

## ❖ Project description

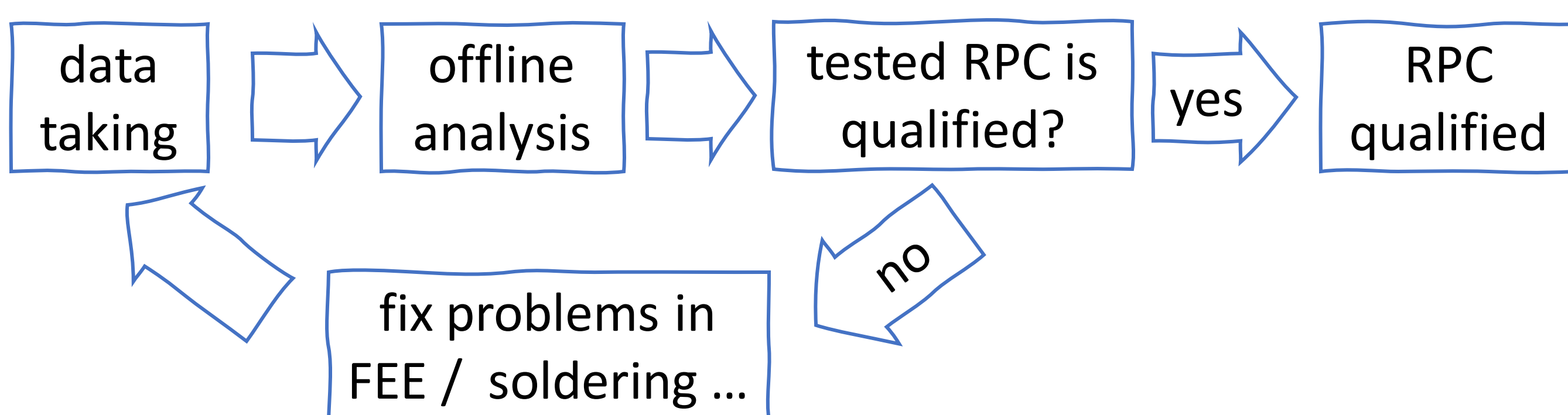
- A GUI program developed as quality control procedure for RPC mass production for ATLAS Phase I upgrade.
- Based on the DAQ program developed by Alexis Fagot
- Controls the TDC and reads the events from its buffer
- Reconstructs and analyses the events read from TDC
- Displays the preliminary results in various plots
- All plots are refreshed in real time during data taking

## ❖ Hardware and software setup

- TDC & VME: V1190a, V1718
- Server: CentOS 7.6
- Develop env: Qt 5.11, Root 6.14, QCustomPlot lib

## ❖ Improve the cosmic-ray test workflow

- Previous workflow:



- Improved workflow including the online monitor:



- P.S. fine tuning of RPC performance parameters like time resolution still requires offline analysis

