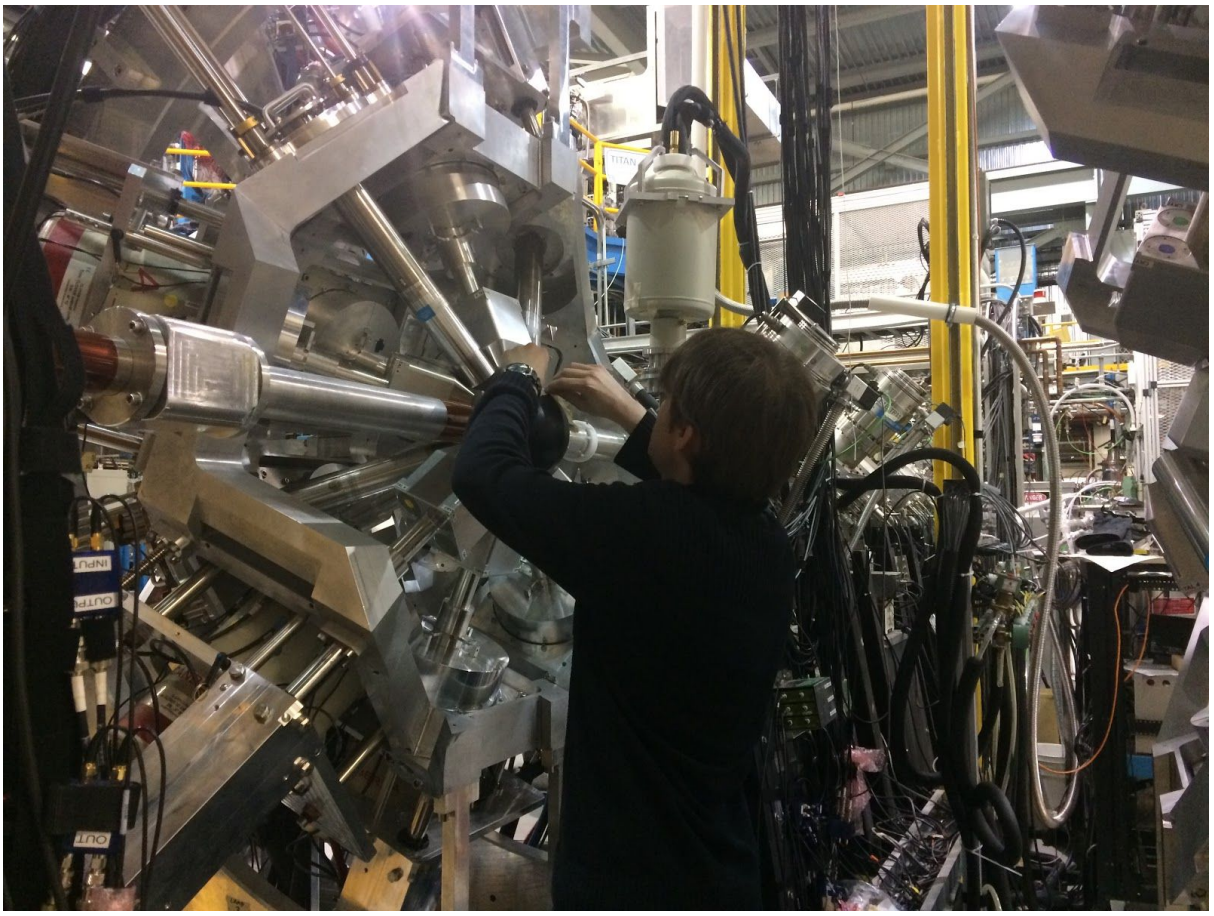
Summary

The dialogue consisted of a meeting at TRIUMF, a follow-up email with diagrams from the physicist, and a meeting at TRIUMF where the artist showed work in progress.

