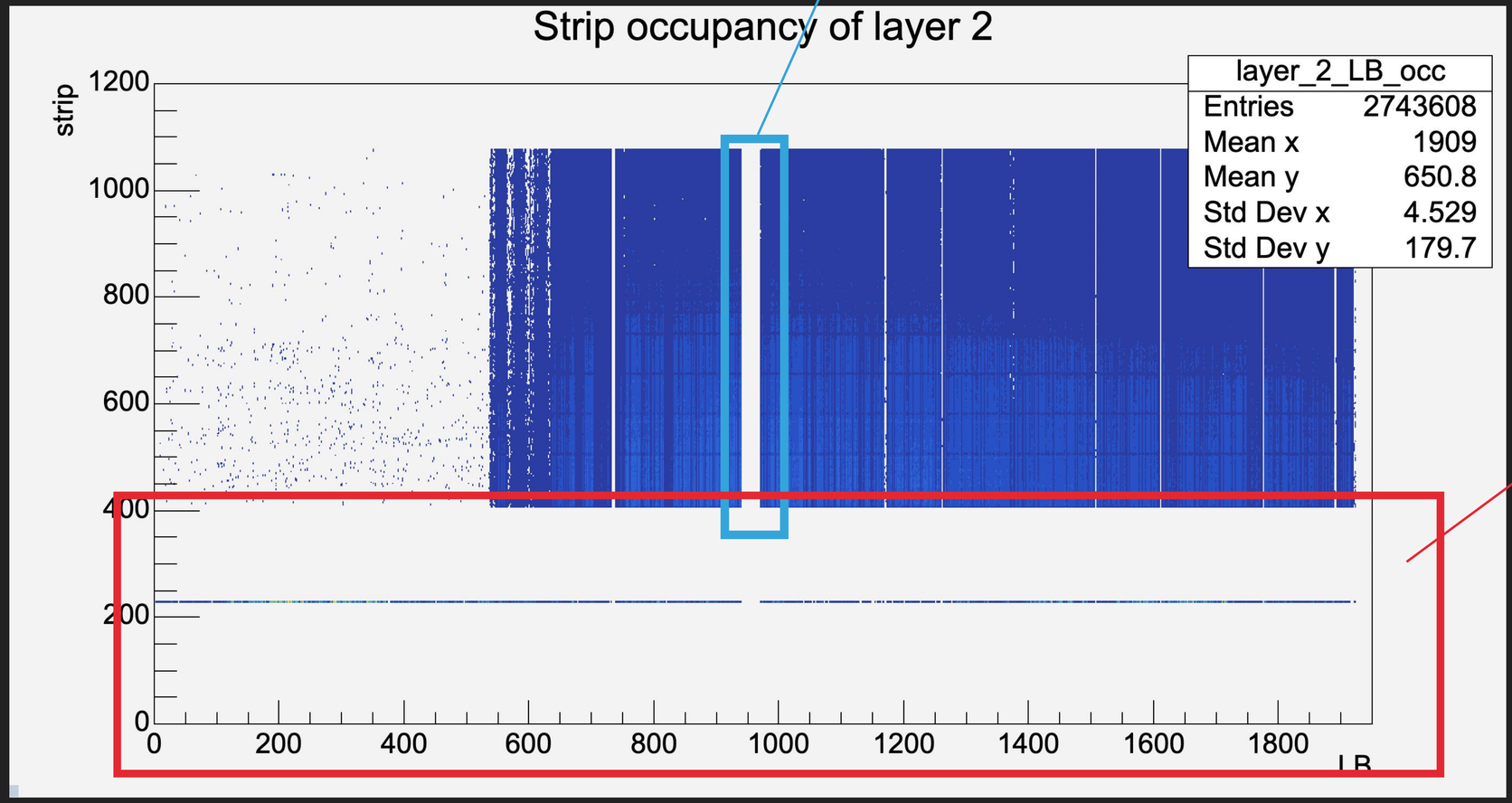
My Current Goal: Given an arbitrary run, having a script to determine which part of the NSW is functioning, which part is not.

What kind of deficiency it is?

ATLAS EXPERIMENT

A randomly selected Run.

What happened here???



What about here??

So, what does good data look like?

