



# GRIFFIN

Gamma-Ray Infrastructure For Fundamental Investigations of Nuclei

**Web Interface to the MIDAS DAQ  
for the GRIFFIN Experiment**

**MIDAS Workshop, 15<sup>th</sup> July 2015**

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Accelerating Science for Canada  
Un accélérateur de la démarche scientifique canadienne

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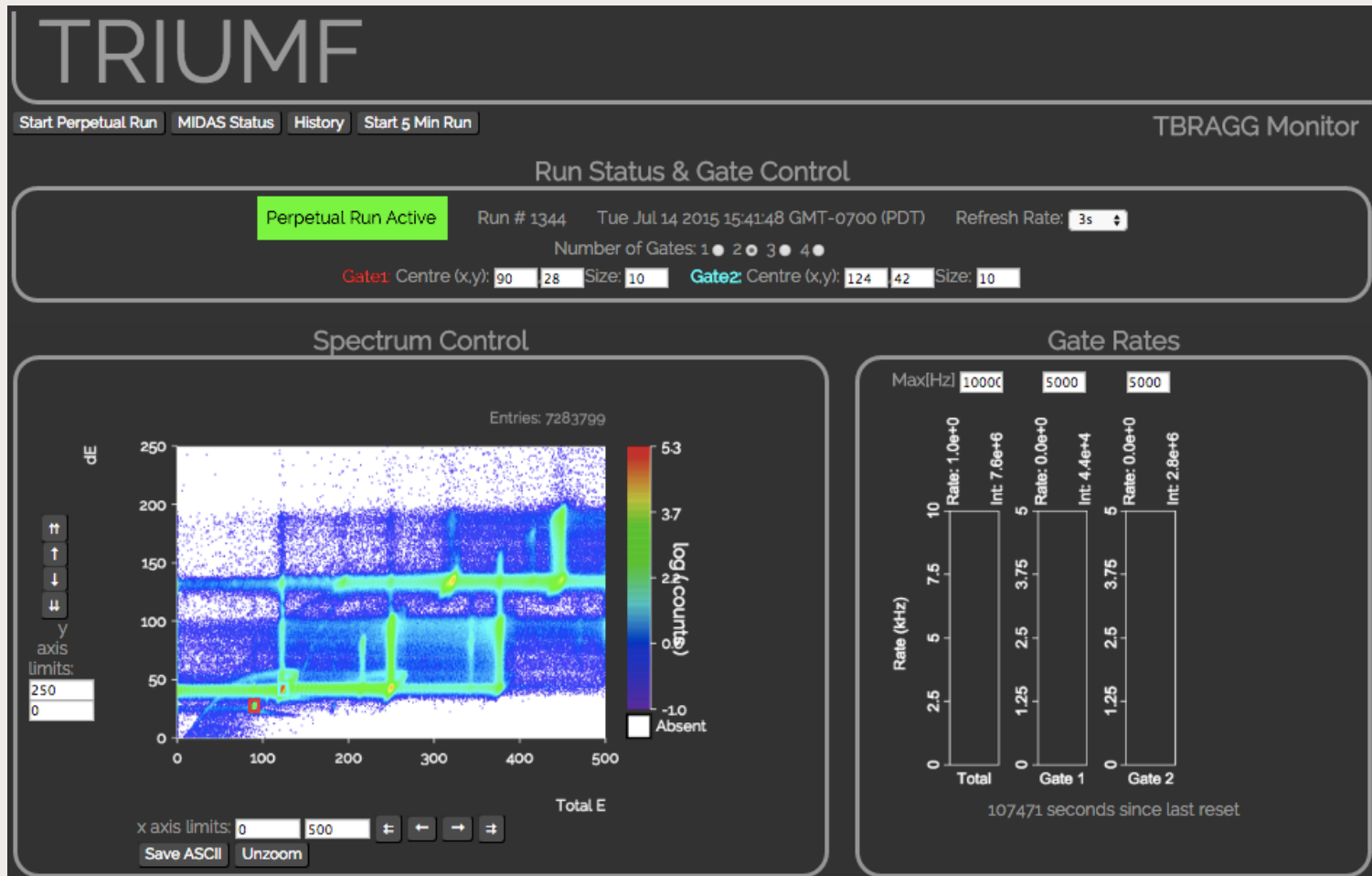
I was inspired by the MIDAS workshop in June 2011 – Thank you!

- Custom page for Tbragg detector
- Dashboard for GRIFFIN
- Web Analyzer for GRIFFIN
- Monitoring page for IRIS

Mostly developed by Adam Garnsworthy, Chris Pearson and Bill Mills, plus students; Tyler Ballast, Liz MacConnachie  
Apologies if I forgot someone!

