



THE INSTITUTE  
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# Operational Guide for the Collection, Storage and Analysis of Particle Data

## I Introduction

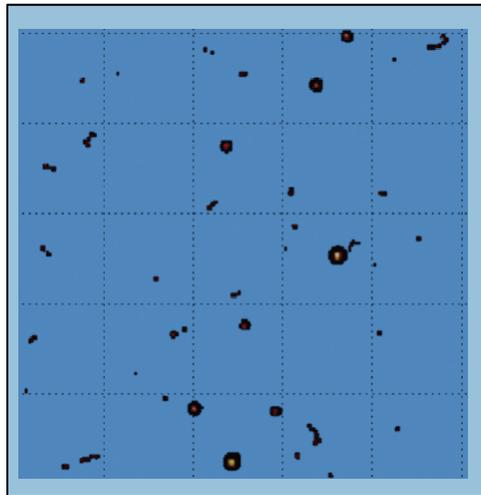
This section is a prelude to the step-by-step operational guide. It is not essential reading but hopefully will provide you with a useful background to your research.

The first part sets the process of data collection within a wider context by summarising the objectives and methodology of particle research. This is followed by an overview of the processes described in the remainder of the manual.

### Overview of Data Collection and Analysis

Particle data is collected using a Timepix detector (often called a 'chip') which is illustrated on the front cover. The detectors register the radiation which is occurring constantly wherever you are on their 256 x 256 pixel frames. For example they have been used on satellites to record accurate details of radiation at different altitudes to assess their impact upon the health of travellers in space. Your own readings will be related to the project. For instance in RAY (Radiation Around You) you are recording the background radiation at locations throughout the United Kingdom or you may be simply detecting radiation from a specific source such as a banana.

While data collection is being performed the Timepix is linked to Pixelman software on a laptop in which you have specified how the number and time-length of the frames you want the Timepix detector to take. These results will be displayed as a picture by Pixelman where pixels will be in different colours to represent different types of radiation as shown in the illustration below.



When the data collection is complete the Timepix detector you have used can now be handed on to others for their data collection. Your own data now needs uploading from Pixelman to TAPAS for the analysis. TAPAS (Timepix Analysis Platform at School) has been created specifically for IRIS (Institute for Research in Schools). When you upload the data TAPAS automatically performs a particle analysis of the data, using an algorithm specifically written for each different research project. The results of the analysis can then be viewed and, if this is required, analysed in more depth by using Python or Excel.

## II Data Collection

### Before you Start

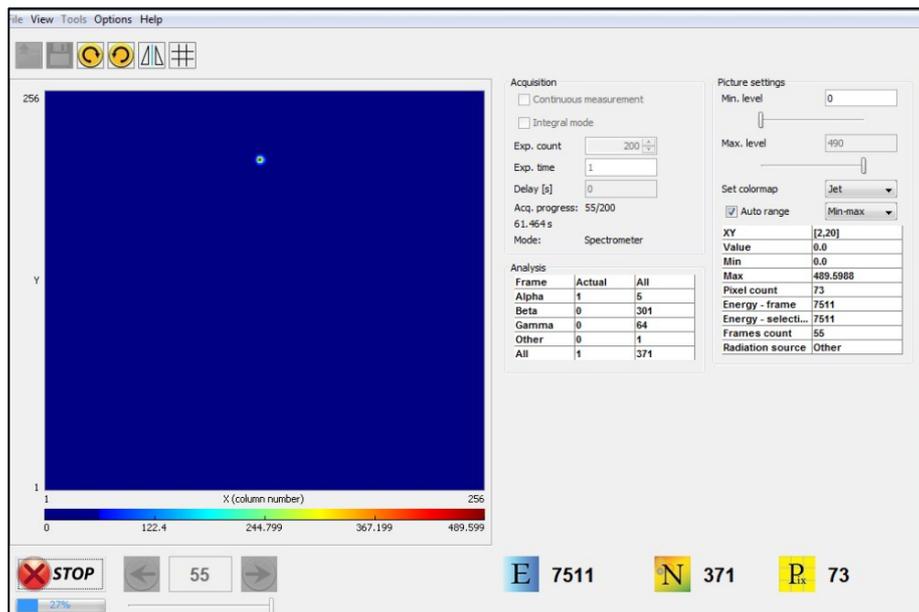
In addition to the Timepix detector you need

