

Analysis - Support #1730

Analysis of TOF0-only June Runs (6715--6729)

13 August 2015 12:52 - Blackmore, Victoria

Status:	Closed	Start date:	13 August 2015
Priority:	Normal	Due date:	
Assignee:	Blackmore, Victoria	% Done:	100%
Category:		Estimated time:	0.00 hour
Target version:			
Description			
Analysis of runs 6715--6719, taken on June 2nd 2015.			
Setup:			
<ul style="list-style-type: none">• TOF1 was not in the beam• TOFs were not calibrated• Trigger was TOF0.			
Purpose of runs:			
<ul style="list-style-type: none">• Tuning of Q123 magnet currents• Run current summary: http://micewww.pp.rl.ac.uk/projects/operations/wiki/02_June_2015_beam_settings			

History

#1 - 13 August 2015 12:59 - Blackmore, Victoria

- File *TOF_assumptions.pdf* added

- File *runs_6715_6729_ExtractedTOF0Data.zip* added

Reading runs 6715--6729 with MAUS is not possible without two modifications:

1. A "hack" to the unpacker. Instructions from Yordan:

```
a. Open the file
/third_party/build/unpacking-mice/src/MDprocessManager.cpp
and edit the line 253
from      if (MDequipMap::GetName(GetEquipmentType())!="VRB") {
to        if (MDequipMap::GetName(GetEquipmentType())!="VRB" && MDequipMap::GetName(GetEquipmentType())!="VL
SBMaster") {
```

```
b. rebuild the unpacking:
source env.sh
cd /third_party/build/unpacking-mice/build/
cmake -DCMAKE_INSTALL_PREFIX=${MAUS_ROOT_DIR}/third_party/install -DSTEPIV_DATA=1 ../
make
make install
```

2. Changing `TOF_trigger_station = "tof1"` to `TOF_trigger_station = "tof0"` in `$MAUS_ROOT_DIR/src/common_py/ConfigurationDefaults.py` (line 535)

Doing the above has worked with MAUS version 1.0.

As there is no valid calibration for TOF0 during these runs, space point reconstruction is extremely poor. Instead, I have stripped off the horizontal and vertical slab hits into a separate root file (archive attached to this entry). Assumptions used when converting slab numbers to (x, y) co-ordinates are also attached.

#2 - 13 August 2015 13:05 - Blackmore, Victoria

- File *task_5pt6_histograms.pdf* added

- File *task_5pt7_histograms.pdf* added

- File *task_5pt8_histograms.pdf* added

- File *task_5pt9_histograms.pdf* added

- File *task_5pt1_histograms.pdf* added

- File *task_5pt2_histograms.pdf* added
- File *task_5pt3_histograms.pdf* added
- File *task_5pt4_histograms.pdf* added
- File *task_5pt10_histograms.pdf* added
- File *task_5pt5_histograms.pdf* added

First, a naive look at the data.

The attached plots show histograms of the horizontal and vertical slab hits at TOF0 for each "task" (corresponding to a beam setting in the run plan). Vertical slab hits are converted into an x-coordinate, centred on the slab (see assumptions pdf in previous entry), and horizontal slab hits are converted into y-coordinates centred on the slabs.

At this point, I'm just counting every slab hit returned -- i.e. there's no accounting of multiple hits or requiring that a particle goes through both planes of the TOF.

There's no dramatic change in the distribution of slab hits, and the means vary by a few mm only.

#3 - 13 August 2015 13:10 - Blackmore, Victoria

- File *all_normalised_to_5pt1.pdf* added

The above histograms are then normalised to the same number of entries as task 5.1

#4 - 13 August 2015 13:16 - Blackmore, Victoria

- File *task_5pt5_pixel_histogram.pdf* added
- File *task_5pt6_pixel_histogram.pdf* added
- File *task_5pt7_pixel_histogram.pdf* added
- File *task_5pt8_pixel_histogram.pdf* added
- File *tof0_intensity_study_analysis_script.zip* added
- File *task_5pt1_pixel_histogram.pdf* added
- File *task_5pt2_pixel_histogram.pdf* added
- File *task_5pt3_pixel_histogram.pdf* added
- File *task_5pt9_pixel_histogram.pdf* added
- File *task_5pt4_pixel_histogram.pdf* added

Next, try and match up horizontal and vertical slab hits into pixels (without having a TOF calibration, I see no other way of doing this than by brute force...)

Analysis code is attached (though I apologise for its inelegance, I've not attempted to tidy it.. it is what it is).

A 'pixel' is made if and only if there is one horizontal and one vertical slab hit for a particle. All other slab hits are ignored. This reduces the number of "hits" at TOF0 to about 70% of what they were without this cut (for the reference beam).