<http://midtig04.triumf.ca:9093/viewer>

- Designed for Accelerator Experts and Operators to use (ie. People with no DAQ or MIDAS knowledge)



<http://midtig04.triumf.ca:9093/viewer>

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- MIDAS analyzer makes a png image in c code. Web page loads the image file every few seconds.
- Parameters of gates set up with javascript and stored in ODB.
- ODB parameters hot-linked to analyzer where rates are calculated
- Rate bars displayed as canvas object
- Images transmitted over network
- Analysis parameters communicated to server

Online Database Browser		
<input type="button" value="Find"/> <input type="button" value="Create"/> <input type="button" value="Delete"/> <input type="button" value="Create Elog from this page"/>		
/ Analyzer / Parameters / Gate0 /		
Key	Value	+
x	90 (0x5A)	
y	28 (0x1C)	
size	10 (0xA)	
Zoom	1 (0x1)	
reset	0 (0x0)	
dump	0 (0x0)	
dumpname	bragg-20150713-1755.dat	
NGates	1 (0x1)	
ResetTime	1436806422 (0x55A3ED16)	

Online Database Browser		
<input type="button" value="Find"/> <input type="button" value="Create"/> <input type="button" value="Delete"/> <input type="button" value="Create Elog from this page"/>		
/ Analyzer / Parameters / Gate1 /		
Key	Value	+
x	124 (0x7C)	
y	42 (0x2A)	
size	10 (0xA)	

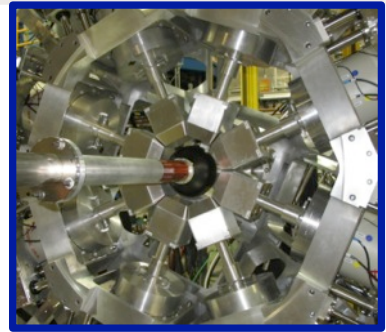


# GRIFFIN Facility at TRIUMF

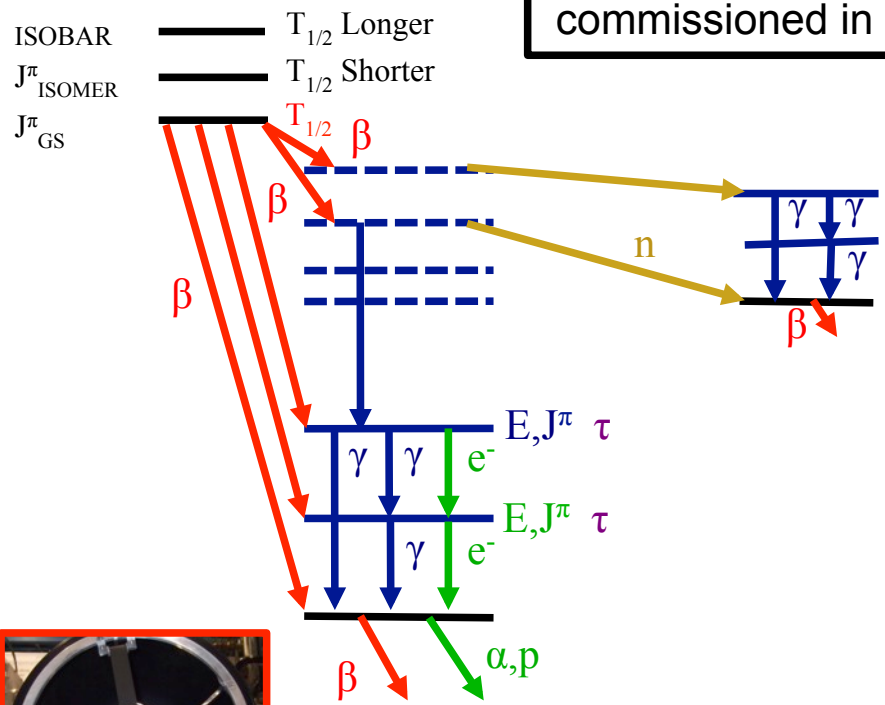
## Sensitive Decay Spectroscopy

Fast, in-vacuum tape system  
Enhances decay of interest

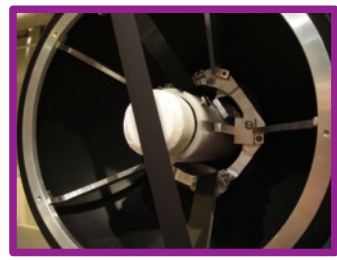
Initial operation in fall 2014. Fully commissioned in 2015



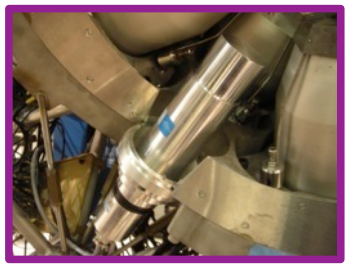
HPGe: 16 Clovers  
Detect gamma rays and determines branching ratios, multiplicities and mixing ratios



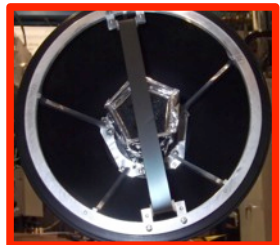
LaBr<sub>3</sub>: 8 LaBr<sub>3</sub>  
Fast-timing of photons to measure level lifetimes



Zero-Degree Fast scintillator  
Fast-timing signal for betas



PACES: 5 Cooled Si(Li)s  
Detects Internal Conversion Electrons and alphas/protons