- Your laptop with Pixelman loaded.
- If you these are required for the project a means of finding out the exact latitude and longitude of your readings. You may know it already but if not you can obtain it through Google Maps by right clicking on your location and selecting “What’s Here”.
- Details of the number and duration of your planned data collections.

Note: you do not need an internet connection.

### Data Collection Procedure

1. If you are required to at your data collection site record the longitude and latitude reading to four decimal places.
2. Set up your Timepix detector ready for data collection checking that the source is in line with the actual detector part of the Timepix before you take your reading.
3. Then plug the Timepix detector’s USB cable into your laptop and open Pixelman.



The above illustration shows how the screen appears *after* data has been collected.

4. In the **Count** field enter the number of frames.
5. In the **Time** field enter the length of time (in seconds) each frame will be making a measurement.
6. Make sure that the checkboxes for **Integral Mode** and **Continuous Measurement** have not been checked.
7. Now press **START**.

When the process finishes select **File** → **Save Measurement**. Name the file and change the file type to 'xyc format separate files'.

Preparing the data for Upload

The data files you have collected need to be saved as zip files before they can be uploaded to Tapas. (Zip files compress all your data files into one file). The procedure is as follows

1. Access the folder containing your data files.
2. Use **Select All**.
3. Then right click the mouse and select **Send to** → **Compressed (zipped) folder**.

Your data is now ready to be uploaded.

## II Uploading Data

Before you Start

You need to be registered as a TAPAS user with a valid email address. This can be done directly from the TAPAS home page <http://starserver.thelangton.org.uk/tapas> and only a takes a few minutes.

Using the TAPAS Uploader Screen

After signing in the TAPAS select the **Upload** tab. The screen below will be displayed.

**Welcome to the TAPAS Uploader**

To get started, you will need to upload some data in a zip file, which contains an equal number of xyc and dsc files.  
Different analysis algorithms may be used depending on the project you choose. If you are not sure which to choose, select CERN@school or Other.  
Note: You only need to enter Latitude and Longitude if your project requires it (eg. RAY, ISS, AutoNaut).

Name:

Project:

Latitude:

Longitude:

Notes:

ZIP File of data:

Complete the screen details as follows.

<b>Name</b>	Enter the name of the upload using any project-specific protocol.
<b>Project</b>	Select the project if not shown by default.
<b>Latitude</b>	If required by the project enter the latitude location of your data e.g. (65. 3458) of your data collection.
<b>Longitude</b>	If required by the project enter the longitude location of your data collection to four decimal places.

- Notes** You are advised to enter some extra information about the data capture. Examples are the weather conditions or the distance between the detector and the source.
- Zip File of data** Browse to select the zip file containing the data from the folder you saved it to.

