

richmon: The RICH monitoring GUI

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1. Introduction

The `richmon` application is designed to monitor the RICH raw data. It provides TDC hit occupancy map, TDC distributions and multiplicity plots.

2. The main `richmon` GUI

The main `richmon` GUI can be launched by any clonpc machine by typing:

```
> richmon
```

The main GUI appears as it is shown in the following Fig. 1.

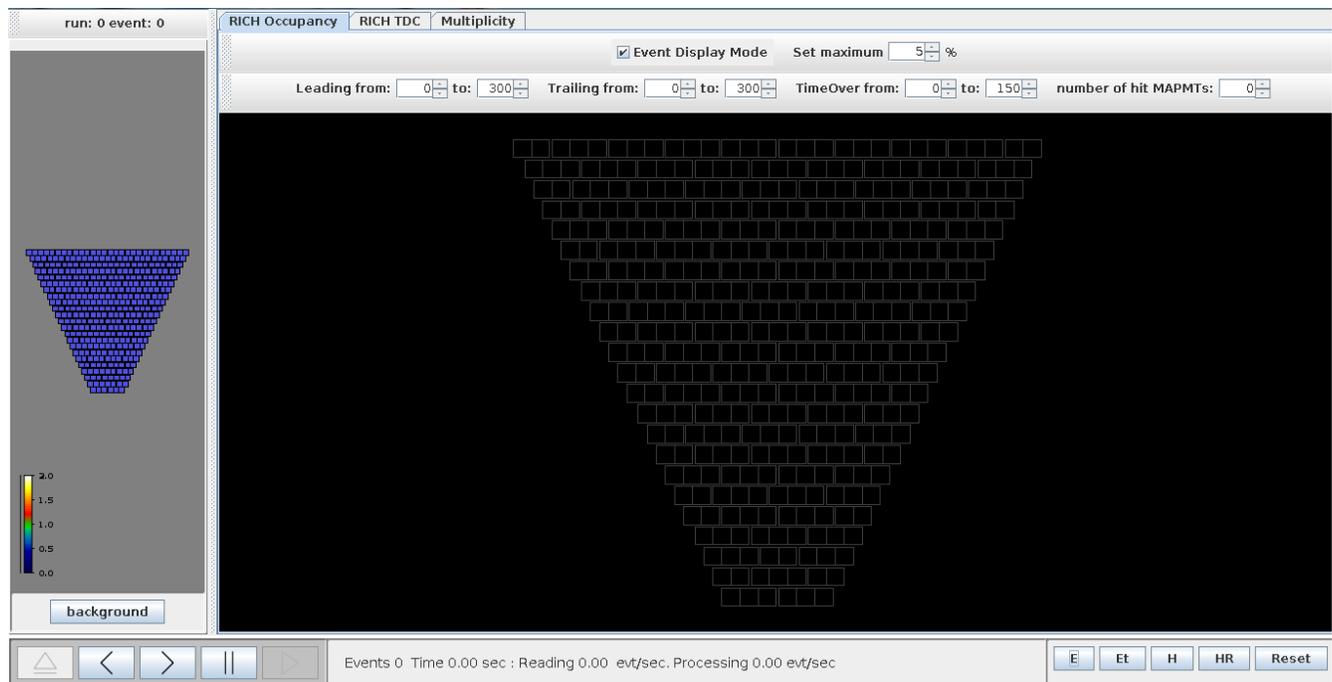


Fig 1. The main `richmon` GUI

One can choose different input data from the bottom right buttons shown in the Fig. 2:

- EVIO raw data from file (E) or DAQ ET ring (Et)
- HIPO data from file (H) or HIPO ring (HR); these are obtained from the EVIO raw data running the CLAS12 common tool decoder.



Fig 2. The buttons to select the input data.

For example, to connect to the EVIO Et ring, click on the Et button, then you will see the GUI shown in the Fig. 3, where you must select clondaq6 and the file /et/clasprod, then click on connect.

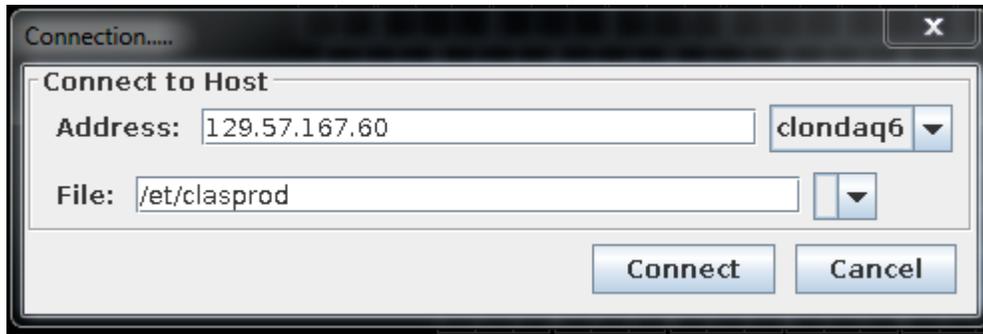


Fig. 3 Connecting to the Et ring data

Once the file is open or the connection to the Et ring is established, the buttons in the bottom left part of the GUI will turn black as in Fig. 4. Click on the right button to start accumulating events. At any time this process can be stopped with the pause button. Left and right arrows allow also moving backward and forward, one event at a time.



