

PADME Shifter Manual

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Pre-requisites

To get access to all machines and/or web pages of the PADME experiment, you need an account at the LNF Computing Center. If you do not have one, you can request it using the form at this link:

<http://www.lnf.infn.it/Calcolo/cgi-bin/newaccountrequest.pl>

Besides your personal data, you can fill the form with the following information:

LNF Office Building: 09 – Daphne building

Room: BTF-CR

Phone number: 2417

Position: Ospite (please check with Paola Gianotti your current position)

Expiration Time: 12 months (please check with Paola Gianotti your current position)

Reason for account request (intended work): Shifts at PADME experiment

Account platform type: Unix

Who is your supervisor (specify none if not applicable): none

Group: padme [Paola.Gianotti@Inf.infn.it]

Do you have an account on LNF Computing Service Machines? No

How do you want to be notified about this request? By E-Mail to your Account Responsible

Please note that the procedure to obtain the account can take a few working days: make sure to send the form well in advance of your shift. When the account is active, Paola Gianotti, the Account Responsible for PADME, will receive an e-mail and will notify you.

If you are doing a remote shift, **once you have obtained your LNF account**, you need to connect to the INFN LNF network using a Virtual Private Network (VPN). Detailed instructions on how to install and configure the OpenVPN client on your node can be found at this link:

<http://www.Infn.infn.it/computing/networking/> → Networking → Network LNF → VPN

If your account is active, you should be able to download the OpenVPN configuration for “Infusers”: this will give you direct access to all nodes and services of the PADME experiment.

IMPORTANT NOTE: Unless otherwise stated, all instructions included in this guide require remote users to be connected to the INFN LNF VPN.

Shift booking

The Shift booking service is available from within the INFN LNF network. Shifts can be booked at this link:

<https://www.Infn.infn.it/computing/padme>

You can access the page using your AAI identity or LNF account. Once connected to the page, choose the month of your shift (top menu on the page) and then just click on the free shift slots you want to book: your name will appear in the slot. If you want to cancel a previously booked shift, click on the small trashcan on the right of the shift.

Connecting to the PADME on-line servers

All PADME on-line servers are reachable from within the INFN LNF network with the SSH protocol.

Windows	By default, the Windows OS does not include a SSH client. You can install either the MobaXterm Unix client (freely available from https://mobaxterm.mobatek.net) or the CygWin Unix environment (freely available under GNU LGPL from https://www.cygwin.com): both natively include the ssh client.
MacOS	The MacOS ssh client is available from within the standard Terminal application.
Linux	The ssh client is a standard component of the Linux OS and can be used from any terminal.

To connect to the main DAQ server, l0padme1, the shifter should use the “daq” account. The password for this account can be obtained from the Run Coordinator.

PADME on GitHub

Most of the information included in this guide come from the main PADME wiki page (Fig. 1) on GitHub at <https://github.com/PADME-Experiment/padme-fw/wiki>



Figure 1- Main wiki page of the PADME Collaboration at <https://github.com/PADME-Experiment/padme-fw/wiki>

Here you can find:

- up-to-date instructions for the shifters, including several troubleshooting procedures (*Instructions for the Shifter*);
- all the information you need to run the simulation, reconstruction and analysis packages of the experiment (*The PADME Software framework*);
- a detailed description of the DAQ system (*The PADME DAQ system*);
- instructions on how to use Grid resources and access off-line data (*PADME and the Grid*).

If you plan to contribute to the analysis and/or software development, it is recommended that you create a GitHub account at <https://github.com> and register it to the PADME-Experiment group by following the instructions in the wiki page:

The PADME Software framework → *Installing the Software*

Running the DAQ

Detailed instructions on how to run the PADME DAQ system can be found in the “Running the DAQ” wiki page at

Shifter instructions → *Running the DAQ* (Fig. 2).