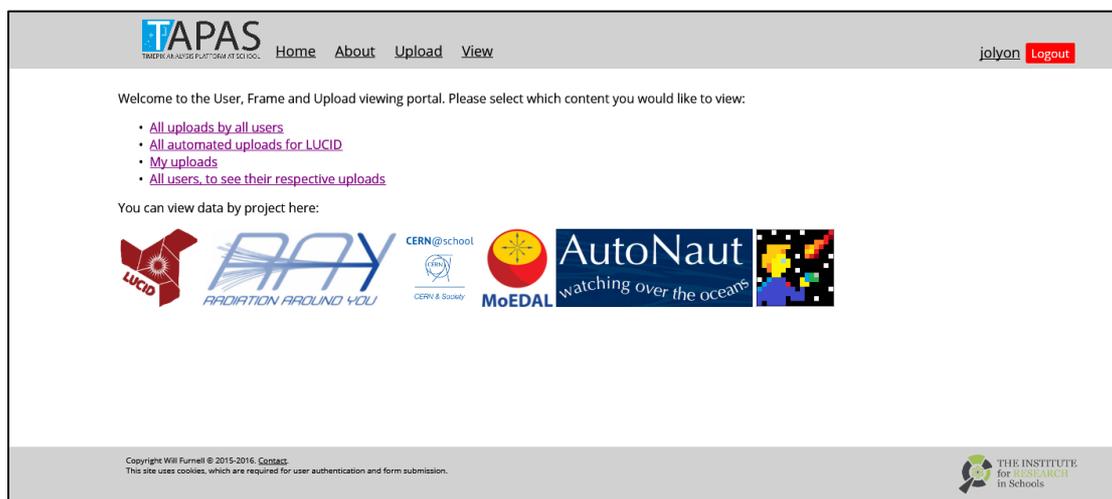
When you have checked your entries press **Upload** at the foot of the screen. Data analysis will now be performed automatically (using the algorithm linked to your project selection).

You will be sent an email to confirm the upload.

## IV Using TAPAS Data View

### Viewing Data

Your data can usually be viewed usually in a few minutes after it has been analysed by clicking on **View Data** on the TAPAS Home Page screen. The screen below will be displayed.



Select **My uploads** and choose your upload.

The screen shown on the following page the will be displayed.

Note: TAPAS also allows you to view data uploads by project or by other users if you wish to do so. The possible selections are displayed on the screen above.

## [TSE] Langton Boys 2

You are viewing upload ID 9. This was uploaded by JBeesty at Sept. 28, 2015, 3:20 p.m..

### Metadata information:

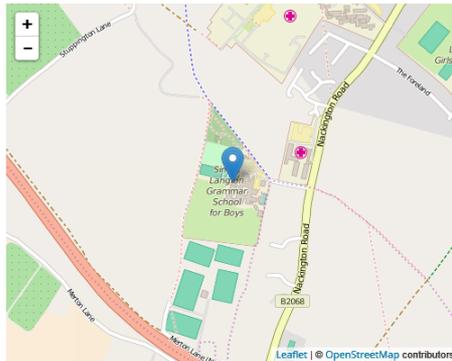
- Capture started: March 20, 2015, 8:45 a.m.
- Detector ID: G07-W0210
- Type: MX-10
- Bias voltage: 95.0
- Bias LVDS: 128
- Frame Acquisition Time: 15.0 seconds
- Total Frame Acquisition Time: 1800.0
- Number of frames: 120
- Notes:

March 20, 2015. Langton Boys Partial Solar Eclipse, 0845-0915

### Total counts (analysis results):

- Alpha: 0
- Beta: 933
- Gamma: 245
- Proton: 0
- Muon: 0
- Unknown: 4
- Total (excl Unknown): 1178

Location of the upload:



Latitude 51.261015, Longitude 1.084127

View frames for this upload:



View a list of all frames [here](#).

Download these results for your own further analysis [here](#).

Download the data that was used to create these results [here](#).

The screen display the following details:

1. **Metadata Information** gives the parameters of your data collection in case they are useful, for example, if you wish to replicate a previous experiment by someone else.
2. **Total particle counts (analysis results)** displays the total counts for all the frames specified for your analysis. You can view the analysis in more detail as described below.
3. **Map of the location of the upload** giving its exact latitude and longitude
4. **View frames for this upload** enables you to view the analysis results for each frame.
5. **View a list of all frames here** displays a list of all the frames from which you can select to view the analysis results for each individual frame.
6. **Download these results for your own further analysis here** with this comma-separated values (CSV) files can be downloaded for further analysis using Python, Excel or other methods.
7. **Download the data that was used to create these results here** downloads the individual files which were in the zip file you uploaded.