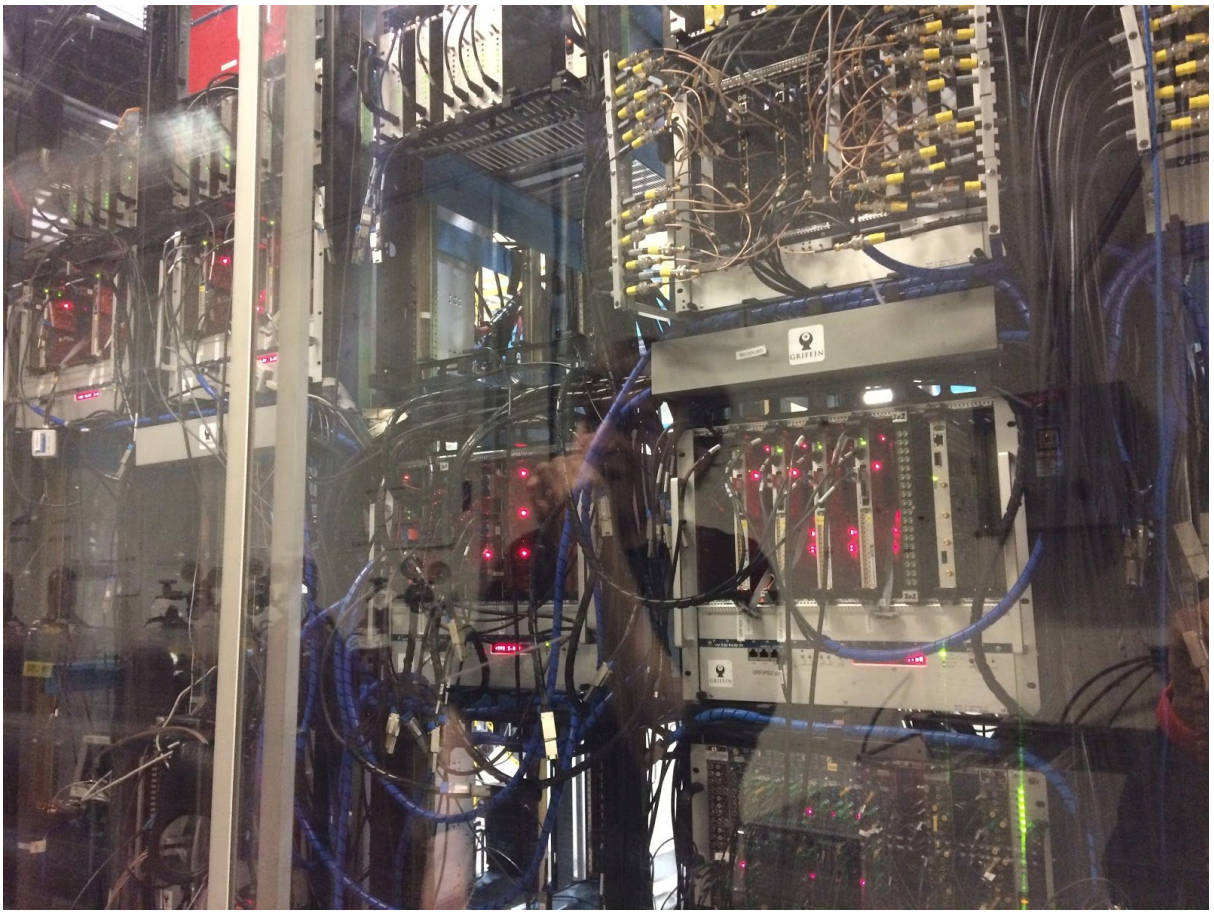
The first meeting was a detailed tour of the GRIFFIN experiment and its data flow, followed by further explanation and feedback in the office involving a lot of drawing by the physicist and some note taking by the artist. Michael emailed follow-up notes and diagrams after the initial meeting. Scott continued exploring the information and resources provided by Michael, and then brought work in progress (3D animation) back to TRIUMF to show Michael. This meeting resulted in discussion of further variation and extension of the details first discussed, and also more personal outlooks on scientific and artistic processes and where they resonate and differ.