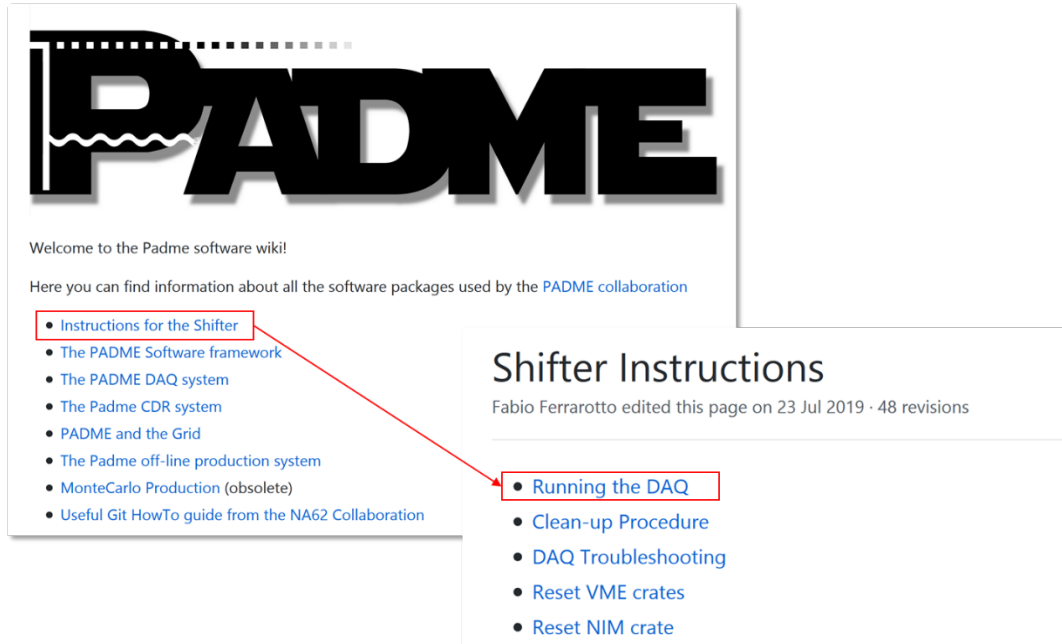


Figure 2 – The “Running the DAQ” wiki page at <https://github.com/PADME-Experiment/padme-fw/wiki/Running-the-DAQ>

Here we report a few recommended procedures to facilitate the remote shift activities. Unless otherwise stated, all these procedures should be applied using the `daq@l0padme1` account.

Checking if the DAQ is running without problems

To verify that data acquisition is going on correctly, it is very important to look at the log messages from the Trigger Manager and the Event Merger processes.

To see these messages while they are produced, you should first get the name of the `<current_run>` with the command

```
> cat /home/daq/DAQ/run/current_run
run_0030035_20200528_103058
```

Then start two terminal windows, connect them to `daq@l0padme1`, and show the log messages generated from the Trigger and the Merger processes. For this, on one terminal give the command

```
> tail -f /home/daq/DAQ/runs/<current_run>/log/<current_run>_trigger.log
```

and on the other give the command

```
> tail -f /home/daq/DAQ/runs/<current_run>/log/<current_run>_merger.log
```

If everything is going on correctly, the number of events in the 2 files should increase in parallel.

Notes:

- Once in a while the Merger will show a sudden list of time misalignment error messages after which the normal reporting resumes: this is due to a known problem with the Trigger board firmware and is not relevant. If the time misalignment messages keep repeating, then the shifter should stop the run and check the troubleshooting instructions.
- The trigger log file is updated every 100 events and a list of instantaneous trigger rates is shown:

```
- Trigger 556600 0x027a01b35d149eb9 770360778425 0x01 122 0 1 1799.526ms 1799.099ms 55.57Hz  
- TrigMsk 1605256795 0(497326,88, 48.90Hz) 1(39590,9, 5.00Hz) 3(9750,2, 1.11Hz) 7(9935,1, 0.56Hz)
```

Individual triggers are:

- 0 BTF
 - 1 Cosmics
 - 2 Calibration (currently not in use)
 - 3 Dual-timer
 - 6 Random (currently not in use)
 - 7 Delayed (900us after the BTF trigger)
- Unless the Run Coordinator indicates otherwise, it is good practice to stop the run after ~2.5 million triggers have been acquired (13-14 hours @ 50Hz) and to start a new one with the same setup.