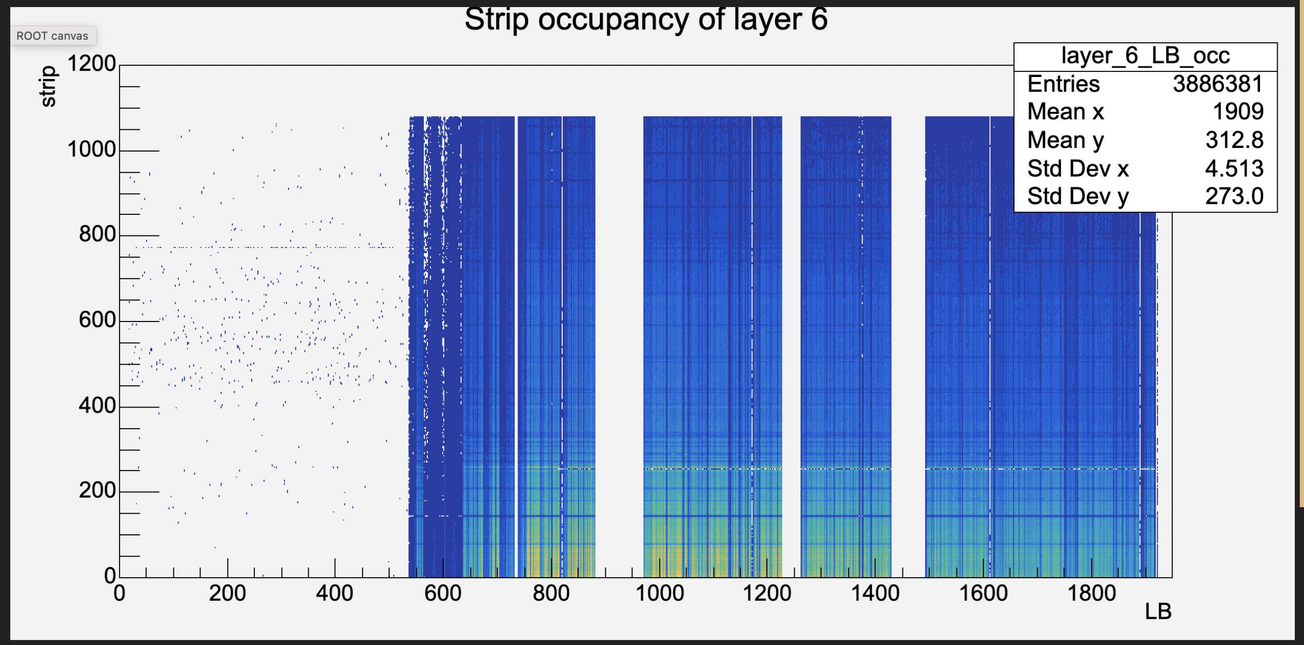
Some criterion:

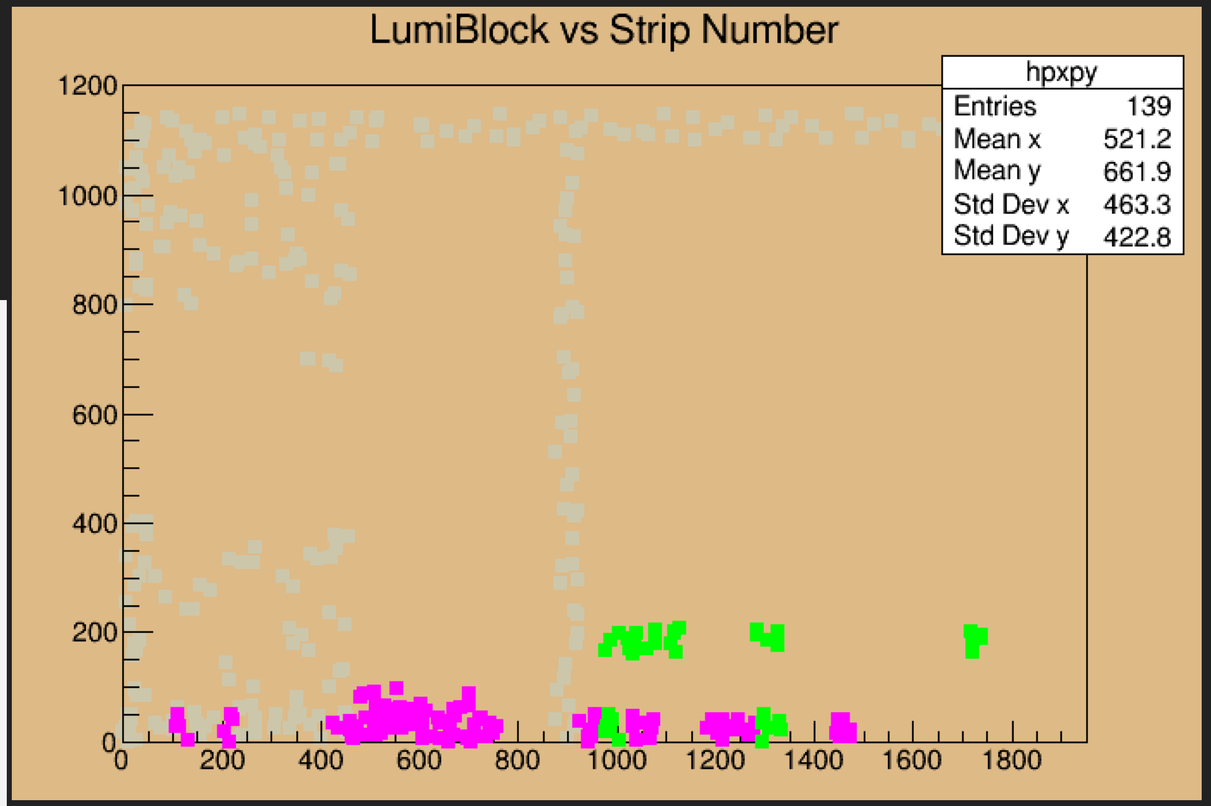
1. There should not be any ”surges”.
2. There should not be any blanks in the middle of the run.

My Progress & Method:

1. Developed a global program, go through all 32 sectors, all 8 layers in each sector, warn about the scenario where the entire plate is not producing any data.

2. Developed a local program, go through all the strip in the layer, and determine locally the problematic regions.





Grey: this region is not responding.

Green: the strip died because in this time window other strips work.

Purple: in this time window. It has low efficiency.

This program is flawed.

What is missing?

1. The beam is not starting at the beginning of the run. You do not want to wrong the strip.

2. gradient detection is not that simple!

What should I do??

1. There are multiple plots I can reference to, such as the cluster positions, good package percentage, etc.

2. Combining information from all plots... We can probably give a detailed report on each run about the condition of NSW.