

CERN@school Solar Eclipse: Protocol For Background Radiation Measurements Version II

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March 2015

Abstract

This is the protocol developed for data capture during the solar eclipse of the 20th March 2015, and any prior tests, for use by CERN@school participants. The eclipse starts at 08:25 UTC (GMT), and continues to 10:41, with the totality of the eclipse starting at 09:31. Presented is the data capture procedure for the Jablotron MX-10 detector and the instructions for how to upload the data to the DAQMAP.

1 Introduction

This is the protocol for use on the 20th March 2015, starting at 08:15, and any prior practice runs for data collection, in order to take background radiation readings during the Solar Eclipse. The protocol is specifically relevant to the Jablotron MX-10 Timepix2 chip, with the version of Pixelman that comes preloaded onto the enclosed memory stick.

This data should be able to look at the radiation fluctuation due to a solar eclipse, building on the work done in this area previously.

This protocol is to be repeated 4 times, in smaller data sets than previously suggested, in order to minimise loss of data due to errors.

2 Protocol for Data Collection

- Start the computer up, and then connect the detector to the computer.

- Ensure no local computer settings will interfere with data collection. Common examples include the below list. Alternatively, software like Caffeine (<http://www.zhornsoftware.co.uk/caffeine/>) can be used to prevent the computer from sleeping, to avoid making any permanent changes to the computer's functionality.
 - Laptop battery life - please keep plugged in.
 - Automatic sleep - please disable sleep function on the laptop after a certain period of inactivity.
 - Screensaver - the start of a screensaver has caused problems previously, so please disable this before starting.
- Open the Pixelman Software.
- Set the bias voltage to 95V, as in Figures 1 and 2.
- Edit the acquisition settings on the main screen (Figure 3) to those shown in Table 1.

Setting	Value
Exposure count	120
Exposure time	15 seconds

Table 1: Settings to adjust.

- Tick the box "Finite count of steps" in Figure 3
- Untick the integral mode box, present in Figure 3
- On the MX-10 chip, keep the cover over the sensor element while collecting data.
- Place the detector in the area to collect data, and start the acquisition.

Orientation note: We would suggest a standard of placing the detectors in a horizontal position, level with the ground. This should maximise the sensor element surface area exposed to the sky, and can easily be reproduced across the CERN@school collaboration.
- When the data is collected, save the measurement (File - Save measurement) in the "XYC format - separate files" format, using the following name scheme:

TSE_[DATE (YYYY-MM-DD)]_[START TIME]_[CHIP ID]_

For example:

TSE_2015-03-20_0815_G07-W0210_

removing the square brackets in the final name. The detector's ID is displayed in the Pixelman window's title, in the form X00-Y0000.

- After this data set has completed, set up for the next run immediately. No changes need to be made. However, when this has finished, please consider:
 - Changing the name of the file to reflect the start time of the next data collection.
 - Specifying a new folder location, so the data files do not become mixed up.
- Repeat this until you have 4 of these 30 minute data sets, so until 10:15 approx. when starting at 08:15 UTC.
- After completion of all data sets, send each batch of saved files to individual compressed folders (by selecting each set of files through Windows Explorer > Right click > Send to > Compressed (zipped) folder), ready for upload to the DAQMAP.
- Use a GPS-equipped smartphone, or another location service, such as Google Maps, to record the location (latitude, longitude and altitude) at which the data was collected. Record these figures in a text file entitled

`LOCATION.txt`

This is only a temporary file, and will not need to be uploaded.