## ❖ GUI interface

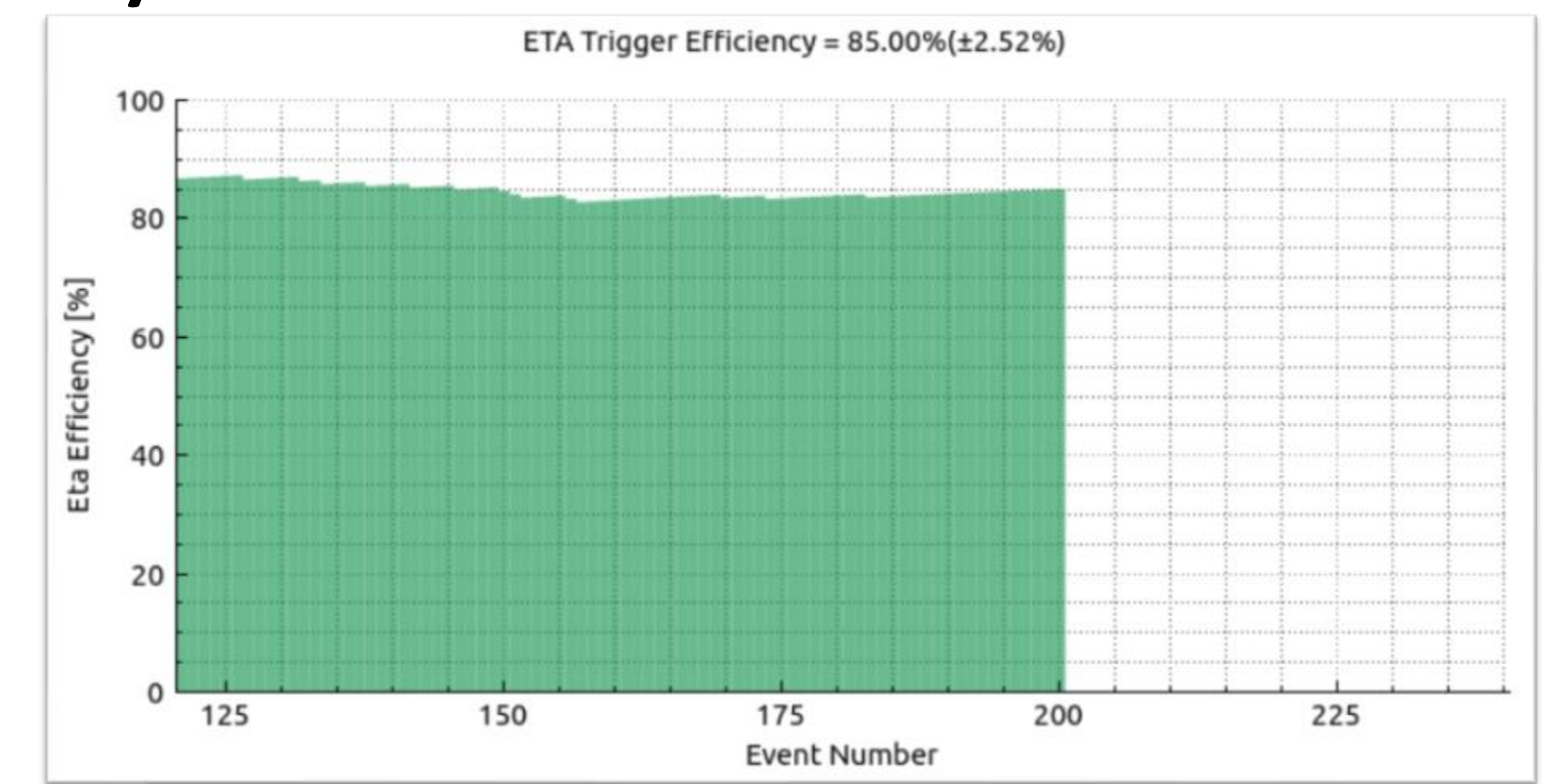


1. Specify the signal polarity and signal time window
2. Import mapping file or configure it manually
3. Start and stop of the monitor: could either read from TDC (DAQ mode) or re-analyse the existing root files from disks (import mode)
4. Config the server which broadcasts the muon tracks via TCP-IP protocol
5. Main display area: containing all results plots and text browser. Plots are tabbed by singlets and sub-tabbed by functions (i.e. efficiency, FEE)