The attached plots show, for each task:

- (top, left): 2D pixel profile at TOF0
- (top, middle): Projection of 2D profile onto the x-axis (equivalent to vertical slab hits)
- (top, right): Projection of 2D profile onto the y-axis (equivalent to horizontal slab hits)
- (bottom, middle): Mean value of y at each x
- (bottom, right): Mean value of x at each y.

#5 - 13 August 2015 13:18 - Blackmore, Victoria

- File *task_5pt10_pixel_histogram.pdf* added
- File *all_pixels_normalised_to_5pt1.pdf* added

(ran out of allowable files to attach to the previous entry)

Also attached is the x and y profiles for 'pixel-worthy' hits, normalised to the same number of entries as task 5.1.

#6 - 13 August 2015 13:41 - Blackmore, Victoria

Summary of means and rms's from histograms for particles that make a 'pixel' only.

Task	Q1	Q2	Q3	mean x (mm)	rms x (mm)	mean y (mm)	rms y (mm)	total pixels	total spills	pixels/spill	relative to Task 5.1 (%)
5.1	102.4	127.9	89.0	-0.3332	96.76	-1.968	73.61	39016	1002	39	100
5.2	97.3	124.1	86.3	-0.6278	96.43	-1.36	74.28	35236	998	35	90.6
5.3	90.1	118.9	80.1	-1.915	96.17	-1.606	74.54	31263	1000	31	80.3
5.4	95.2	117.7	74.8	-1.605	97.04	-1.182	73.45	31495	1002	31	80.7
5.5	132.6	188.3	89.4	-2.283	95.96	-1.204	74.54	26514	998	27	68.2
5.6	158.3	179.2	198.5	-1.527	95.74	-1.684	73.69	39647	994	40	102.4
5.7	85.97	146.61	117.65	-0.6262	96.83	-1.738	73.81	32547	996	33	83.9
5.8	94.41	140.64	110.90	-0.6582	96.38	-1.746	73.93	35583	1000	36	91.4
5.9	38.18	115.70	110.12	-0.8329	96.99	-1.718	74.65	25669	1001	26	65.9
5.10	87.39	138.82	113.50	-1.486	96.97	-0.9925	74.06	32724	997	33	84.3

#7 - 28 January 2016 11:43 - Rogers, Chris

- Status changed from Open to Closed

- % Done changed from 0 to 100

I think this is closed?

Files

File Name	Size	Date	Location
TOF_assumptions.pdf	107 KB	13 August 2015	Blackmore, Victoria
runs_6715_6729_ExtractedTOF0Data.zip	8.96 MB	13 August 2015	Blackmore, Victoria
task_5pt6_histograms.pdf	16.6 KB	13 August 2015	Blackmore, Victoria
task_5pt7_histograms.pdf	17.3 KB	13 August 2015	Blackmore, Victoria
task_5pt8_histograms.pdf	17 KB	13 August 2015	Blackmore, Victoria
task_5pt9_histograms.pdf	16.9 KB	13 August 2015	Blackmore, Victoria
task_5pt1_histograms.pdf	16.5 KB	13 August 2015	Blackmore, Victoria
task_5pt2_histograms.pdf	16.9 KB	13 August 2015	Blackmore, Victoria
task_5pt3_histograms.pdf	17.3 KB	13 August 2015	Blackmore, Victoria
task_5pt4_histograms.pdf	17.2 KB	13 August 2015	Blackmore, Victoria
task_5pt10_histograms.pdf	17.3 KB	13 August 2015	Blackmore, Victoria
task_5pt5_histograms.pdf	17 KB	13 August 2015	Blackmore, Victoria
all_normalised_to_5pt1.pdf	20 KB	13 August 2015	Blackmore, Victoria
task_5pt5_pixel_histogram.pdf	19.6 KB	13 August 2015	Blackmore, Victoria
task_5pt6_pixel_histogram.pdf	20.2 KB	13 August 2015	Blackmore, Victoria
task_5pt7_pixel_histogram.pdf	19.7 KB	13 August 2015	Blackmore, Victoria
task_5pt8_pixel_histogram.pdf	20 KB	13 August 2015	Blackmore, Victoria
tof0_intensity_study_analysis_script.zip	7.71 KB	13 August 2015	Blackmore, Victoria
task_5pt1_pixel_histogram.pdf	20 KB	13 August 2015	Blackmore, Victoria
task_5pt2_pixel_histogram.pdf	20 KB	13 August 2015	Blackmore, Victoria
task_5pt3_pixel_histogram.pdf	19.8 KB	13 August 2015	Blackmore, Victoria
task_5pt9_pixel_histogram.pdf	19.6 KB	13 August 2015	Blackmore, Victoria
task_5pt4_pixel_histogram.pdf	19.9 KB	13 August 2015	Blackmore, Victoria
task_5pt10_pixel_histogram.pdf	19.8 KB	13 August 2015	Blackmore, Victoria
all_pixels_normalised_to_5pt1.pdf	25.5 KB	13 August 2015	Blackmore, Victoria