#### e15091 guide

## 1 Introduction

This guide will show you how to fill out a run sheet, open all readouts (including the master readout), how to start SpecTcl for experimental runs, and how to unpack runs and do diagnostics. Before this DAQ version, MoNA, LISA, and Sweeper all had different run numbers (i.e. 1xxx for MoNA, 2xxx for LISA, 3xxx for Sweeper) and were merged offline. With DAQ11 and the event builder, data is merged online. This requires the use of a master readout, which enslaves the MoNA, LISA, and Sweeper readouts and merges their data online using the event builder.

## 2 Filling out a Run Sheet

Run sheets can be found in the folder attached to the wall between Data-U PC's 2 and 3. One needs to be filled out each hour when a new run is started. **DO NOT copy from previous runsheets!** They should be filled out according to the following:

- 1. Write down the run number from the master readout and MAKE SURE THAT ALL READOUTS HAVE THE SAME RUN NUMBER.
- 2. Experimenter in charge will be located on the experiment monitor above u5pc4.
- 3. Recorder should be your name.
- 4. Title will be what is set in the master readout title box. It will likely refer to the type of run (i.e. "production").
- 5. Date will be the current date.
- 6. Start and end times: write in military time. (i.e. 5:00 PM should be written as 1700).
- 7. Beam will be either  ${}^{11}Be$  or  ${}^{12}B$ .
- 8. Target will be <sup>9</sup>Be (segmented target). Comment on target position (in/out).
- 9. Blocker position: the blocker may or may not be used; so if it is, this field needs to be filled with the blocker position.
- 10. Pot.Scint scaler should be read from the scalers (likely located on u5pc4).
- 11. XFP.scint should also be read from the scalers (likely located on u5pc4).
- 12. Trigger Condition should be read off the Level 3 Trigger GUI (i.e. Sweeper singles).
- 13. Computer Go scaler may not be used.
- 14. Sweeper Current should be read from the Panel Mate. This is usually located on the computer to the right of u5pc2.
- 15. Hall probe values should be read from the Panel Mate. This is usually located on the computer to the right of u5pc2.
- 16. Pot Voltage should be read form the power supply labeled "POT-SCI" on the crate in Data-U5.
- 17. MoNA and LISA local triggers may be unavailable.
- 18. Crdc1.anode and Crdc2.anode should be read from the scalers (likely located on u5pc4).
- 19. Notes: add anything potentially relevant to the data (i.e. ended early, beam stopped, etc.).

# 3 Starting MoNA-LISA

This section will familiarize you with starting the MoNA-LISA CFD, XLM, and Readout GUIs. Where you see MoNA(LISA) it means that the commands are for *either* MoNA or LISA, and the commands inside the parenthesis are for LISA. So if you see a command like gocfd mona(lisa) it means you would type gocfd mona for the MoNA CFD GUI and you would type gocfd lisa for the LISA CFD GUI. You will start all of MoNA first, then repeat the entire "Starting MoNA-LISA" section for LISA.

### 3.1 Starting the CFD GUIs

- 1. Begin by signing into a Data-U computer (likely u5pc3) with the e15091 experimental account and password.
- 2. Open up a terminal in an empty desktop. To start the MoNA(LISA) CFD GUI, type:

>gocfd mona(lisa)

3. Wait for the CFD GUI to come up. It should look similar to the picture below. Click **Connect All**, circled in gree, to connect the array. Ensure all layers are connected (the check boxes in the red box are all checked for every layer).

MoNA	cfd_gui	0.0		3	- 3 - * -
AL	ARVB	LVBRVCLVCRVI	OLVDRVELVERVFLVFRVOLVO		
CA	ENV 812	2 @ 0x20000	Module: AL	Serial Number: 88	MoNA_AL.ctd =Contig File
Activ	e Chanr	els Thresholds	Module Thresholds (mv	)	
	20	-10	-1	Connect 0	Saved 0
	21	-40	r	Connect All	Save All
	¥2	-10	Dead_t Ch0-7 (ns)		
	₩3	40	500		_
	₩4	-10	r	All MoNA threshold	5
	₩S.	-10	Width Ch0-7 (ns)	-10	-
	₩6	-10	150	Majority condition	1
	27	-10	r	1	-
	28	-10	r	🖓 Unmask the pa	9e
	99	-40	Dead_t Ch8-15 (ns)	🗟 Unmask ALL	
	₩10	-40	500	ſ.	
	₩11	-40	r		Exit
	₩12	-40	Width Ch8-15 (ns)		
	⊽13	-40	150	r.	
	₩14	-40	r		
	¥15	40	r		

- 4. Set the threshold for MoNA(LISA) CFDs to -10 mV(-20 mV). This is the slider located in the orange box in the picture above.
- 5. Click **Save All**, circled above in yellow, to save these settings.
- 6. You are done setting up the CFD GUI. Move onto the XLM GUI.