## ❖ Plots: efficiency curves

Shows the live efficiency curve during data taking

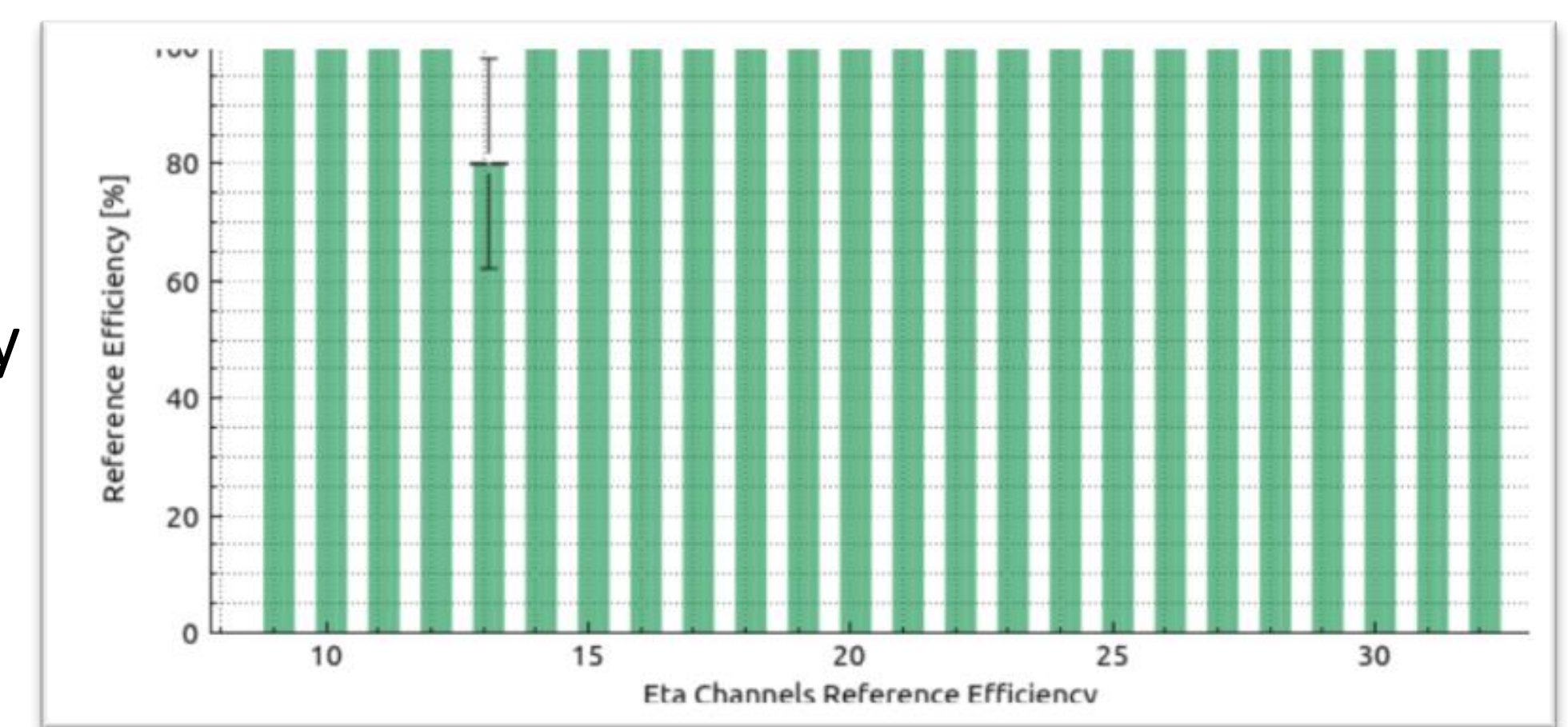
- of Eta / Phi panel
- of gas gap / singlet
- with / without reference singlet
- error is given under Poisson assumption