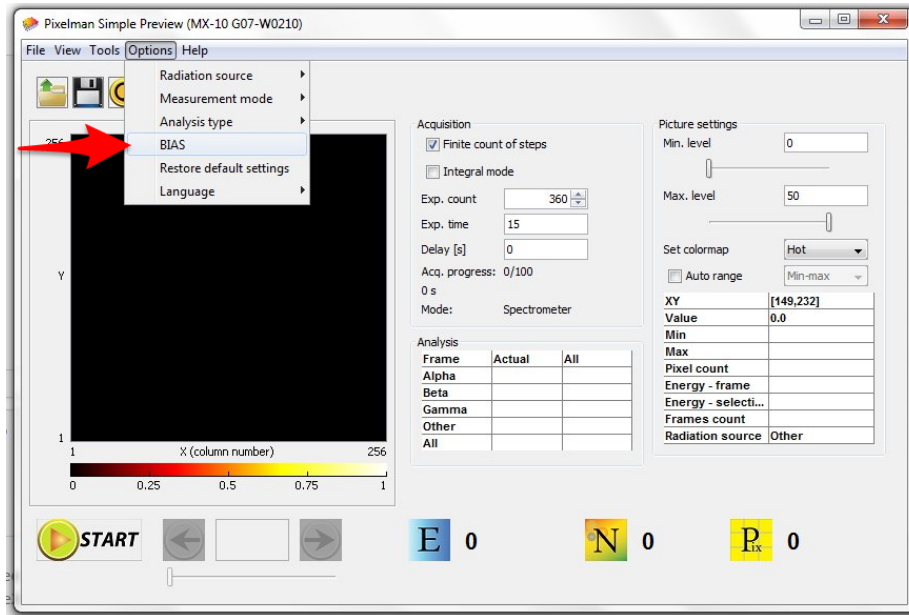


Figure 1: Setting the bias voltage via the options menu.

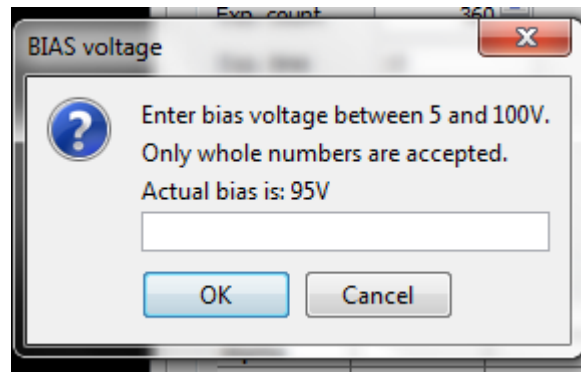


Figure 2: Set bias voltage to 95V using the bias voltage dialog box.

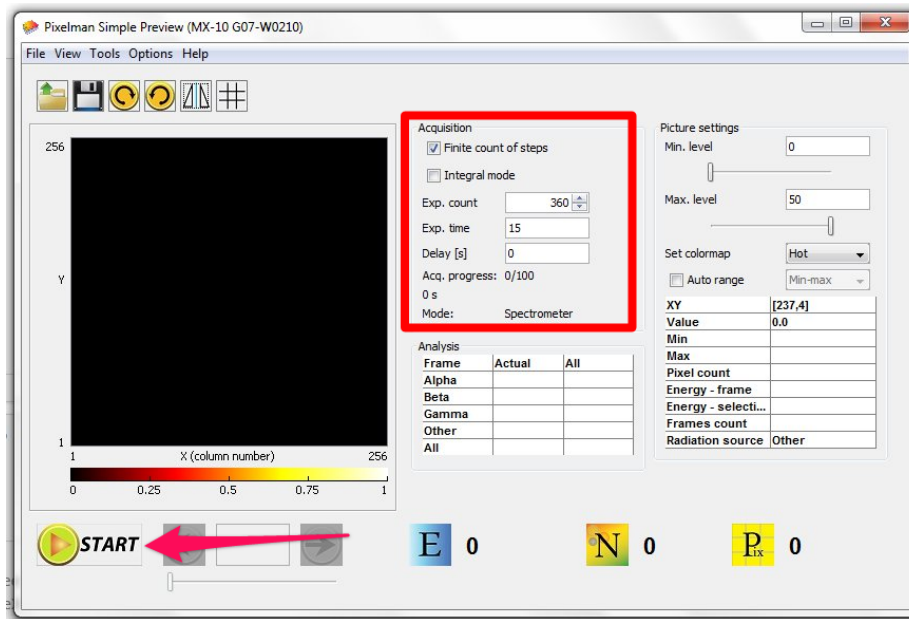


Figure 3: Defining the acquisition settings and beginning data capture.

3 Dealing with Glitches

There is a bug in Pixelman where opening the "Acquisition", "Picture settings" and "Analysis" control boxes can cause the Pixelman window to become too big and extend off screen.

To solve this, "Alt + Space" opens the menu, "m" selects "Move" and then the arrow keys can be used to bring it down.

4 Uploading the Data

The data collected from the Solar Eclipse should be uploaded and analysed using the central CERN@school, platform for data analysis - the DAQMAP. To be able to access this, please visit

<http://www.cern-at-school.org/DAQMAP/login>

5 Contact

For more information about CERN@school, or to get an account on the DAQMAP, please visit

<http://cernatschool.web.cern.ch/contact>

If you would like more information on the Radiation Around You (RAY) project, please feel free to contact us, and we will endeavour to answer all questions and queries. Alternatively, we would welcome any suggestions for the improvement of the RAY project. We are available at

admin@mail.ray-project.org.uk

or by directing questions through Dr. Parker at The Langton Star Centre, who your teacher should have contact details for.