### 3.2 Starting the XLM GUIs

1. Open a new terminal in the same desktop, and type:

>goxlm mona(lisa)

2. Wait for the XLM GUI to come up. You may need to load all FPGAs by pressing the "Load all FPGAs" button on the FPGA configure panel if this is the first time you open the XLM GUI, or if the associated spdaq has been power cycled. It won't ever hurt to do it, it just takes a few minutes. If you do NOT need to load all FPGAs, click **Read file** to read the XLM settings from file.

The settings should be (refer to left picture below):

Primary Option: Time Stamp Common Stop Source: Pot Scint Local Triggers: MoNA(LISA) Enable Low Mult Limit: 1-fold

On the **FPGA configure** panel (right side in pictures below), the settings should be: QDC Gate: Readout Delay: FCLR Period: TDC Veto Delay:

MoNA XLM control - VIRTEX -	MoNA XLM control - VIRTEX -
control page FPOA configure / Signal routing	Control page FPGA contigure Signal routing
Ext Read XLM Set XLM Read Fie Wrte Hie Check XLM E.k Primary options This Stamp TS reset Local Common Stop Source (also trigger when in local mode) Thin Stint • Pot Scint • ALX B • First PMT MoNAVAUX Self Local Inggers • MotA enable • AUX C enable	Ext Read XLM SIGURY Read File Write File Check XLM O.K. select XLM Load selected Reset selected Read am Unmap XLM Load all FPQAs QDC gate 16 readout delay 52 FCLR period 52 
	LV1 bitfle: /user/e15091/fpga/bitfles/monalisa_levell_v1-3.bit
	LV2 bitfile: /user/e15091/fpga/bitfiles/monalisa_level2_v1-2.bit
	values file: /user/e1S091/fpga/vim_tsmonavalues.dat

If in doubt, the correct XLM settings for MoNA and LISA are tacked to the wall above u5pc2.

3. When you are done setting up the XLM, press the following buttons in order: Set XLM
Write File (confirm overwrite)
Check XLM (should have a green "o.k." next to it after pressing)

You are finished setting up the XLM GUI. Move on to the readout GUI.

## 3.3 Starting the MoNA(LISA) Readout GUI

1. Open a new terminal in the same desktop, and type:

godaq\_mona(lisa)

2. Wait for the Readout GUI to come up. It should look similar to the picture below. Press "Start" (in the green box below) but DO NOT press "Begin." Find the run number in the top right corner (boxed in yellow below). This will be relevant later.

🦫 Mona Run control	1001.00.1	
File Data Source Settings		
Title:		Run Number: 2000
Start		0 00:00:00 Active Run Time
Begin Pause	Timed Run 0	
main SSHPipe@spdaq40.nscl.msu.edu:0 (12)		
07/05/2017 15:41:15 : log : Run state changed: 07/05/2017 15:41:15 : log : Run state changed:	NotReady -> Starting Starting -> Halted	
I No event segments recorded yet		

3. Click the "Data Source" dropdown menu at the top of the GUI (boxed in orange above) and select "list." In the data source list, check that the MoNA(LISA) readouts are attached to the mona(lisa) rings, and that the sourceid is the same as the device's spdaq number (40 for MoNA and 42 for LISA). These are highlighted in the picture below.

NOTION IS					
Source Id	Source Type	Parameter	Value		
)	SSHPipe				
		host	spdaq40.nscl.msu.edu		
		parameters	-ring=monasourceid=40		
		path	/user/e15091/dag_testing_mona/Readout_m	iona	
		wdir	/user/e15091/dag_testing_mona		

4. You are finished with setting up the MoNA(LISA) readout. Please repeat the "Starting MoNA-LISA" section in a clear desktop, and use the commands pertaining to the other array.

