

# DAQ to Octave Library for FLASH data analysis

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## 1 Introduction

The data of the FLASH DAQ system ist stored in the new raw format. To access this data from octave (<http://www.octave.org>), which has a language very similar to Matlab a DLD library and some m-files have been written. All functions have been tested on unihase1. Not everything has been implemented, yet, so if there are problems in reading data send me an email.

The code is on the work group servers *unihase1* and *flash-wgs01*. To setup the needed environment login into the server using ssh in an exceed or cygwin enviroment (under windows). On unix system just use `ssh -X flash-wgs01`. At the prompt enter the command `source /xuv/products/bin/daqinit` and start octave by entering `octave` at the prompt.

Usually all raw data for data evaluation is stored under `/xuv2/data/amop/flash` in different directories. Due to the limited disk space available (currently only 4 TByte for raw data) not all files are on the disk. Nevertheless, all data is available on the tapes; staging can be done with the flash tool on *flashuser1* and *flashuser2*.

The `daq2oct` libraries provides the basic functions to have direct access to the data in the raw files. There already exist also some more functions e.g. for the reading the `gmd` data from an external file. Aim will be to provide a general *toolbox* (in matlab) or *package* (in octave) to preprocess the data on the servers and to extract the essential informations which can than be further analyzed on local machines.

## 2 Functions

### 2.1 daqlist

Usage:

```
list = daqlist(datadir, runno);
```

Return a list of properties, which are stored in the run. The directory of the data files and the runno has to be given.

### 2.2 daqreader

Usage:

```
DAQFile = daqreader(datadir, filelist, propertylist);
```

Open DAQ raw files for reading. The data directory, a list of files, which can be created by the function `rawfiles` and a list of properties has to be supplied for the function. The output has to be used as an input for the function `daqdata`, which reads the data from the raw files.

## 2.3 daqdata

Usage:

```
[ info , data , properties ] = daqdata(DAQFile);
```

Read the data from the DAQ raw files. The output *info* will return an array with to values. *info*(1) shows if the data is valid and *info*(2) gibes the event Id *evid* of the bunch. If  $a \neq 0$  no data can be read from the raw files. *properties* will return a cell array of the properties. The data is return in the cell array *data*. The different properties read from the file can be accessed by *data*{*k*}, where *k* is the index of the property. *data* can be a value, an array or a matrix depending on the property read.

## 2.4 rawfiles

Usage:

```
filelist = rawfiles(datadir, runno [, filename=all ]);
```

Read all files for the run number *runno* from the directory *datadir*. The output is a list of files, which can be used as an input to *daqreader*.

## 2.5 slicebunch

Usage:

```
sliced data = slicebunch(bunchdata, start index, number of bunches, slice length);
```

Slice the data from a single trace with data from a macrobunch with *N* number of bunches. The sliced data is store in a matrix.

## 2.6 gmdreader

This function is needed only, if the gmd data is not written successfully in the DAQ files. This usually happens, if the photon flux server is not running correctly. If the photon flux server is running, the gmd values for each shot can be easily read by selecting the corresponding property.

Usage:

```
gmdreader(filename);
```

Initialize the *gmdreader* function with the file, which includes the data from the *gmdreader*.

```
[value, average, valid] = gmdreader(evid [, nbunch]);
```

Get the gmd values for the event ID *evid*. As an option the number of bunches can be given.

## 3 Examples

In the following example raw files from the run 2512 are opened and three properties are read from the data set.

```
# Define some parameters
datadir = "/xuv2/daq/HASVUV_PG2/";
runno = 2512;
props = ["PGO.ADC/PGO.0"; "GMD.ADC/GMD.BDA"; "HASVUVFW01.CAM/CAMERA4"];

# Read the list of files
files = rawfiles(datadir,runno);

# Open the DAQ files
```

```
ptr=daqreader(datadir,files,props);
```

```
# Read the first dataset
```

```
[a,b,c]=daqdata(ptr);
```

```
# Show the image
```

```
imagesc(b{3});
```

```
drawnow();
```