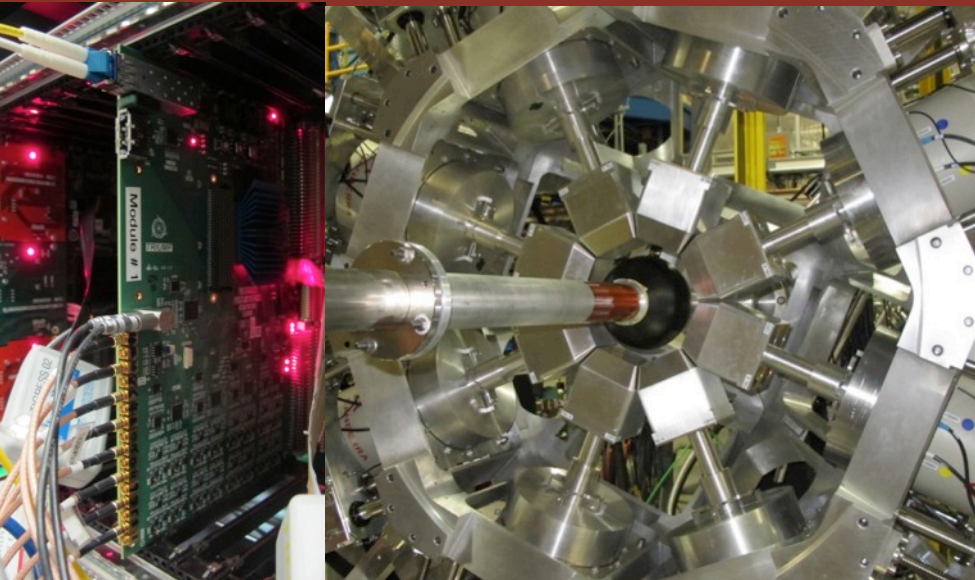
SCEPTAR: 10+10 plastic scintillators  
Detects beta decays and determines branching ratios



Neutron-Arrays:  
DESCANT or VANDLE  
Detects neutrons to measure beta-delayed neutron branching ratios

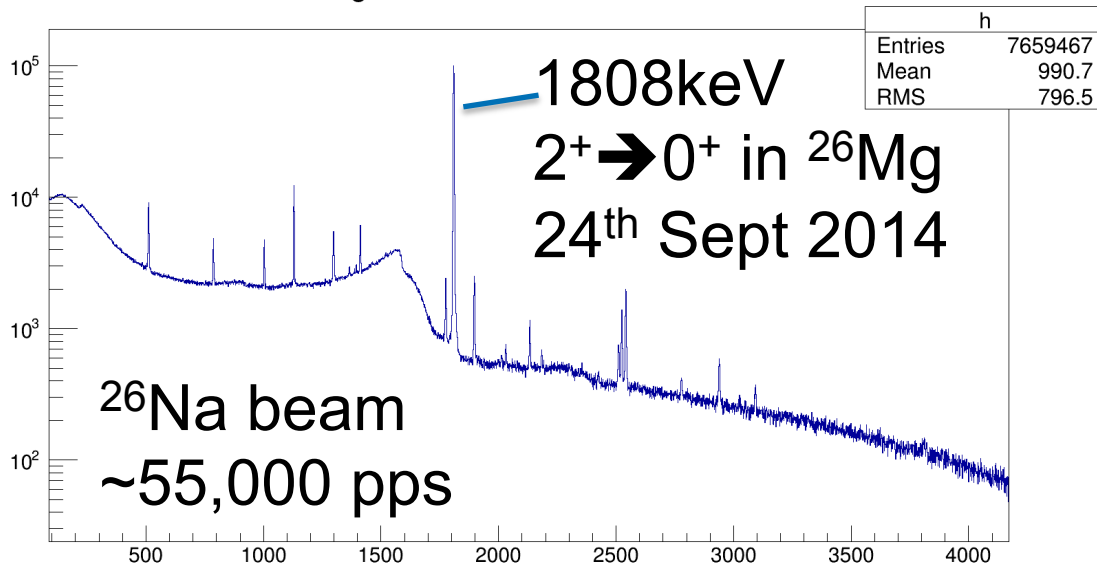


# GRIFFIN is now Operational

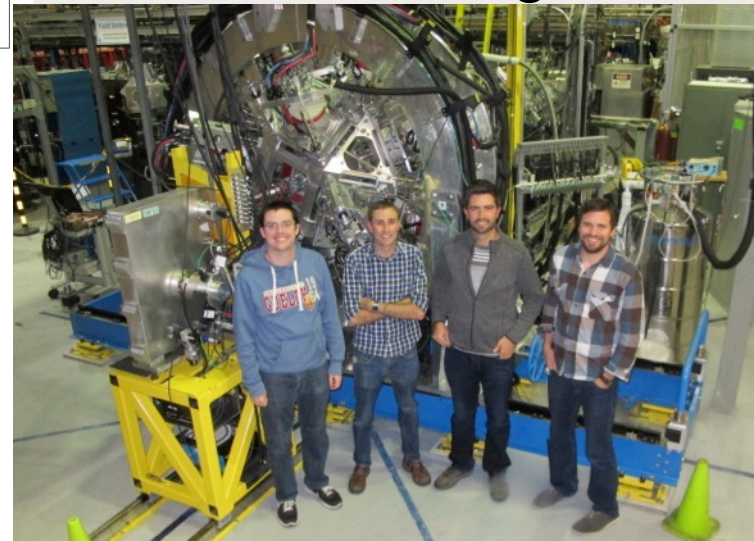


- 16 of 16 clovers accepted
- Custom designed and built Digital DAQ
- New beamline commissioned
- First RIB delivered 24<sup>th</sup> Sept 2014,  $^{26}\text{Na}$
- First experiment,  $^{115}\text{Ag}$  decay