# 4 Starting Sweeper

This section will familiarize you with starting the Sweeper readout GUI and its associated GUIs. If extra documentation is needed, visit the sweeper DAQ page: https://wikihost.nscl.msu.edu/SweeperMagnet/doku.php?id=sweeper data acquisition daq

### 4.1 Starting Sweeper Readout GUI

- 1. Begin by signing into a Data-U computer (likely u5pc4) with the sweeper account and password.
- 2. Click the "DAQ Sweeper" desktop icon to start the Sweeper Readout GUI.
- 3. Click "Start" (boxed in green below) and observe the extra buttons that appear at the bottom of the GUI. Below is the readout after beig started. Find the run number (boxed in yellow below). This will be relevant later.

🐓 Sweeper Run Control	
File Data Source Settings MultiLogger	
Title: Thin SCI test with cosmic rays	Run Number: 2000
Start	0 00:00:00 Active Run Time
Begin Pause	Timed Run 0 😴 0 💌 0 💌 0
Record	1.01.01.00.00
main SSHPipe@spdaq34.nscl.msu.edu:1 (18) SSHPipe@sp	daq34.nscl.msu.edu:0 (14)
	, τ. τ. τ.
No event segments recorded yet	
Launch ULMTriggerGUI	Launch MCFD16Controls
Launch Gate Delay GUI	Launch Level3 Trigger GUI
Event building parameters (vsn 11) Ordered Fragment Ri Ts is:      earliest      latest      average      Tee output to this i     Build 1	ng Destination ring ring Output Ring sweeper Use for recording

4. Click the "multilogger" dropdown menu and click "List Loggers..." to bring up a list of loggers. Make sure that the mona, lisa, and sweeper rings (boxed in red below) are enabled (boxed in blue below).

istloggers				-	_	and a second sec	- 0 - X
From Ring	To directory			ls ena	bled	End run timeout (Sec)	Event sources
tcp://spdaq40.nscl.msu.edu/mona tcp://spdaq42.nscl.msu.edu/lisa	/user/e15091/stagearea/s /user/e15091/stagearea/s	tagearea_mo tagearea_lisa	na/complete a/complete	Yes Yes		20 20	1
tcp://spdaq34.nscl.msu.edu/sweeper	/user/e15091/stagearea/s	weeper		Yes		20	2
		Ok					

5. Click the "Launch ULMTriggerGUI" button (boxed above in red), and wait for the GUI to appear. Click the "Save to File" button on the top left (boxed in red below). Sometimes an error message pertaining to slow communication will pop up while trying to open the ULM Trigger Settings GUI. If this happens, try opening the GUI again (it can and has happened multiple times in a row).



6. Open the Level 3 Trigger GUI by clicking the "Launch Level3 Trigger GUI" button.

🐓 TS Level 3 XLM	control					_ <b>_</b> ×
control page	FPGA conf	figure Sig	nal routing			
Exit Rea	ad XLM	Set XLM	Read File	Write File	Check XLM	0.K.
Trig	ider Detec	tor dT cointillo	tor (standard	trianan thin		
L	Timina sci	ntillator (p	ot scint, not r	recommende	d)	
Syst	tem Trigge	er Conditio	n		-,	
<u> </u>	Sweeper s	standalon	e (disables all	other trigger	rs)	
•	Sweeper s	singles (wi	II read MoNA-L	ISA & CAESA	R) NECASSAD	
	coinciden	ce sweep	er - requires M	alde6c	OF CAESAR OF	DS
		_	is reser	840600		
<u></u>	_	_	_		-	
🐓 TS Level 3 XLM	control				-	×
F TS Level 3 XLM	control FPGA conf	figure Sig	nal routing		NC.	- • ×
TS Level 3 XLM control page	control FPGA conf ad XLM	figure Sig Set XLM	nal routing	Write File	Check XLM	- • • ×
S- TS Level 3 XLM control page Exit Rea	control FPGA conf ad XLM Lo	figure Sig Set XLM bad	nal routing Read File Reset	Write File	Check XLM	
S- TS Level 3 XLM control page Exit Rea	control FPGA conf ad XLM Lo	figure Sig Set XLM Pad	nal routing Read File Reset Idence gate	Write File	Check XLM rad s/n	0.K
TS Level 3 XLM control page	control FPGA conf ad XLM Lo	figure Sig Set XLM Dad Coinc 38	nal routing Read File Reset idence gate	Write File	Check XLM rad s/n	o.k
S- TS Level 3 XLM control page	control FPGA conf ad XLM Lo	figure Sig Set XLM pad Colnc 38	nal routing Read File Reset Idence gate	Write File Re	Check XLM rad s/n	o.k
F TS Level 3 XLM	control FPGA conf ad XLM Lo	figure Sig Set XLM Dead	nal routing Read File Reset Idence gate	Write File	Check XLM rad s/n	
5- TS Level 3 XLM control page Exit Rei	control FPGA cont ad XLM Lo	figure Sig Set XLM bad Coinc 38	nal routing Read File Reset Idence gate	Write File	Check XLM had s/n	0.K
5 TS Level 3 XLM control page Exit Rei	Control FPGA cont ad XLM Lo	figure Sig Set XLM oad Coinc 38	nal routing Read File Reset idence gate	Write File Re	Check XLM Had s/n	0.K.