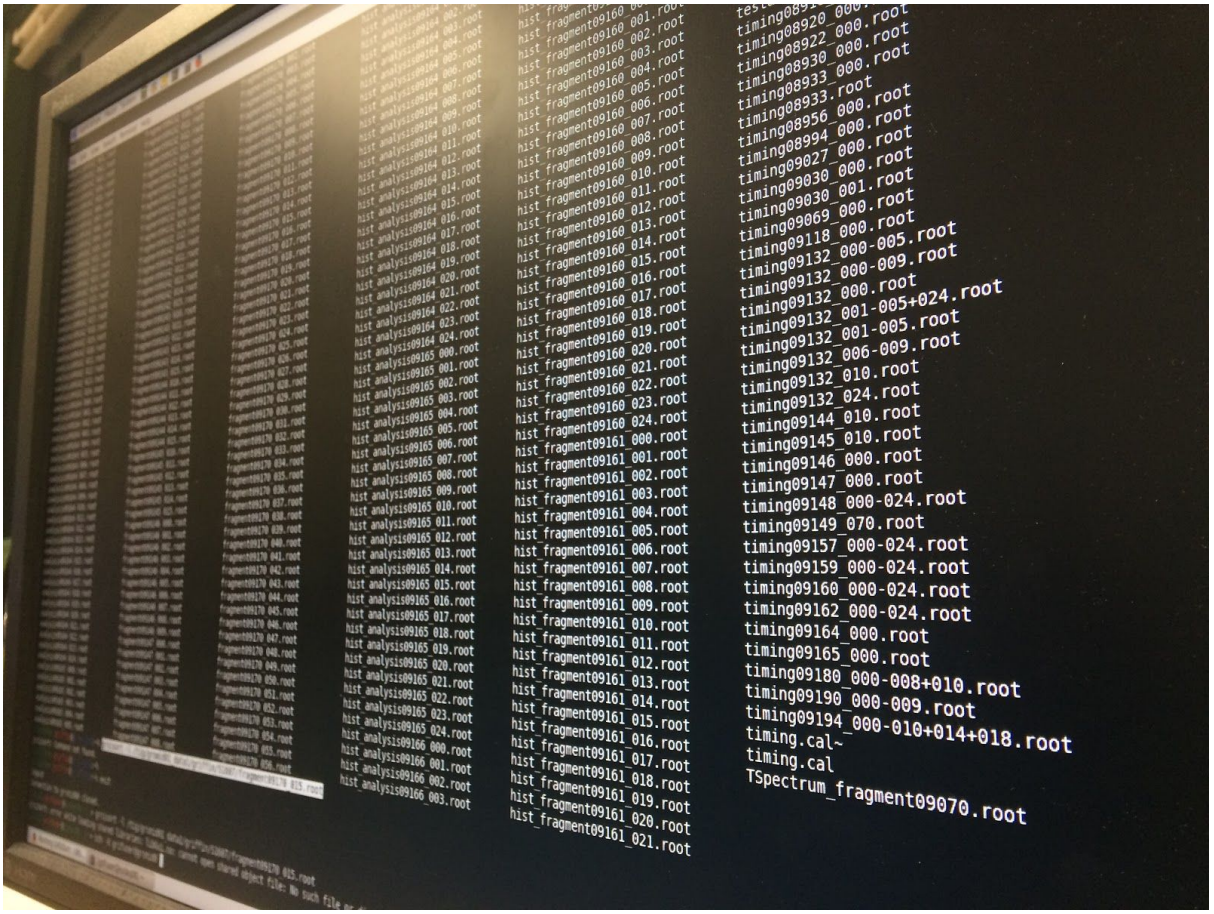
May 17 - Meeting at TRIUMF

Michael gave a detailed walkthrough and explanation of the GRIFFIN experiment's machinery, data flow, and how the data is managed, coded, read and visualized. He explained further in the office, drawing boards full of diagrams. More than expected was easy to follow because many of the diagrams and terminologies are similar to those in sound engineering, such as resolution, sampling, steps, decay, kHz. This overlap meant I could take less notes and take photos of the boards and some video as reference. It also made me consider sound for the final artwork.