Fig. 4 The action buttons

3. Data display modes

There are three event display options that show different sets of monitoring plots of the RICH data.

3.1 RICH occupancy

The RICH occupancy plots can be displayed on an event-by-event basis or integrated over the accumulated events, by checking or un-checking the “Event Display Mode” box on the top of the GUI. The Fig. 5 shows a typical RICH event in the single-event mode, where one can see the charged particle cluster and the single Cherenkov photon hits. By using the boxes on top of the plot, one can choose the time interval to look for the

hits. The on-time RICH signals region can be identified by looking at the “RICH TDC” display (see next paragraph). Typically, the RICH signals have leading edge around 100 ns, trailing edge around 160 ns, time-over-threshold of about 60 ns. Note that the time cuts will affect also the RICH TDC and multiplicity plots.

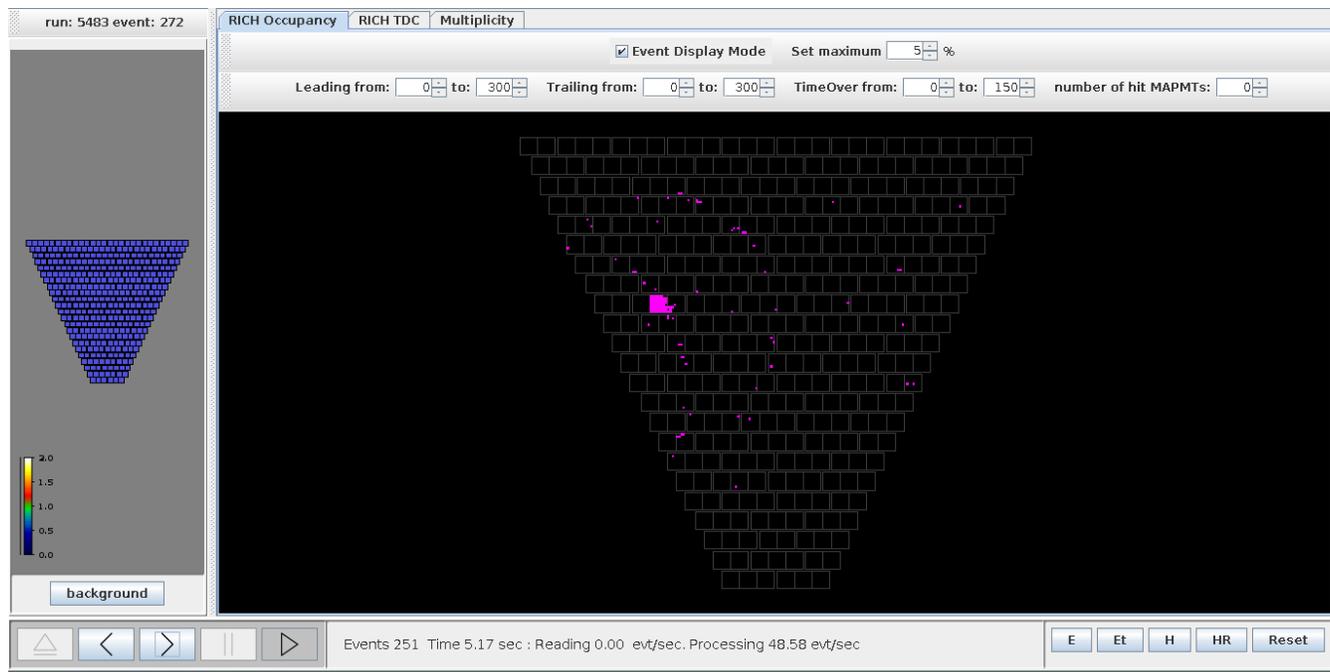


Fig. 5 RICH occupancy plot.

3.2 RICH TDC

For each RICH hit, the readout electronics record the leading and trailing edges. i.e. the times when the input signal crosses the threshold value. These two times, together with their difference (i.e. the time over threshold) can be shown by using the “RICH TDC” display mode. The Fig. 6 shows an example of the TDC distributions for the whole RICH detector. One can also choose to display one single pmt by clicking on the one of the small boxes representing the 391 RICH pmts in the map on the left of the screen and selecting the “pmt” display mode (for the integrated hits) or the “pixel” mode (for all the 64 pixels of the pmt). Note that for the latter plots, a large amount of events should be accumulated to see significant distributions. Examples of these plots are shown in the Figs. 7 and 8.