$^{26}\text{Na}$  in beta-gamma coincidence with beam on



## End of the first night shift



# GRIFFIN DAQ System

[Status](#)
[ODB](#)
[Messages](#)
[Alarms](#)
[Programs](#)
[History](#)
[MSCB](#)
[Config](#)
[Help](#)

[Dashboard](#)
[ELOG](#)
[Contacts](#)
[Wiki](#)
[SOH](#)
[SpectrumViewer](#)
[SpectrumViewer2](#)

## Run Status

**Run  
4140  
Stopped**

Start

Start: Tue Jul 14 10:00:21 2015      Stop: Tue Jul 14 10:05:06 2015

Alarms: On

Restart: No

Logging disabled

**Experiment Name:** griffin

**Run Title:** SCEPTAR tests, preamp #9 in US

**Current Cycle:** 32Na-3coll-5dec

10:05:09 [mhttpd,INFO] Run #4140 stopped

## Equipment

Equipment +	Status	Events	Events[/s]	Data[MB/s]
Trigger	fegrifip09@grsmid00.triumf.ca	23119	0.0	0.000
HV-0	Ok	7390	0.3	0.000
HV-1	Ok	7337	0.3	0.000
HV-2	Ok	7391	0.3	0.000
Epics	Ok	22372	1.0	0.000

## Logging Channels

Channel	Events	MB written	Compr.	Disk level
#0: run04134_000.mid	0	0.000	N/A	52.1 %

## Clients

Logger [grsmid00.triumf.ca]	Epics [grsmid00.triumf.ca]	FeSy2527-0 [grsmid00.triumf.ca]
FeSy2527-1 [grsmid00.triumf.ca]	FeSy2527-2 [grsmid00.triumf.ca]	fegrifip09 [grsmid00.triumf.ca]
Analyzer [grsmid00.triumf.ca]	mhttpd [grsmid00.triumf.ca]	

# GRIFFIN Dashboard

<http://grsmid00.triumf.ca:2154/GRIFFIN>



HV DAQ PPG Clocks Filter Shack **GRIFFIN** SCEPTAR

## griffin

Run 4140 Stopped

Started Tue Jul 14 10:00:21 2015  
Stopped Tue Jul 14 10:05:06 2015  
Run Duration 0 h, 4 m, 45 s

Start

### Trigger Stats:

Events: 0.023 k  
Events / s: 0  
kB / s: 0  
Logger: 0.000 GB  
Write Data: No  
Data Dir: /data2/griffin/4C-

### Messages

Tue Jul 14 10:05:09 2015  
[mhitpd,INFO] Run #4140 stopped

Tue Jul 14 10:00:23 2015  
[mhitpd,INFO] Run #4140 started

Tue Jul 14 09:58:10 2015  
[mhitpd,INFO] Run #4139 stopped

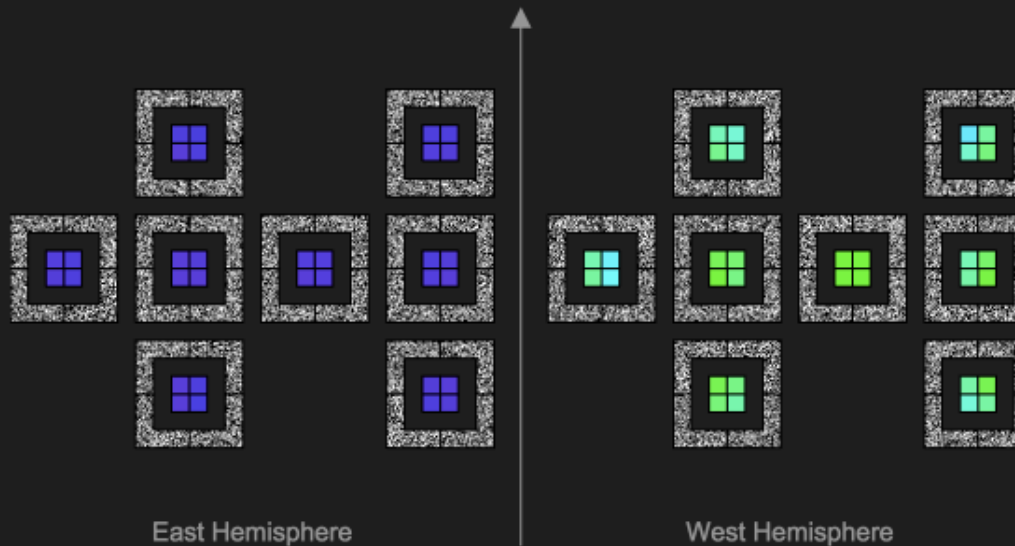
Tue Jul 14 09:54:34 2015  
[mhitpd,INFO] Run #4139 started

Tue Jul 14 09:51:03 2015  
[mhitpd,INFO] Run #4138 stopped

## GRIFFIN

### Summary

HV Threshold Trigger Request Rate **Trigger Accept Rate**



Click on a rate or threshold channel to get started.