## ❖ Plots: efficiency histograms

Show the efficiency of each channel

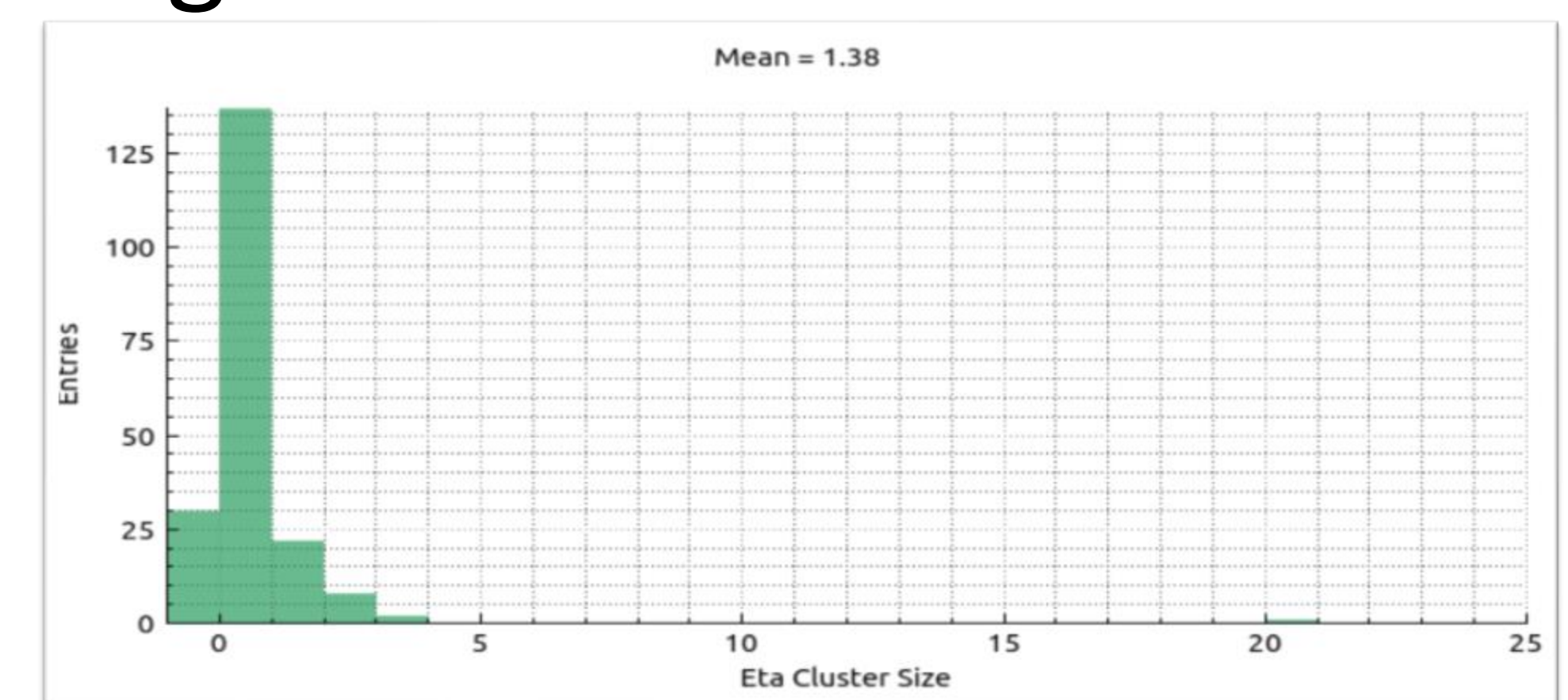
- of Eta / Phi panel
- to check the efficiency of separate channel
- error is given in the Poisson assumption