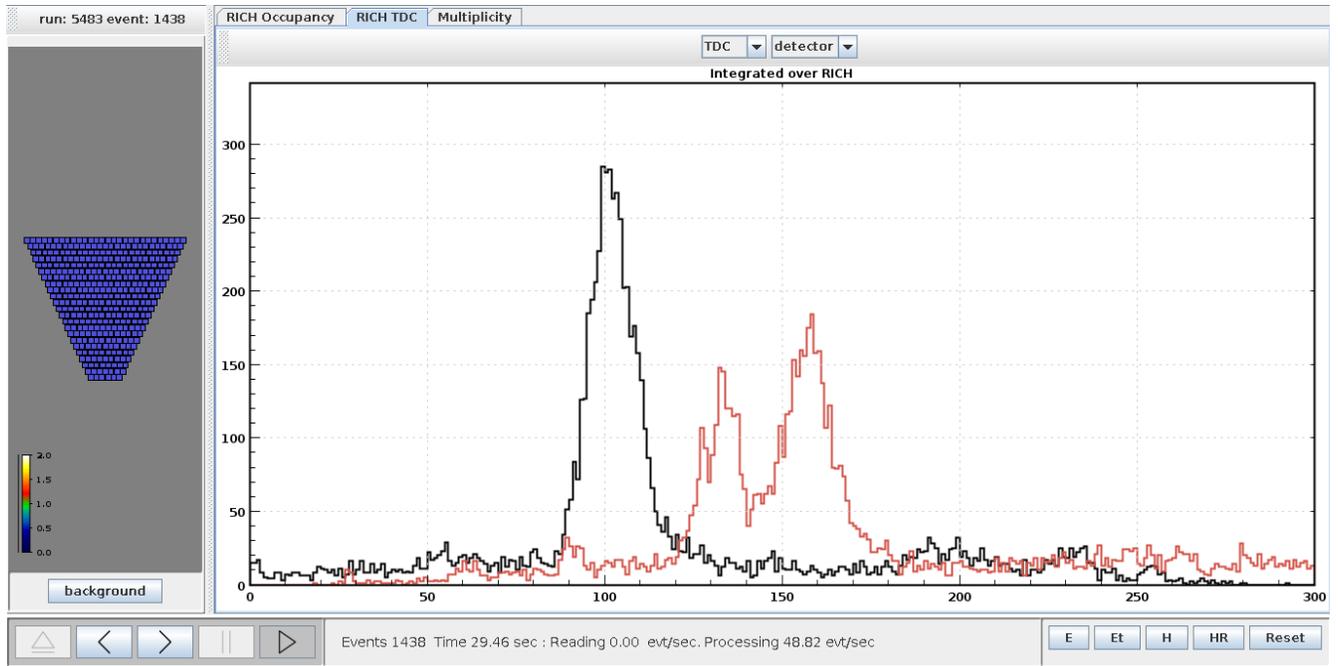


Fig. 6 Leading and trailing edge TDC distribution for the whole RICH.