7. Click "Read XLM" (boxed in red above) to read the settings from the XLM module. The settings (highlighted above) should be:
Trigger Detector: Sweeper DE scintillator
System Trigger Condition: Sweeper singles

and in the FPGA configure panel,

#### Coincidence gate: 38

If in doubt, the correct settings are tacked to the wall above u5pc4 for the level 3 trigger settings.

- 8. When you are done setting up the Level 3 Trigger GUI, press the following buttons in order: Set XLM
  Write File (confirm overwrite)
  Check XLM (should have a green "o.k." next to it after pressing)
- 9. Now, the Sweeper Readout GUI is fully configured.

### 4.2 Troubleshooting Sweeper Readout

- 1. Occasionally, the process of starting the Sweeper readout will have issues. If this is the case, we may need to delete the rings associated with this readout, and try starting the Sweeper readout again.
- 2. First, ssh into the spdaq for sweeper, spdaq34 if you are not already there. Then, to delete a ring, first bring up a list of existing rings:

#### >ssh -Y spdaq34 >\$DAQBIN/ringbuffer status

This should show you a list of rings(see below). If the rings "rawccusb," "rawvmusb," and "sweeper" exist (boxed in yellow below), we will need to delete them.

🖗 fishtank.ns	fishtank.nscl.msu.edu - PuTTY					Securrents library				
weeper8a	pdaq34:~\$ \$DA	QBIN/rin	gbuffer status							
Name	data-size(k)	free(k)	max_consumers	producer	maxget(%)	minget(k)	client	clientdata(k)		
rawccusb	8194	8194	100	25683	10	0	-	I- I		
-	-		-	1-	-	-	385	10 1		
rawvnusb	8194	8194	100	25682	10	10	- 1			
-	-		-	-	-	-	353	10 [		
sweeper	8194	8194	100	-1	10	0	-	-		
-	-		-	-	-	-	4895	10 1		
-	-		-	-	-	-	30230	10 I		
-	-		-	1-	-	-	522	10 1		
weeper8a	pdaq34:~\$	+	+	+	+	+	+	++		

3. To delete the rings, use the following command:

#### >\$DAQBIN/ringbuffer delete ringname

You should substitute "ringname" for the rings "rawccusb," "rawvmusb," and "sweeper."

- 4. Try to restart the sweeper readout GUI. If problems arise with any of the readouts, try going to their respective spdaq and deleting the rings present (likely named mona, lisa, etc.). Then try to restart the readout. Sometimes this solves the problem.
- 5. To ensure that the sweeper event builder is functioning properly, click "Begin" and notice the event builder window pop up. Wait until the event builder window looks to be processing data (i.e. no 0's for Total Fragments, Total Bytes, and output rates, and no -1's for the Hottest and Coldest source IDs) and then click "End."

# 5 Starting Master Readout

This section will familiarize you with starting the master Readout GUI.