Trigger Accept Rate [Hz]



Plot Control

Min: 0 Max: 1000 Linear



# GRIFFIN Dashboard

<http://grsmid00.triumf.ca:2154/GRIFFIN>

## DAQ

Master

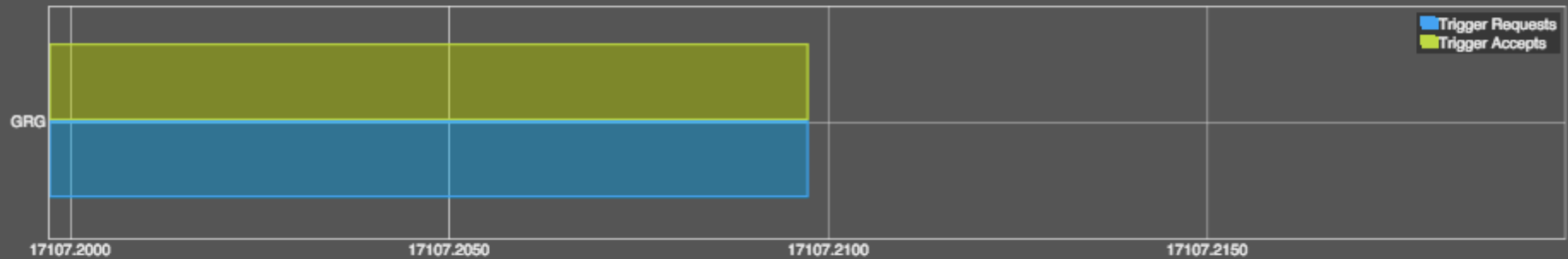
Trigger Request Rate

Trigger Accept Rate

Canonical MSC

MSC Builder

Master Node foo.triumf.ca



Trigger Accept Rate [Hz]

### Plot Control

Min: 0

Max: 30000

Linear

# GRIFFIN Dashboard

<http://grsmid00.triumf.ca:2154/GRIFFIN>

## Cycle Configuration

Displayed Cycle: 32Na-3coll-5dec

Summary **Edit**

Earlier Remove Later

Duration: 1 s

- Move Tape
- Collect Background
- Collect Data with Beam on
- Collect Data with Beam off
- Collect Source Data

Earlier Remove Later

Duration: 500 ms

- Move Tape
- Collect Background
- Collect Data with Beam on
- Collect Data with Beam off
- Collect Source Data

Earlier Remove Later

Duration: 40 ms

- Move Tape
- Collect Background
- Collect Data with Beam on
- Collect Data with Beam off
- Collect Source Data

Earlier Remove Later

Duration: 65 ms

- Move Tape
- Collect Background
- Collect Data with Beam on
- Collect Data with Beam off
- Collect Source Data