On-line monitor

The PADME on-line monitor system allows the shifter to check the run conditions. The system collects information from the DAQ and DCS systems and present them to the shifter via a web interface (Fig. 3) at

<http://l0padme3:9090/main>

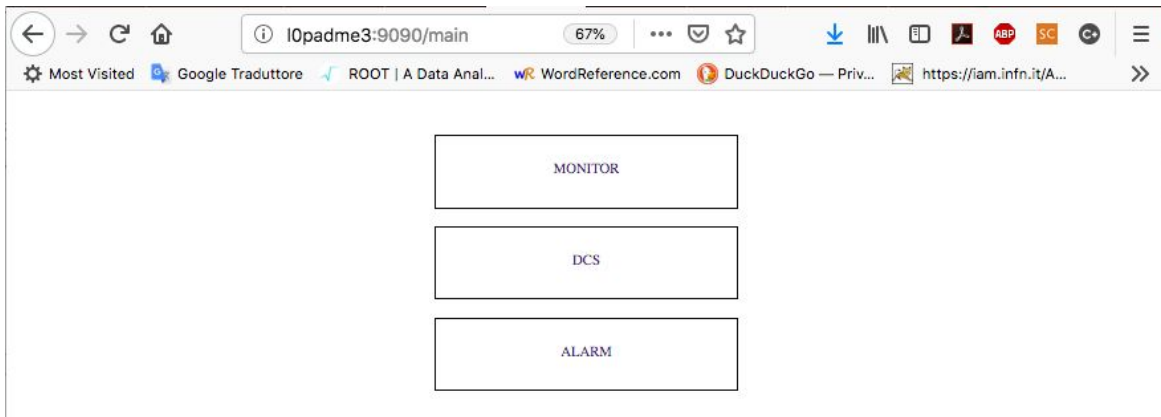


Figure 3 – The PADME on-line monitor main page at <http://l0padme3:9090/main>

The MONITOR section shows DAQ-related information: detectors occupation, beam profile, etc. The most relevant histograms can be found under the GENERAL heading (Figg. 4 and 5).