LEANING OUT OF WINDOWS - Dialogical Log
Artist: Scott Mallory
Physicist: Michael Bowry





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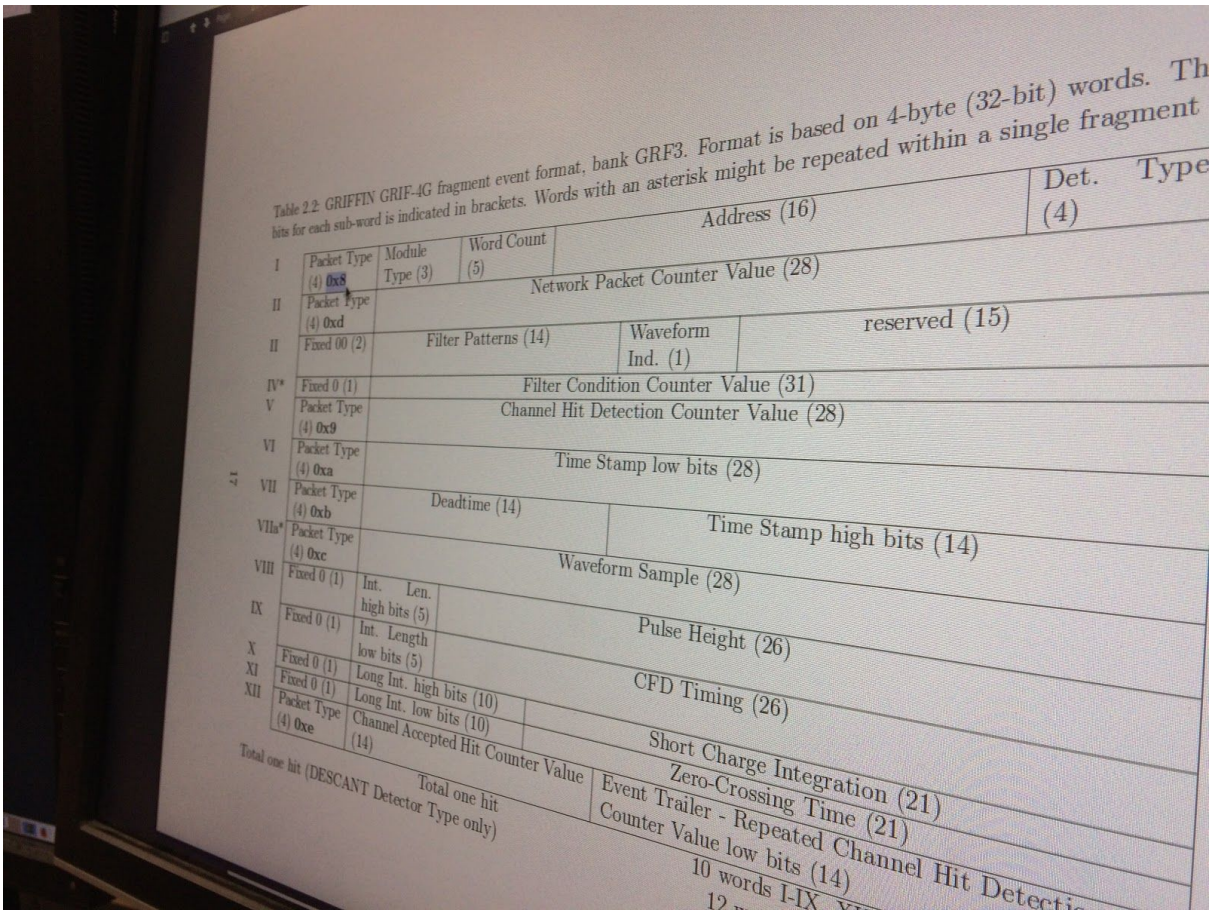
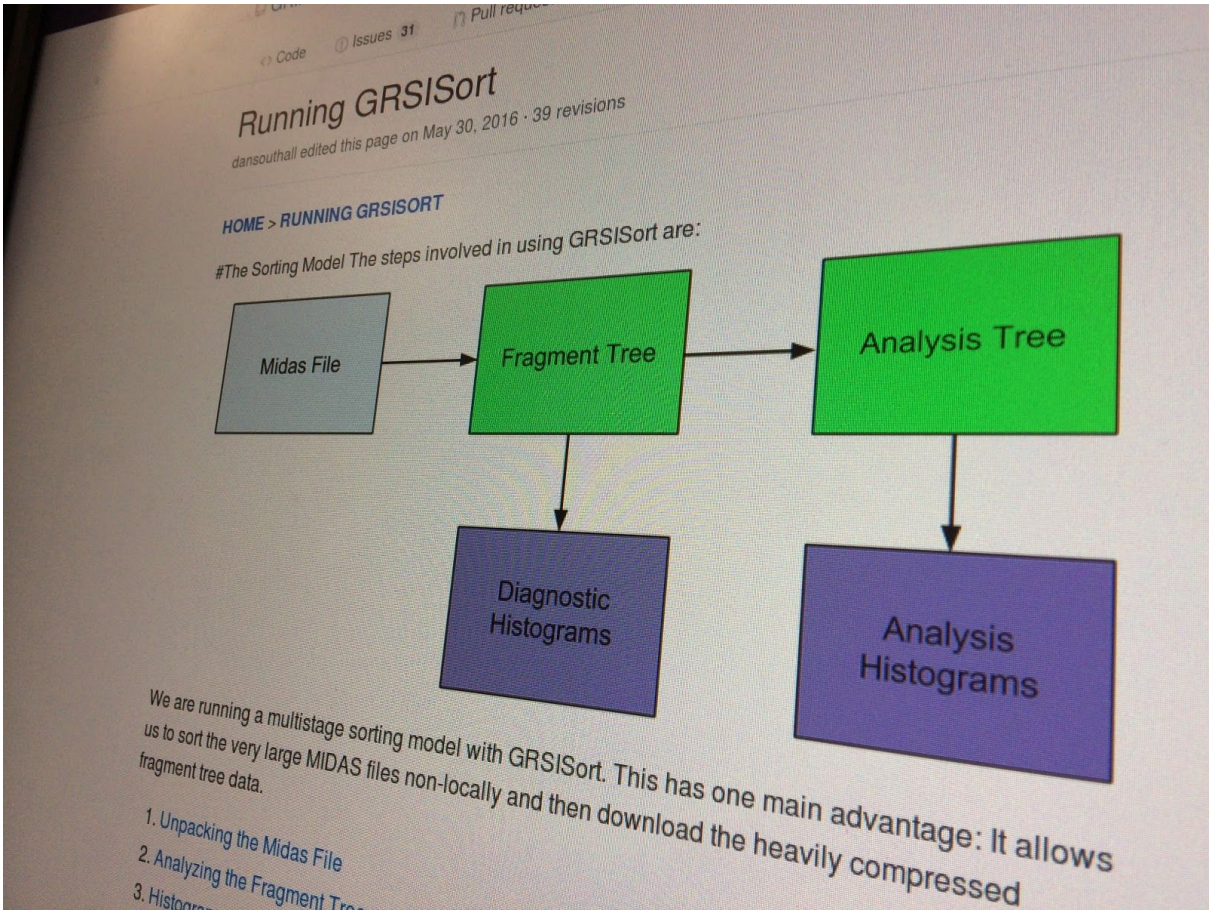