Cycle Name: 32Na-3coll-5dec **Save Cycle Definition**

Load / Delete Cycle: 32Na-3coll-5dec **Display** **Delete**

# GRIFFIN Dashboard

<http://grsmid00.triumf.ca:2154/GRIFFIN>

### Filter Control

Current Active Filter: 62Ga

GRIFFIN Singles Remove

AND new condition Delete This Block

OR

SCEPTAR Prescale Factor: 100 Remove

AND new condition Delete This Block

OR

GRIFFIN Singles Remove

AND SCEPTAR Singles Remove

AND new condition Delete This Block

OR

GRIFFIN Coincidences Multiplicity: 2 Coinc. Window [ns]: 100 Remove

AND SCEPTAR Singles Remove

AND new condition Delete This Block

OR new condition

Filter Name:  
62Ga

Save Filter Definition

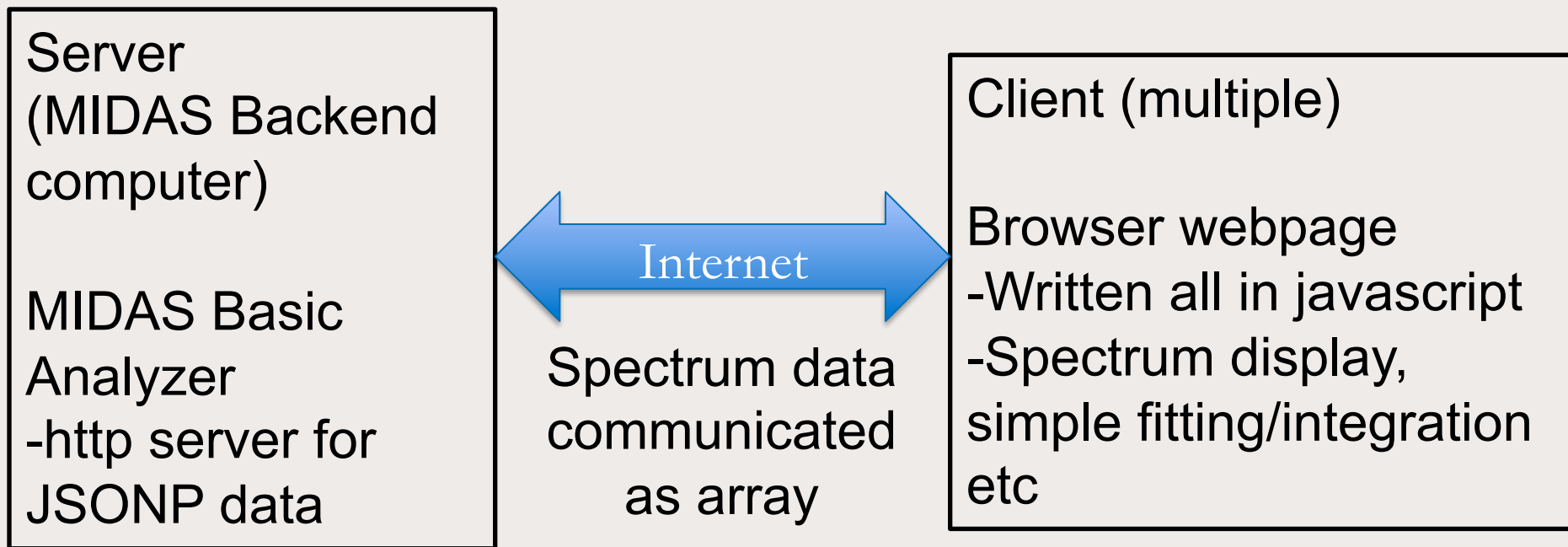
Save & Apply Filter Definition

Load / Delete Filter:  
62Ga

Load Delete


# Spectrum Viewer

<http://grsmid00.triumf.ca:8081/CS/SpectrumViewer>



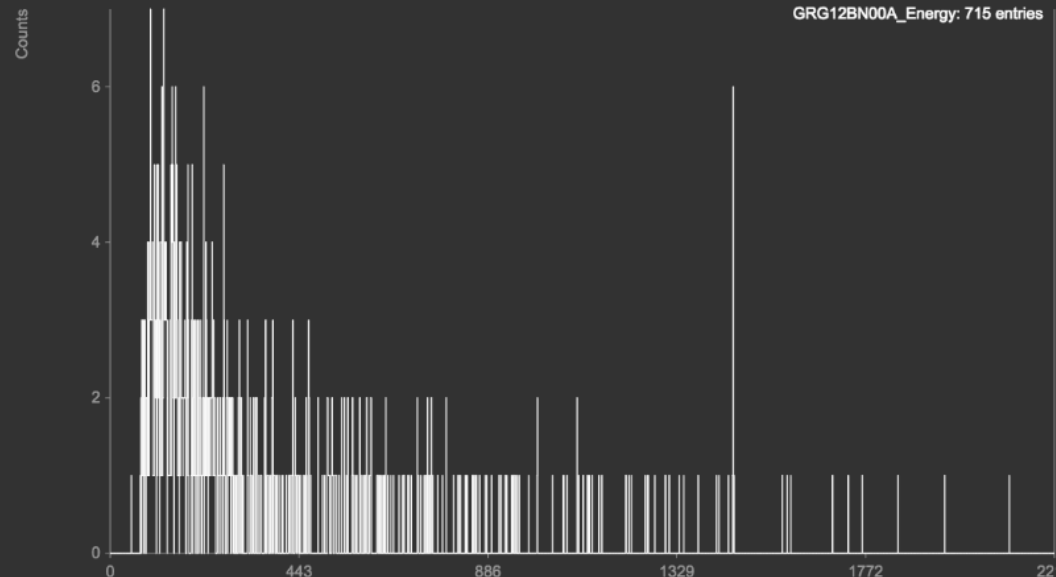
# Spectrum Viewer

<http://grsmid00.triumf.ca:8081/CS/SpectrumViewer>

 GRIFFIN

MIDAS Status

GRG12BN00A\_Energy: 715 entries



Counts

Channels

x=143 y=6

0 < x < 2215

Fit Mode Unzoom Linear  Log Snap to Waveform

Update Every: 3 s Update Now Zero Spectrum Counts

- GRG07RN00A\_Energy
- GRG07WN00A\_Energy
- GRG08BN00A\_Energy
- GRG08GN00A\_Energy
- GRG08RN00A\_Energy
- GRG08WN00A\_Energy
- GRG09BN00A\_Energy
- GRG09GN00A\_Energy
- GRG09RN00A\_Energy
- GRG09WN00A\_Energy
- GRG10BN00A\_Energy
- GRG10GN00A\_Energy
- GRG10RN00A\_Energy
- GRG10WN00A\_Energy
- GRG11BN00A\_Energy
- GRG11GN00A\_Energy
- GRG11RN00A\_Energy
- GRG11WN00A\_Energy