Figure 4 – On-line monitor control interface

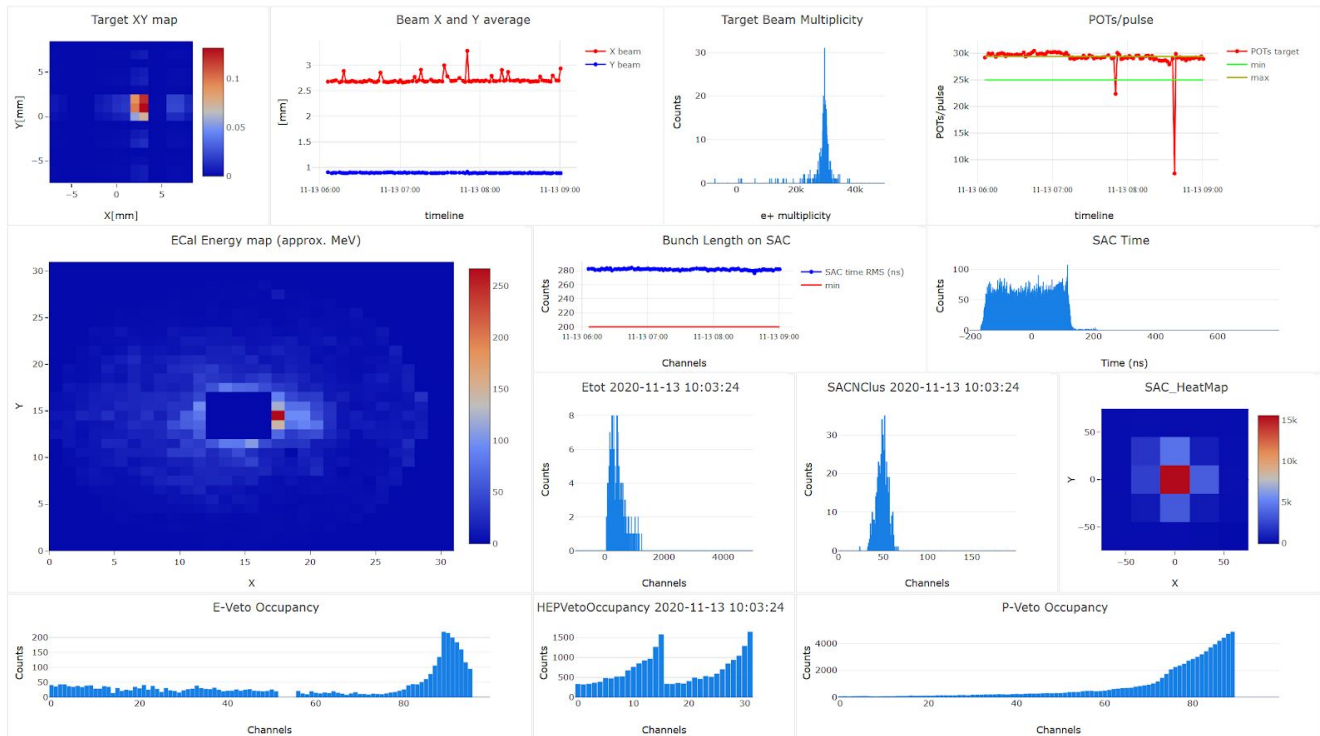


Figure 5 – DAQ summary information

Note: if the on-line monitor histograms are not regularly updated, instructions on how to verify the status of the monitoring system and how to restart it can be found on the wiki page

Shifter instructions → Restart Reco online, RecoMonitor and trends

Trend plots should be as much as possible flat. Target Beam Multiplicity should show 2 peaks: $\geq 20k$ corresponding to beam trigger, ~ 1 corresponding to cosmic trigger.

Remote shifter recommended setup

An optimal setup to follow the data taking remotely will need five terminal windows:

Node	Account	Instructions
l0padme1	daq	Run the RunControl client <pre>> cd /home/daq/DAQ</pre> <pre>> ./RunControl</pre>

l0padme1	daq	<p>Monitor the Trigger log file</p> <pre>> tail -f /home/daq/DAQ/runs/<current_run>/log/... ...<current run> trigger.log</pre>
l0padme1	daq	<p>Monitor the Merger log file</p> <pre>> tail -f /home/daq/DAQ/runs/<current_run>/log/... ...<current run> merger.log</pre>
l0padme3	daq	<p>Check the RecoMonitor script which handles on-line reconstruction and analysis</p> <pre>> ps -fu daq grep RecoMonitor</pre> <p>If the script is not running, restart it:</p> <pre>> cd RecoMonitor > ./RecoMonitor.sh</pre>
l0padme3	monitor	<p>Check the RecoMonitor script which handles the production of monitoring histograms</p> <pre>> ps -fu monitor grep RecoMonitor</pre> <p>If the script is not running, restart it:</p> <pre>> cd monitor/RecoMonitor > ./RunRecoMonitor 2020.sh</pre>

The remote shifter will also need to open five web pages on a web browser (Chrome and Firefox are recommended):

URL	Instructions
http://l0padme3:9090/monitor	<p>GENERAL → Summary → Padme_Summary</p> <p>Main monitor page of the experiment (Fig. 5)</p>
http://l0padme3:9090/monitor	<p>TRENDS → Summary → Padme_Summary</p> <p>Trend histograms (Fig. 6)</p>
http://l0padme3:9090/dcs	<p>GENERAL → DCS_Summary → Summary</p> <p>Slow control information (Fig. 7)</p>
https://github.com/PADME-Experiment/padme-fw/wiki/Running-the-DAQ	<p>Wiki page with the up-to-date information on how to run the PADME DAQ system</p>
http://padmesrv2.lnf.infn.it:8080/Run/	<p>Access to the eLogBook system to take note of any important fact during the shift and to fill the Shift Summary at the end</p>

Note: A run of 2.5 M events requires roughly 1.5 TB of disk space. Before starting a new run check from the DCS summary page if both data servers (l1padme1 and l1padme2) have enough free space. If not, report the fact to the Run Coordinator and send an email to padme-shifters@lists.infn.it asking for an intervention.