Table 2.2: GRIFFIN GRIF-4G fragment event format, bank GRF3. Format is based on 4-byte (32-bit) words. Th
bits for each sub-word is indicated in brackets. Words with an asterisk might be repeated within a single fragment

I	Packet Type (4) 0x8	Module Type (3)	Word Count (5)	Address (16)	Det. Type (4)
II	Packet Type (4) 0xd	Network Packet Counter Value (28)			
II	Fixed 00 (2)	Filter Patterns (14)	Waveform Ind. (1)	reserved (15)	
IV*	Fixed 0 (1)	Filter Condition Counter Value (31)			
V	Packet Type (4) 0x9	Channel Hit Detection Counter Value (28)			
VI	Packet Type (4) 0xa	Time Stamp low bits (28)			
VII	Packet Type (4) 0xb	Deadtime (14)	Time Stamp high bits (14)		
VIIa*	Packet Type (4) 0xc	Waveform Sample (28)			
VIII	Fixed 0 (1)	Int. Len. high bits (5)	Pulse Height (26)		
IX	Fixed 0 (1)	Int. Length low bits (5)	CFD Timing (26)		
X	Fixed 0 (1)	Long Int. high bits (10)	Short Charge Integration (21)		
XI	Fixed 0 (1)	Long Int. low bits (10)	Zero-Crossing Time (21)		
XII	Packet Type (4) 0xe	Channel Accepted Hit Counter Value (14)	Event Trailer - Repeated Channel Hit Detecti		