Spectra Hide All  Show All Fit Target Fit Results Clear Delete All

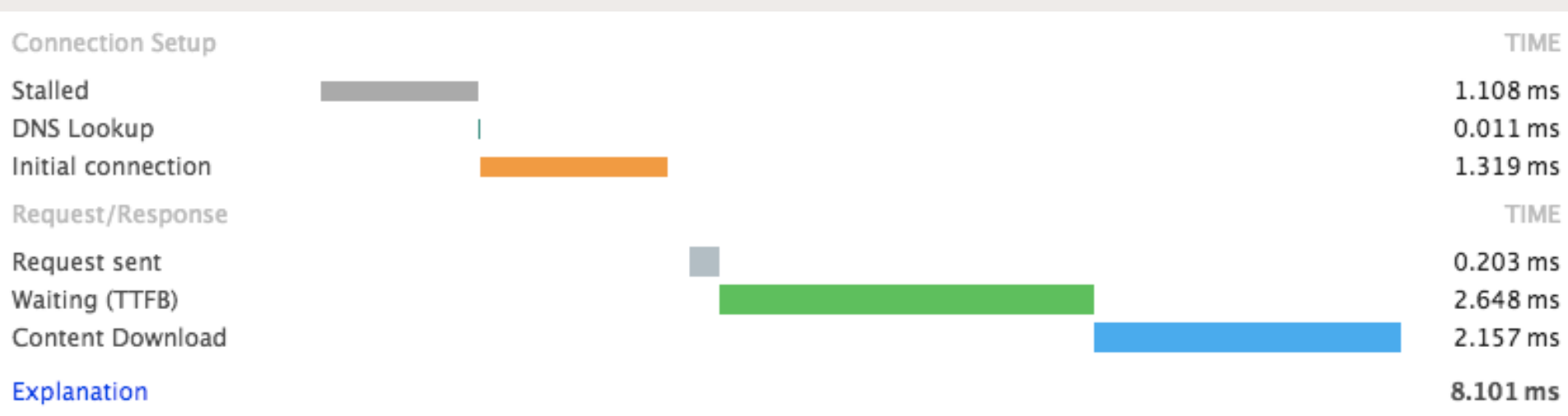
GRG12BN00A\_Energy Hide  Show



# Spectrum Viewer

<http://grsmid00.triumf.ca:8081/CS/SpectrumViewer>

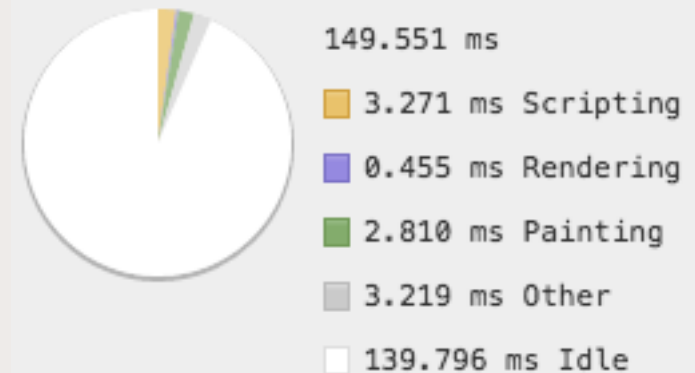
Request for 1 spectrum of 84 channels.



Client-server transaction takes  
8.1 milliseconds.

Javascript is ~10ms.

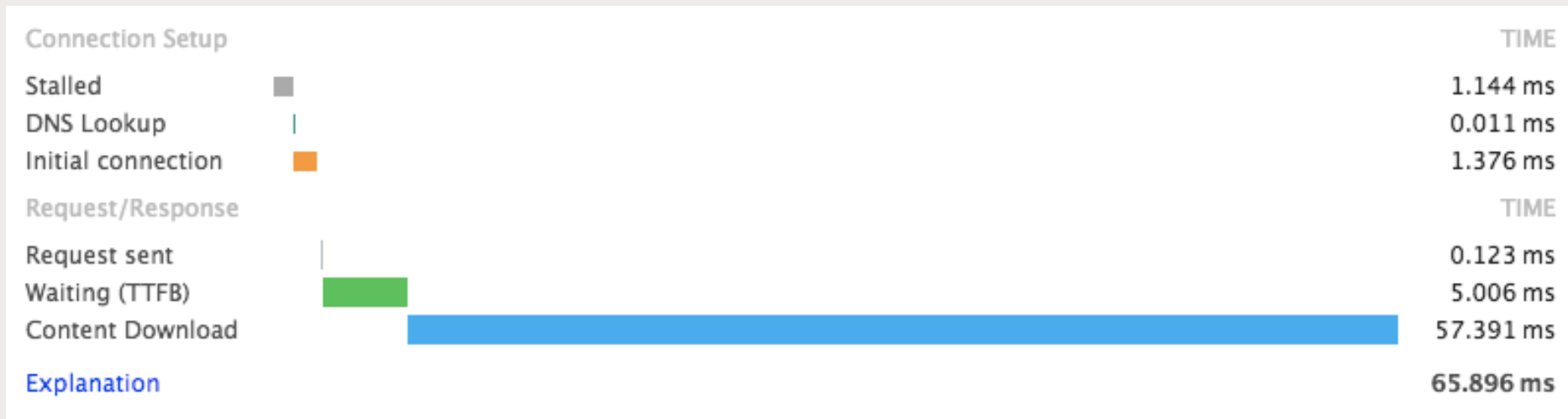
Total refresh procedure is <20ms



# Spectrum Viewer

<http://grsmid00.triumf.ca:8081/CS/SpectrumViewer>

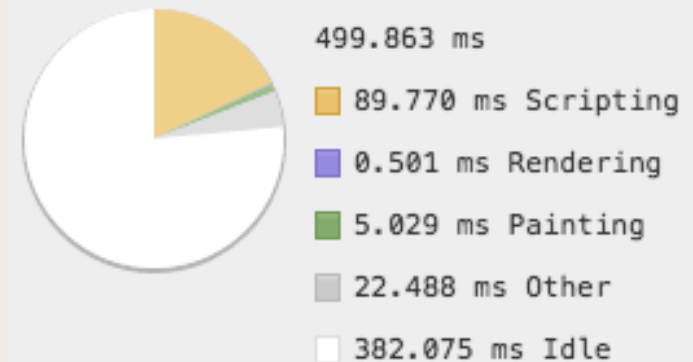
Request for 8 spectra of 8192 channels each.



Client-server transaction takes 66 milliseconds.

Javascript is ~130ms.