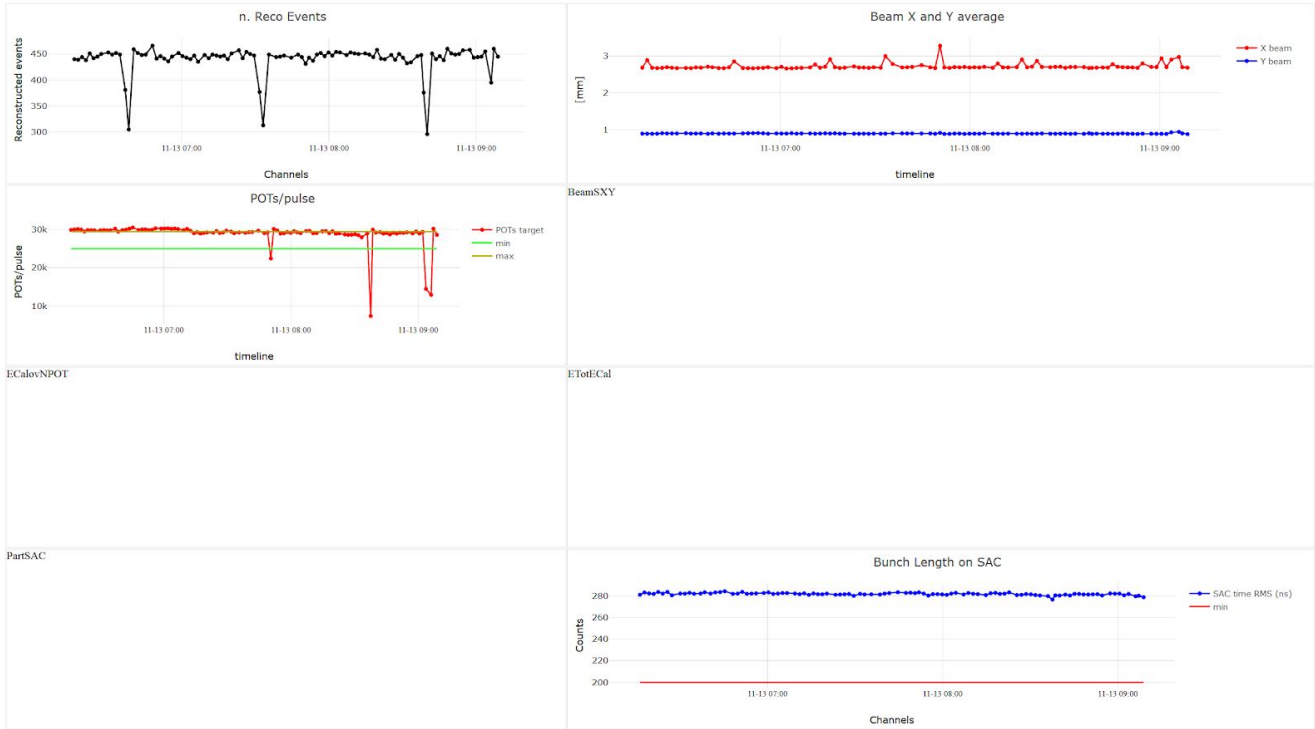


Figure 6 – Example of trend plots



Figure 7 – DCS summary information page

General recommendations

Since only one RunControl client at a time can run and interact with the server, when you finish your shift, always remember to close your RunControl client (command Q to quit).

If no beam is announced by the BTF crew for more than one hour, start a cosmics run: change the run setup to cosmics202010 (command `change_setup cosmics202010` in the RunControl console) and start a new run.

