A Brief Introduction to the ATLASITkRD53aPixelUKTBRecoRepo

Adam Rennie

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Whose beam is it anyway?

- All recent test-beams have been at DESY
- Use the synchrotron there to produce an electron beam
- Aim to characterise new devices with this beam and DESY’s *telescope* (pictured right)
Whose beam is it anyway?

- The telescope is a system comprising six planes of Mimosa pixel detectors.
- With the device under test (DUT) in the centre of the telescope, fire the beam through.
- Collect data from all planes including DUTs in runs; compare DUT to telescope information.
EUTelescope is the software which is used to reconstruct the data taken from the telescope at DESY. There are five steps to the reconstruction:

1. Converter
2. Clustering
3. Hitmaker
4. Align (multiple iterations possible)
5. Fit
The output files from EUTelescope are:

1. histograms
2. lcio
3. database
4. logs
5. tbtrack
TBMon2 is the software used to then analyse the reconstructed data. Amongst other things, it will calculate the most important metric for the module, the efficiency. This is defined as:

$$\epsilon = \frac{\text{Number of tracks with a hit in the DUT}}{\text{Number of tracks in the telescope}}$$ (1)
TBMon then

- TBMon2 can also produce many other useful pieces of insight, dependent on how it has been configured.

- For example, in-pixel efficiency.
Work, you piece of git

Doing reconstruction by copying and pasting over OneNote

Using a central framework to git reconstruction done
The aim

- Have a central git repository on which to host scripts, configs, gear files etc. for UK test beam efforts

- To be structured à la the markey survey repository which a few of us have been using
Why?

- Ensure homogeneity in setups across our efforts
- New fixes, updates, new scripts, features etc. can be easily integrated and pushed out to everyone
- For each new test beam, simply create a few new files and you’re good to go
How?

- **A new UK PIXEL TEST BEAM group** has been created on the CERN GitLab. This will be the namespace on which the new repository is hosted ⇒ not tied to one individual. . . eternal

- The central repository is called **TESTBEAMUK**

- **RECOTRICKS** can also be hosted on this namespace and included in **TESTBEAMUK** as a submodule

- People have been added to **UK PIXEL TEST BEAM** and have hopefully cloned **TESTBEAMUK** and created their own branch to work on
What does it look like?
What does it look like?

![Diagram of file structure]

- Recent
- Home
- Desktop
- Downloads
- Rubbish Bin
- Network
- Computer
  - lxplus.cern.ch
- Documents
- Pictures
- Connect to Server

- EUTelescope
- TBmon2
- testbeamRecos
- testBeamUK
- Market Survey
- InstallEuTel.

UK Work
What does it look like?

The directory structure includes:

- **Recent**
- **Home**
- **Desktop**
- **Downloads**
- **Rubbish Bin**
- **Network**
- **Computer**
- **lxplus.cern.ch**
- **Documents**
- **Pictures**
- **Connect to Server**

### Files and Folders:

- **testBeamUK**
  - **condor**
  - **config**
  - **gear**
  - **img**
  - **notes**
  - **plugins**
  - **scripts**
  - **steering-templates**
  - **tbmon**
  - **README.md**
  - **runcard.txt**
  - **runlist.csv**
  - **sensor_layouts_offline.cfg**
Reconstruction

- Runs are organised into *batches*

- Batches are groups of runs for which the configuration of the telescope and DUTs is constant

- The file “runlist.csv” groups runs into batches and associates each batch with a “gear” file

- Each batch has a corresponding config file, named “config_(YEAR)(MONTH)(BATCH)” which points to input and output locations and allows for cuts and parameters to be altered

- Each batch also has its own gear file, named “gear_(YEAR)(MONTH)(BATCH)” which defines the geometry of that batch.
Reconstruction

- The EUTelescope environment should be set by running:
  \texttt{scripts/setupEuTelescope.sh}

- With these files defined, EUTelescope can be run by doing:
  \texttt{. scripts/runEuTelescope.sh RUN BATCH MONTH YEAR}

- It is also now possible to send a whole batch to HTCondor for reconstruction by doing
  \texttt{. scripts/batchRunCondor.sh BATCH MONTH YEAR}

- The output can then be investigated using the rest of the "scripts" directory and the "tbtrack" files passed on for use in TBMon2
TBMon2 is configured via the "tbmon/config/mainConfig.cfg" file

This in turn points to the "tbmon/config/analysisConfig.cfg" file
With these files defined, TBMon2 can be run by doing:

```
./scripts/runTbmon.sh
```

Similarly to EUTelescope, TBMon2 can also be run over sub-batches (i.e. voltage steps, THL changes), by doing:

```
./scripts/runAllTbmon.sh
```
Happy Reconstruction!