- 1. Ensure that the MoNA, LISA, and Sweeper Radout GUI's have all been "Started" (BUT NOT BE-GUN).
- 2. Open a terminal on a Data-U PC, signed in with the e15091 experimental account, and type:

#### >godaq\_all

Choose the option MoNA + LISA + Sweeper for experimental runs (we want all devices).

sys	config	
٠	MoN	A + LISA + Sweeper
(	MoN	A + Sweeper
	LISA	+ Sweeper
$\hat{}$	MoN	A + LISA
		0k

3. This starts the Master Readout GUI. Press "Start" DO NOT press "Begin" yet.

When you press "Start" some event builder information will pop up at the bottom of the GUI. Check that the output ring is called "built." (below boxed in orange) This is the ring that will contain fully built events that contain MoNA, LISA, and the pre-built Sweeper data. If you go back to any of the three enslaved readouts, you will see that their "Start," "Begin," and "End" buttons are gone, replaced by a statement telling you they are enslaved by the Master Readout. Find the run number (boxed in yellow). This will be relevant later.



- 4. Ensure that the MoNA, LISA, and Sweeper Readout GUIs all have the SAME RUN NUMBER as the Master Readout GUI.
- 5. Check the "Record" box (boxed in blue in the above picture). **DO NOT** click the "Timed Run" box. Each run will last for approximately an hour, but they need to be manually started and stopped by the user.
- 6. Press "Begin" when you are ready to take data. Note that the master readout takes about 30 seconds to actually start up once you press "Begin."
- 7. If you need to exit the readouts, exit the Master Readout first.

### 5.1 Ending and Beginning a Run

- 1. Each run should last an hour. When you are ready to stop a run, press "End" on the **Master** readout. It can take up to 30 seconds to end the run completely.
- 2. Be sure to fill out the "End Time" on the runsheet.
- 3. Fill out a new run sheet for your next run, leaving the "End time" blank for now.
- 4. Once again make sure that all the readouts have the SAME RUN NUMBER as the Master readout.
- 5. Once the run sheet is filled out and the run numbers have been confirmed to be the same, you may press "Begin" to start the next run.
- 6. After beginning the run, check the SpecTcl histograms to ensure data in coming in from MoNA, LISA and Sweeper and it looks normal.
- 7. Once an hour has passed, refer to the beginning of this subsection "Ending and Beginning a Run" and repeat the process.

## 6 SpecTcl

SpecTcl lets us look at online data. Since we are building MoNA, LISA, and Sweeper data online, we can use the same SpecTcl for all of them. This section will familiarize you with starting up SpecTcl and attaching it to the "built" ring.

- 1. Log into a Data-U PC with the e15091 account and password.
- 2. Open a terminal and type:

#### >gospec\_master

This will open up SpecTcl control, the Xamine window, and the Tree GUI. The rest is less important to us. 3. In the Tree GUI, we need to load the definitions file that has the histograms we are interested in seeing online defined. To do this, click the "Load Definitions" button (boxed in blue below). In the file explorer, click and hold the dropdown menu at the top, and find the e15091 directory. Navigate to /e15091/spectcl\_master/definitions/ and double click "master\_definitions.tcl" to open the definitions file. You should see many histogram definitions pop up in the Tree GUI, for Sweeper and for MoNA-LISA. The Tree GUI should look like the picture below after loading the definitions.