Total one hit (DESCANT Detector Type only)

Total one hit Counter Value low bits (14)
10 words I-IX



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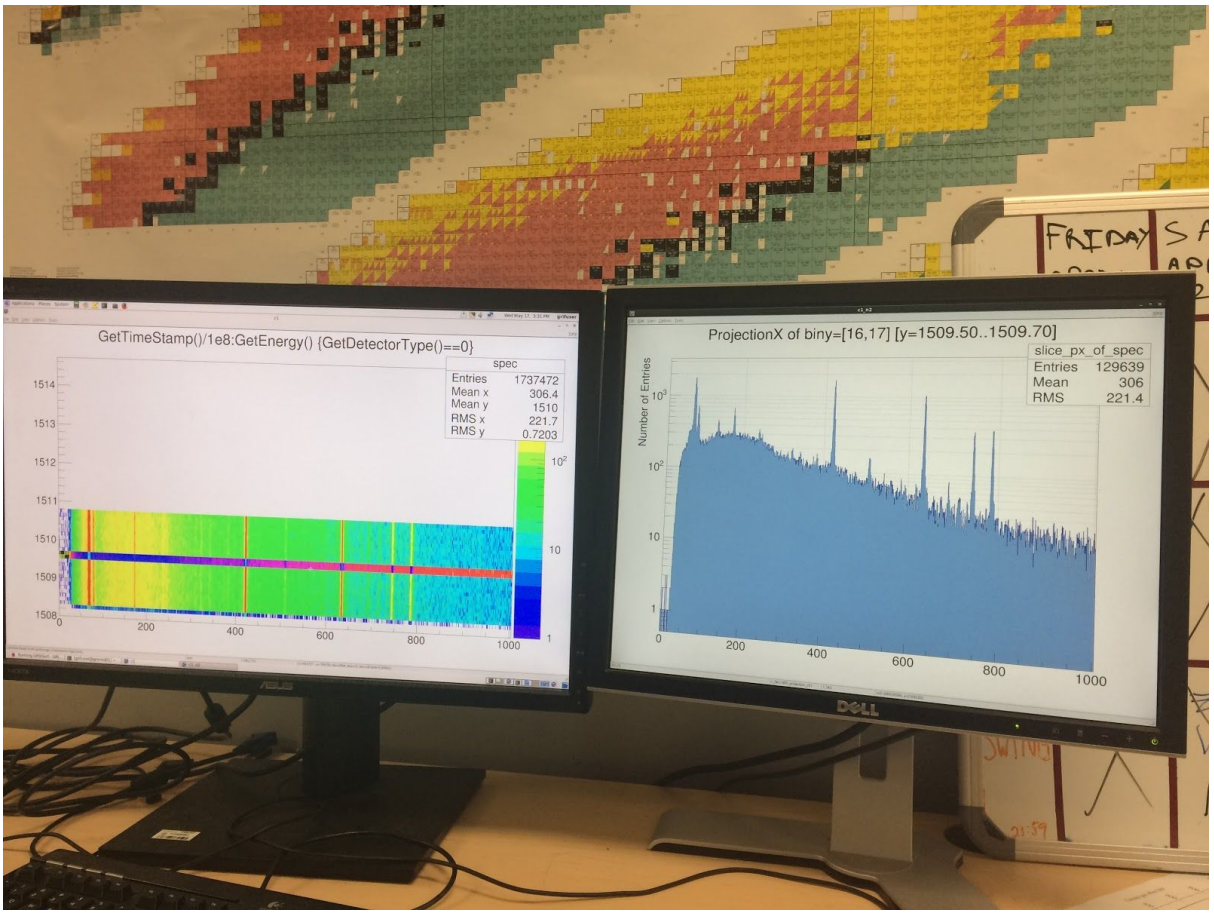
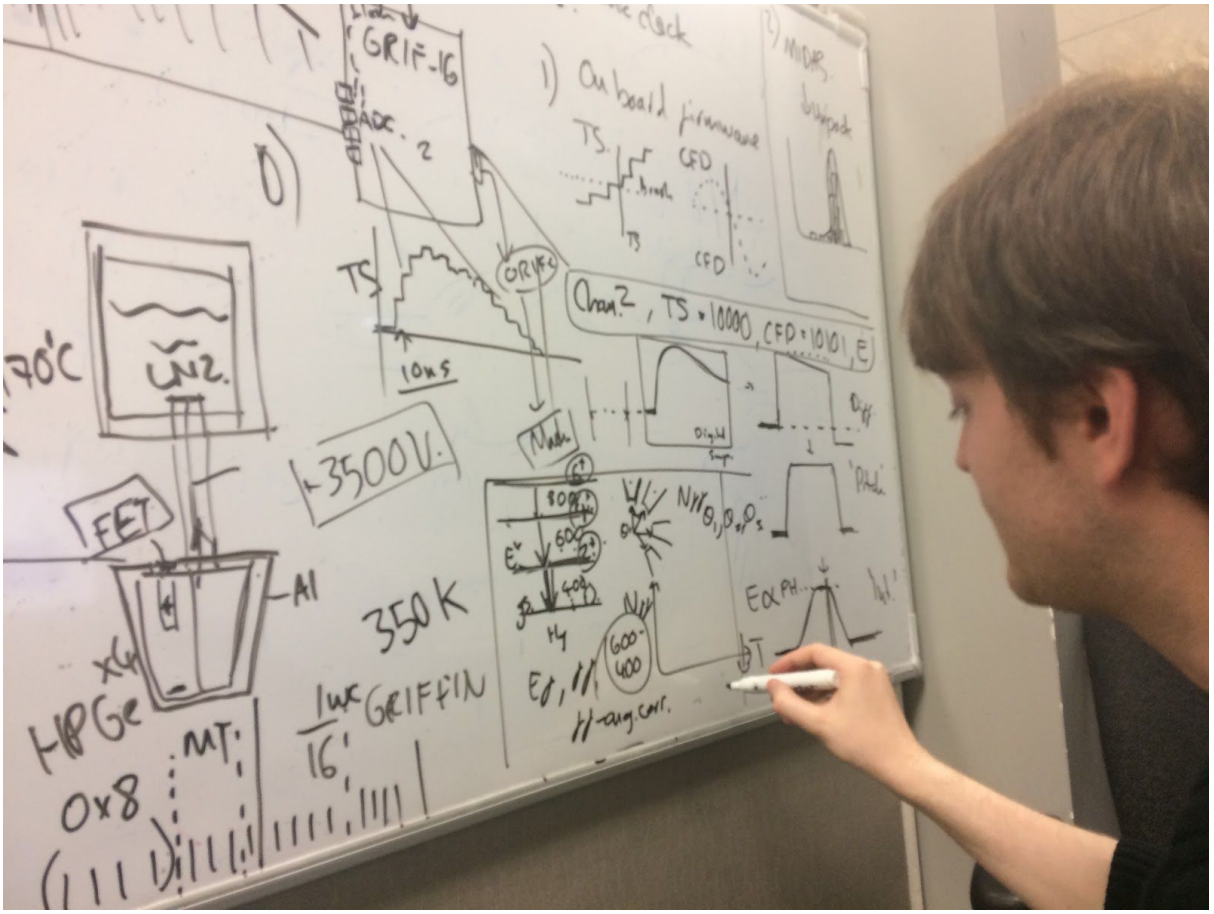