Total refresh procedure is <200ms



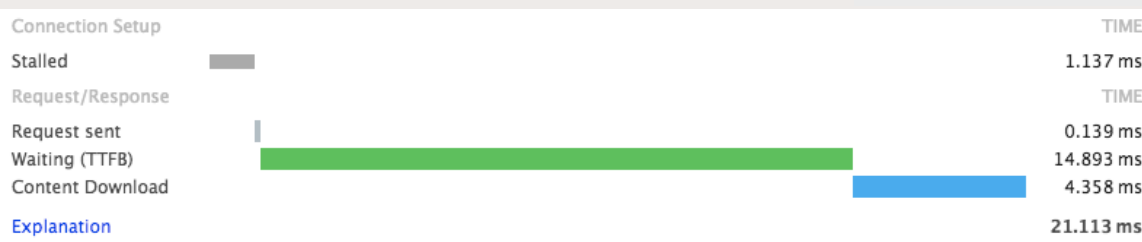
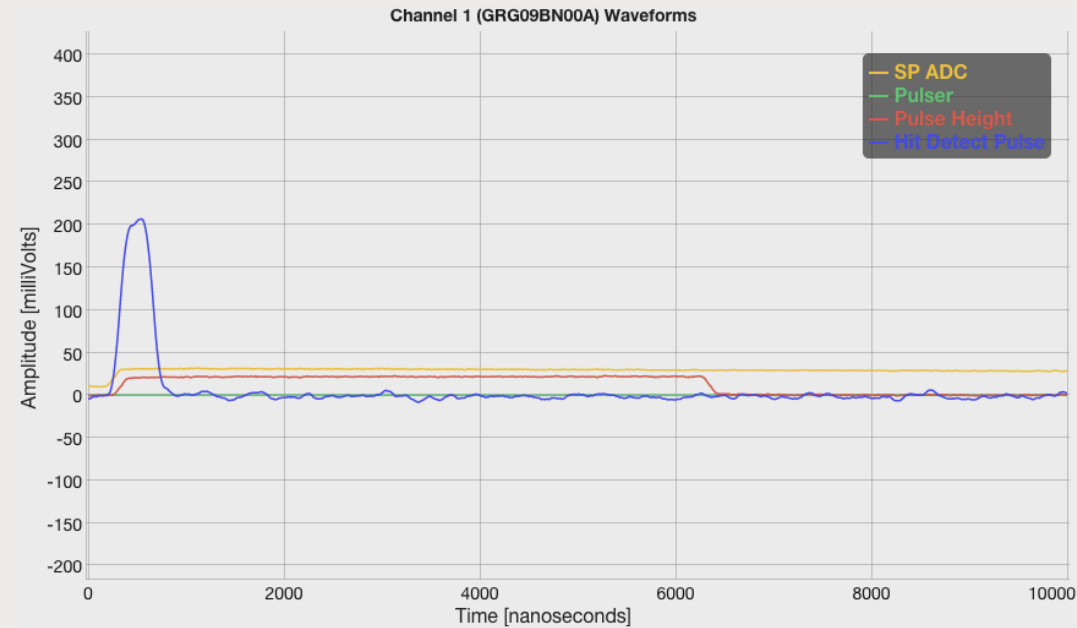


# Binary JSON

<http://grifadc05.triumf.ca>

Request for 4 spectra of 10,000 channels each.

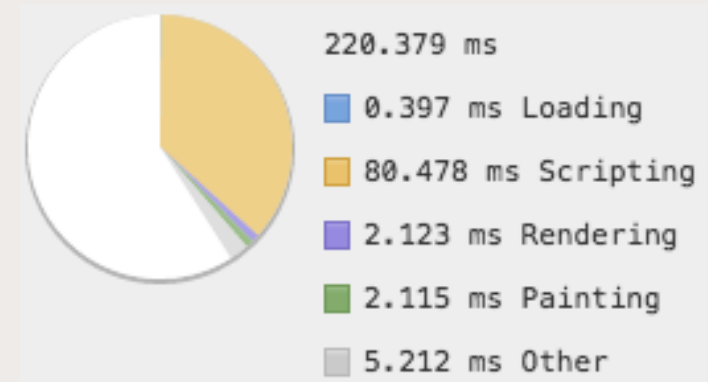
**Content download is factor of 5 faster!**



Client-server transaction takes 21 milliseconds.

Javascript is ~90ms.

Total refresh procedure is <120ms



# IRIS Ion-Chamber Monitor

[http://iris00.triumf.ca:8081/CS/IC\\_Monitor](http://iris00.triumf.ca:8081/CS/IC_Monitor)

- Single spectrum served from MIDAS analyzer to the webpage and displayed as histogram.
- Analysis (Integration of two regions) done all in browser (javascript) using clients CPU. No communication to server of analysis parameters required.
- Implemented a history graph using the javascript package, Dygraphs

<http://dygraphs.com/>

# Conclusions

- MIDAS is fantastic! The web-based interfaces are a really great extension
- GRIFFIN has moved as much experiment control as possible to intuitive and simple web-based interfaces
- Good idea to minimize network traffic in both size and frequency as much as possible

## **Future...**

- Develop a standard analyzer server using Binary JSON. (See next talk from Bryerton)

Hopefully this will inspire others so look forward to the MIDAS workshop in June 2019 – Thank you!