treegui		Acar from					-					×
File Edit Help Data Sour	ce Filters S	pectra Gate									_	
Spectra Parame Online	Gates	Folders										
Spectry File		Data Type	1							Def	inition file:	
1D Pipe		Word (16 bits)								er defi	itions.tcl	
	S	and (22 bite)								Load	Sa	ve
Filter File		cong (32 bits)							1.1	umulat.	we 🔳 Fai	safe
Summary		Byte (8 bits)										
Stripchart Detach												
SpectrumName		Create/Rep	lace		Clear		Del	ete	Gate	-	Apply	
		C Array		E A	1		Dupl	icate			Ungate	
Parameter -	Low High	n Bins L	Inits	[	Para	ameter	-	Low	High	Bins	Units	
Name	Туре Х	Parameter	Low	High	Bins	Y Para	ameter	Low	High	Bins	Gate	
crdcl.anode	11 s	weeper.fp.crdc1.	0	4096	4096							
crdcl.anode_crdcl.tac	2 w s	weeper.fp.crdc1.	0	4096	500	sweep	er.fp.crdc	1. 0	4096	500		
crdcl.padmax	11 s	weeper.fp.crdcl.	0	128	4096							
crdc1.padsum	11 5	weeper.fp.crdcl.	0	4096	4096							
croci.raws	5 W 5	weeper.ip.crdc1.		1000	4006	sweep	enip.cide	*-				
ordel tac is sum	21 6	weeper.tp.crdc1		2000	1000	swaan	er folio su	m 0	1000	1000		
crdc1.tac_track.bfp	21 5	weeper.fp.crdcl.	· 0	1000	500	sweep	er.fp.track	k.t -0.05	0.05	500		- 1
crdcl.x.anode	2 w s	weeper.fp.crdc1.	-300	300	1000	sweep	er.fp.crdc	1. 0	4096	1000		- 1
crdcl.x.tac	2 w s	weeper.fp.crdc1.	-300	300	1000	sweep	er.fp.crdc	1.: 0	4096	1000		- 1
crdcl.x_crdcl.padsum	2 w s	weeper.fp.crdc1.	-300	300	500	sweep	er.fp.crdc	1. 0	60000	500		- 1
crdcl.x_ic.sum	21 s	weeper.fp.crdc1.	-300	300	1000	sweep	er.fp.ic.su	im 0	4096	1000		- 1
crdcl.xg	1  s	weeper.fp.crdc1.	0	224	1000							- 1
crdcl.xg_crdcl.maxpad	2 w s	weeper.fp.crdc1.	0	224	500	sweep	er.fp.crdc	1. 0	1023	500		- 1
crdcl.xg_crdcl.padsum	2 w s	weeper.fp.crdc1.	0	224	500	sweep	er.fp.crdc	1. 0	10000	500		
crdcl.xg_crdcl.tac	2 w s	weeper.fp.crdc1.	0	224	300	sweep	er.fp.crdc	1. 0	4096	300		
crdc1.xg_crdc2.xg	21 s	weeper.fp.crdc1.	0	128	1000	sweep	er.fp.crdc	2.0	128	1000		
crdc1.xg_track.afp	2 W S	weeper.fp.crdcl.	0	224	300	sweep	er.fp.track	K.8 -0.1	0.1	300		
cracz.anode	11 5	weeper.tp.crdc2.	0	4096	4096			2.0	1000	500		V
Update Spectrum Li	st	Spectrum	Mask:		•						Clear	
Display memory: 64/120 MB Data Source: Test Data Sour	Title >>> Uni ce (inactive) 1	nown <<< Run Buffers Analyzed	Number d 100.00	: 0 1% effici	ent							

4. Now we need to attach SpecTcl to read online data. The MoNA, LISA, and Sweepr readouts are enslaved by the Master Readout, which has the output ring "built." This is the ring we want to attach to. To do this, go to the dropdown menu "Data Source" at the top of the Tree GUI (boxed in green above). Click the "online" option, and fill in the following:

hostprompt	X-
Host:	u5pc3
Ring:	buit
Buffer size in bytes:	8192
Data format	
🔆 nscl 🔿 jumbo 🔿 ring10 💽 ring11	
Ok	Cancel Help

Host: u5pc# (This should be the computer that Master Readout is running on) Ring: built Data Format: Ring 11 When done, click OK. Now SpecTcl is attached to the "built" ring, and once the master readout is running, this data will be available to SpecTcl.

Create Raw MolA Spectra Create Raw LISA Spectra Create Raw LISA Spectra Euro But But But But Create Raw LISA Spectra Create Raw LISA Spectra But Create Raw LISA Spectra Create Create Creat	Source: none			
Create Raw MortA Spectra Create Raw LISA Spectra Create Raw LISA Spectra Ent But Master GUI	Run: 0 Ana	vzed Buffers: 1	Buffersi	sec: 0
Create Raw Mol/4 Spectra Create Raw LISA Spectra Create Raw LISA Spectra Help			Master GUI	COMP CONT
Create Raw Mol/M Spectra Clear Spectra Clear Spectra Help		EAR		<u>k</u>
Create Raw MolMA Spectra	Create Raw LISA Spectra	Help		<b>U</b>
Start Analysis	Create Raw MoNA Spectra	Clear Spectra		
		Start Analysis		

5. On the SpecTcl Control GUI, click the "Create Raw MoNA(LISA) Spectra" buttons (see below).

In order to look at the histograms that are defined in the Tree GUI, go to the Xamine window. In the bottom left, you can click "Display" (boxed in orange on the left below) to see the histograms available. Alternatively, you can go to the "Window" drop down menu (blue box below) and select "Read Configuration" (green box below). In the explorer, go up one directory (spectcl\_master/NewTcl/..) and find the folder "windows" (boxed in yellow below). Here you will find pre-defined MoNA-LISA and Sweeper histogram configurations(boxed in orage on the right below).