Artist's notes:

Coincidence

Gamma ray angular correlations
..angular momentum per energy level, gives you clues to protect and neutron makeup (structure of the decay). Need 10,000 coincidences to do it properly

Can derive complicated info from simple info, measure half life
T1/2

10kHz preferred
50kHz max

.1 Hz was min (1 ion owe 10 sec)

**How decay leads to low states*

American Physical Society journals (APS)
Physics Review Letters (PRL)
Physics Review C (PRC)

The Archive - for complete papers without having to wait or pay for access

European Physics Letters
European Physics Journal A
Nuclear Physics A

Nature Papers

Goal: not just a single equation. Building up a picture of the nucleus and how it behaves as a complex multi body system. Why does it do what we expect or don't expect. Aspect of making problems more solvable (different mathematical approaches and increasing computing power, more efficient use of computer power and code).

Computer power, processing, more efficient codes. More powerful codes.
IMSRG (combining Griffin with one of these state of the art codes)

Angular correlations have odd shapes. Can calculate and visualize. Basic maps. No decent ways of visualizing.
Difference between 2 distributions is visualized 3D. It's symmetrical.
Multipolarity.
Find the equations of how to calculate it. Probably appears in a quantum mechanics textbook.

Trying to explain an angular correlation without those shapes is nearly impossible.

Electric and magnetic transitions which can have different orders.
Electric dipole looks like a peanut. Can have different projections of that shape which produce different shapes

Electric quadrupole

Wouldn't see the highest order ones anyway
A lot of web apps were written for Griffin. Can look it up on the public Griffin website.

May 30 - Email from physicist

Michael sent an image/diagram and further description of what he tried to describe in prior meeting (angular distribution). At the meeting he had said this kind of visualization is nearly the only way to understand it.

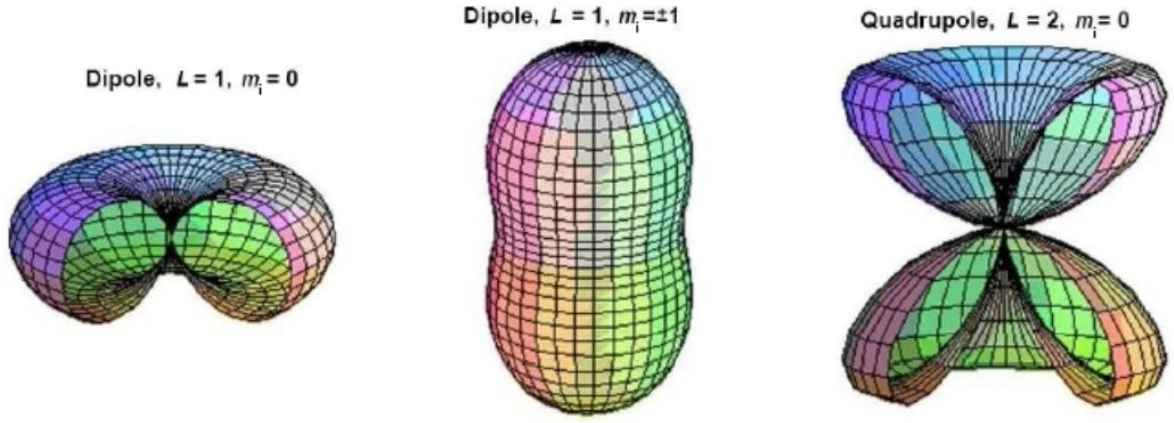
Physicist's email:

As discussed in our May 17th meeting, attached is an image illustrating the type of phenomenon I was describing.

Essentially, the distribution of the intensity of different types of gamma rays has many different shapes and orientations that can be described mathematically. The distributions possess what is known as 'positive parity' which simply means they appear symmetric.

Some gamma rays actually display a mixture of these shapes, and the proportions of the mixture are determined by the properties of the radioactive atom as it decays.

GRIFFIN can measure the difference between the shapes of these distributions for successive gamma rays (i.e. those emitted during the same decay) and can also tell us about the mixture of shapes present for a single gamma ray. This way we learn about the properties of the radioactive atom.



June 30 - Meeting at TRIUMF

I brought work in progress (particle simulations animated in 3D) to show Michael, and explained where I ended up in terms of grappling with the physics he explained previously, the resources he gave me, and previous LOoW seminars. It turned out to be an area borderline in his expertise, and he suggested other TRIUMF physicists he could try to put me in touch with to explore more details.

See the WIP: https://vimeo.com/223865992

I also showed him the sound-driven/wave-driven 3D animation workflow I like to use by doing a demo for him in the software side-by-side. It resonated how parts of that workflow reflected workflows and visualizations that would be useful to physicists working on something like the GRIFFIN experiment.

Example demo of sound/wave-driven: https://vimeo.com/44173084

Finally, we talked about each other's personal motivations, thought processes and outlooks on our work. There were far more existing overlaps and potential overlaps than differences. There were a lot of "Hm, I never thought of it like that" moments.