## ❖ Plots: FEE histograms

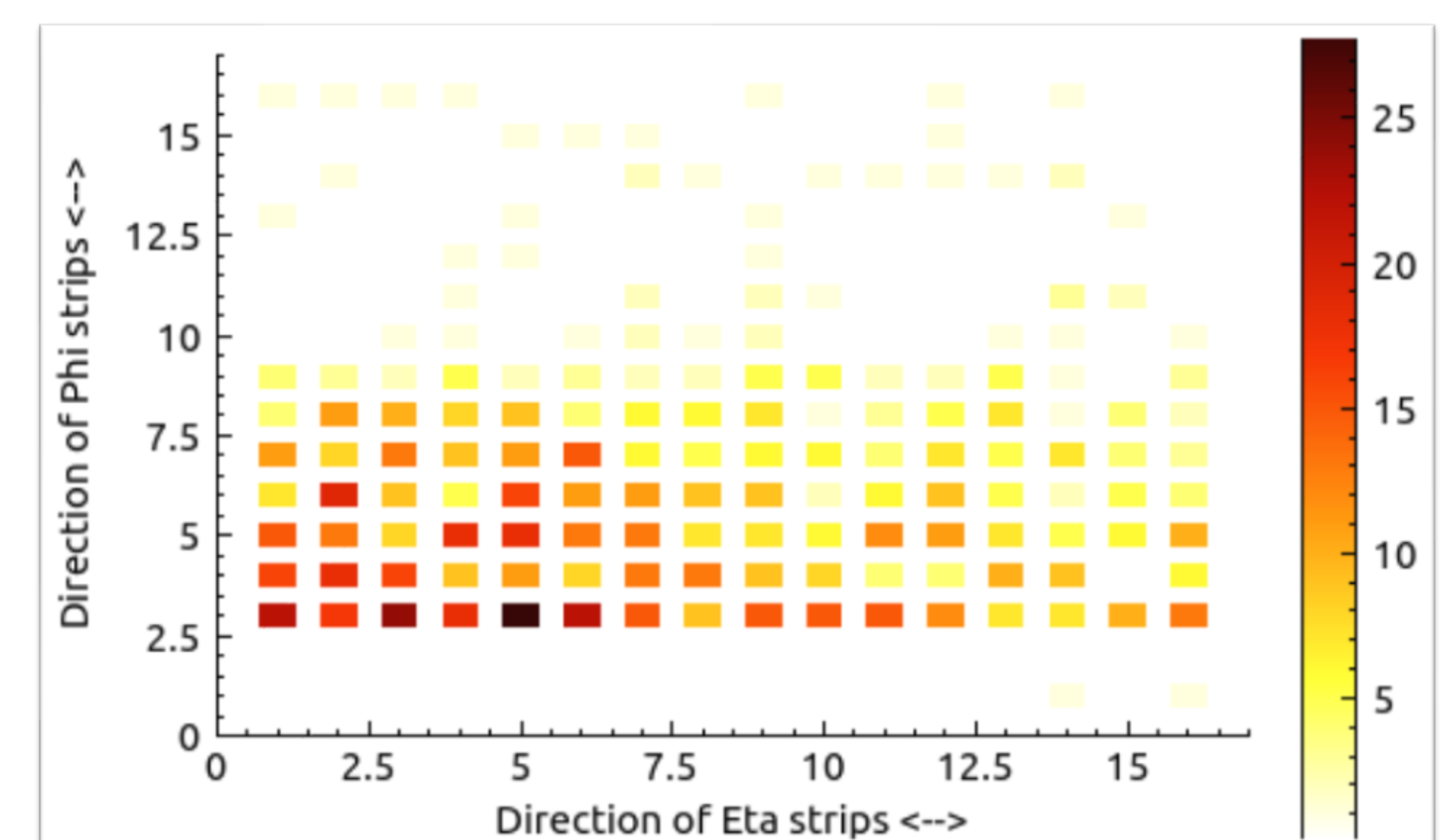
Including:

- Cluster size
- Leading edge, falling edge
- Time over threshold



## ❖ Plots: 2D hit histograms

- Shows the hits in 2D histogram to find out the noisy points or broken strips, e.g. Phi 1 & Phi 2 are disconnected (no entry below 2.5 in Phi)



## ❖ Extra function: quick analysis report

- After DAQ finished, a pdf-formatted quick analysis report is automatically generated
- To archive results
- Contains all the plots displayed in the monitor
- Contains the mapping used in the monitor

## ❖ Extra function: tracks broadcast

- If more than one singlet is used, muons tracks are reconstructed by the monitor together with the user-specified position of singlets
- The reconstructed tracks are broadcasted via the TCP-IP protocol
- Could be received by an external AR (augmented reality) program to display the tracks upon the video captured by the camera while the coordinate system of the real world could be recognized and established by the markers printed on the detectors
- Demos of AR programs have been developed
- Could be used for outreach purposes