Xamine /user/e15091/spectcl_master/windows/MoNAUSA/C_a1win	
File         Umdow         Spectra         Options         Craph_objects           Info         Alt+0         Alt+0	Halp
Zoom     Alt+2       Zoom +     Hinimize       Scale Down     Alt+ -	Open_windows_file_popup           Filter           user/e15091/spectol_waster/windows/*.vini
	Directories Files
Spectrum 803 X 490,08 Y 1000 Cou	nts //user/e15091/spectcl_master/windows/
Geowetry         J Zoow         Update All         Expand         Harker           Itplag         Update Selected         UnExpand         Summing Region           Itplag +         Info + - F Log F Hap         Integrate	Cit. Band Concel Help

## 7 Unpacker

This section will show you how to run the unpacker.

- 1. Log into a Data-U PC with the e15091 account and passowrd.
- 2. Open a new terminal and type:

>unpack\_master.sh runnumber runsegments

Where *runnumber* should be substituted for your run number, NOT INCLUDING preceeding zeros. The *runsegments* argument should be replaced with how many run segments are in that run. To find out how many segments are in a run, open a new terminal and go to the directory ~/stagearea/stagearea\_mona(lisa)/con and list the contents. You should be able to see how many run segments there are. For example, if there are 2 run segments in run 27, then to unpack it we would type:

>unpack\_master.sh 27 2

3. Recall that since we are building data from MoNA, LISA, and Sweeper, and they all have the same run number, we only need to unpack one run number.

# 8 Diagnostics

There are two diagnostic scripts located in e15091/analysis\_master/macros. This section will teach you how to use them.

#### 8.1 Run Diagnostics

1. This macro will output various informative histograms useful for diagnostics. First, sign into a Data-U PC with the e15091 account and password. Then, type:

>cd analysis\_master/macros

2. Start a ROOT session<sup>1</sup>:

>root -l

3. Load run\_diagnostics.C:

```
root[] .L run_diagnostics.C
```

4. To run this macro, you will need the filename with its path. The file should be unpacked into a .root file (See the "Unpacker" section above for instructions on unpacking a run). For example, if we wanted diagnostics for run 27, we would type:

root[] run\_diagnostics(~/saved\_data/root\_merged/run-0027-00-cal.root)

Note that this run has been calibrated.

 $<sup>^1\</sup>mathrm{The}$  -l option makes it so the splash screen doesn't come up

5. This will output many windows with various histograms. If instructed, print these out and put in the e5091 experimental binder. When prompted for the print command, use lpr -P u6-color. If in doubt, the print command is on a sticky note attached to the u5pc2 monitor. The plots will print to the printer in Data-U6.

### 8.2 Time Diagnostics

1. This macro will output various histograms that can show the detector character over time. This is a useful diagnostic to make sure our detectors are performing uniformly throughout the experiment. Begin by signing into a Data-U PC with the e15091 account and password. Then, type:

>cd analysis\_master/macros

2. Open up the time\_diagnostics.C file:

>gvim time\_diagnostics.C

3. Scroll down until you see lines similar to:

```
TChain * inChain = new TChain("t","Chained data for time diagnostics");
```

```
inChain->Add("~/saved_data/root_merged/run-0023-00-cal.root");
inChain->Add("~/saved_data/root_merged/run-0024-00-cal.root")
```

Change these lines to incorporate the files you'd like to add to the chain and run time diagnostics for.

- 4. Save and close the file.
- 5. Open a ROOT session:

>root -l

6. Load and run the time\_diagnostics.C macro:

```
root[] .L time_diagnostics.C
root[] time_diagnostics()
```

This will create various histograms that are useful for time diagnostics. If instructed, print these out and put in the e5091 experimental binder. When prompted for the print command, use 1pr -P u6-color. If in doubt, the print command is on a sticky note attached to the u5pc2 monitor. The plots will print to the printer in Data-U6.