Every 2 hours, please add an eLogBook entry reporting the run status:

<http://padmesrv2.Inf.infn.it:8080/Run/>

If you are doing the night shift, you need to add at least 5 entries at 23:00 - 01:00 - 03:00 - 05:00 - 07:00

After stopping a run, it is good practice to verify that the end of run procedure removed all processes and control files from the DAQ servers so that a new run can be started. The correct procedure is described in the wiki page

Instructions for the Shifter → Clean-up Procedure

Troubleshooting

In case of problems, we report here the links to the solution of some known issues. Please always add an entry describing the problem in the PADME eLog:

<http://padmesrv2.Inf.infn.it:8080/Run/>

From this page, click on **New** and write your report. If needed, pictures can be uploaded using the Attachment field at the bottom of the page. Once submitted, any log entry can be updated in the following 10 min, then it becomes permanent.

Run does not start

This is usually due to some processes/files left from the previous run: execute the clean up procedure described on the wiki page at

Instructions for the Shifter → Clean-up Procedure

Also verify from the DCS Summary page of the On-line Monitor (Fig.7) if both disk servers have enough free space.

When all is clean and you know that enough disk space is available, you can restart the run.

ADC board failing initialization

If one or more ADC boards fail to initialize (this may happen if the previous run stopped anomalously), you can reset the VME crates following the procedure described in

Instructions for the Shifter → Reset VME crates

Then execute the clean up procedure described on the wiki page at

Instructions for the Shifter → Clean-up Procedure

When all is clean, you can restart the run.

Trigger failing initialization

In some occasions the Trigger board stops responding and cannot be initialized. In this case you can reset the NIM crate hosting it by following the instructions at

Instructions for the Shifter → Reset NIM crates

Usually only the right crate (address 192.168.62.20) needs to be reset. After resetting the NIM crate, always remember to reset the Veto DAQ modules, as described in the wiki page.

Then execute the clean up procedure described on the wiki page at

Instructions for the Shifter → Clean-up Procedure

When all is clean, you can restart the run.

No triggers are produced

If after initialization no triggers are produced (can be checked by looking at the Trigger log file), this is usually due to the use of the wrong setup: stop the run, change the setup and restart.

Problems with ECAL/SAC HV

To intervene on SY4527 HV mainframe follow the instructions available at

Instructions for the Shifter → Check ECAL/SAC HV

Problems with VETO detectors

To check VETO SIPM status refer to

Instructions for the Shifter → Setup vetos

RunControl server crashes

In rare occasions, the RunControl server crashes just after inserting the new_run information:

```
Start of run comment: adjusting ch 6 of bard 8 baseline
Sending adjusting ch 6 of bard 8 baseline
*** FATAL ERROR ***
Server closed connection
```

This is due to a known problem in the DB interface which is being investigated.

If this happens, execute the usual clean-up procedure described in the wiki page

Instructions for the Shifter → Clean-up Procedure

Then you can restart the RunControl server and client as described in

Instructions for the Shifter → Running the DAQ

Other problems

If the standard procedure does not solve the problem or the problem is not described here, call the Run Coordinator. You can inspect who is on duty on the PADME shift page (to be completed).

Interacting with the DAΦNE control room

The DAΦNE/Linac control room is located in the same corridor as the PADME/BTF control room, at the right of the main entrance door.

To communicate with the Linac crew you can call the following phone number:

2400 from within the laboratory.

+39 06 9403 2400 from outside the laboratory

If you are doing your shift remotely, call the DAΦNE control room (+39 06 9403 2400) as soon as you get the control of the run and inform them that you are on shift for PADME. Give them a phone number where you can be reached in case of need.

Useful phone numbers

Here below is reported a list of useful phone numbers.

To call LNF numbers from outside the lab, first dial

+39 06 9403

followed by the four digits given in the list:

- PADME/BTF control room **2417**
- BTF-1 Experimental hall **2388**
- DAΦNE/Linac control room **2400**
- LNF Emergencies **5555**