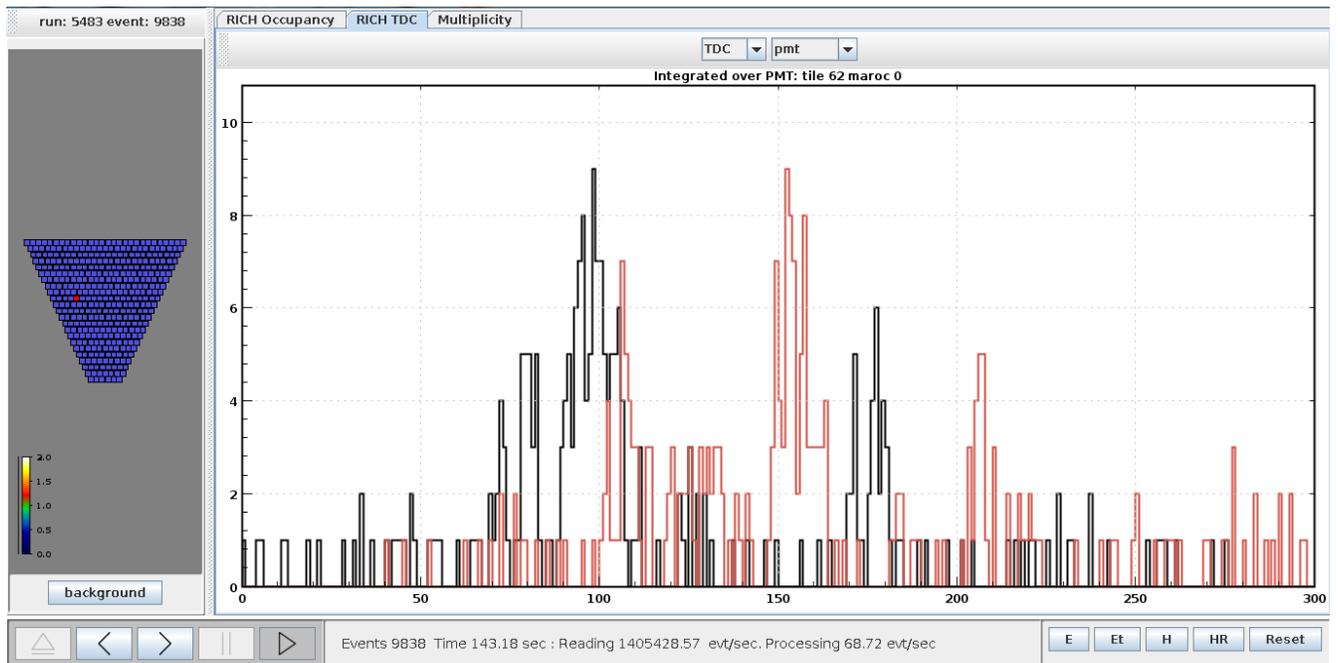


Fig. 7 Leading and trailing edge TDC distribution for the pmt 62.

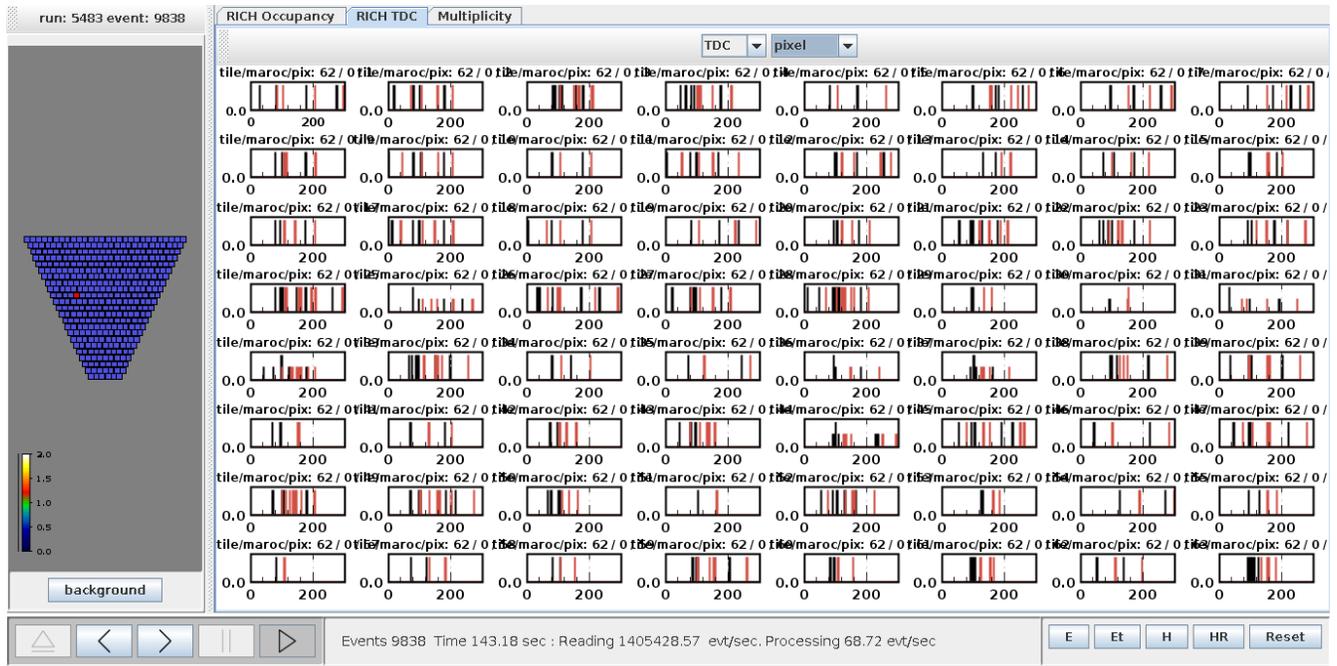


Fig. 8 Leading and trailing edge TDC distribution for the 6 pixels of the pmt 62.

3.3 Multiplicity

Distributions of the number of RICH hits per event can be shown in the “Multiplicity” mode. Here, one can choose to show the leading edge, the trailing edge or both. Plots can be shown for the whole detector or for one single pmt. Fig. 9 shows for example a leading edge multiplicity plot integrated over all the RICH detector.

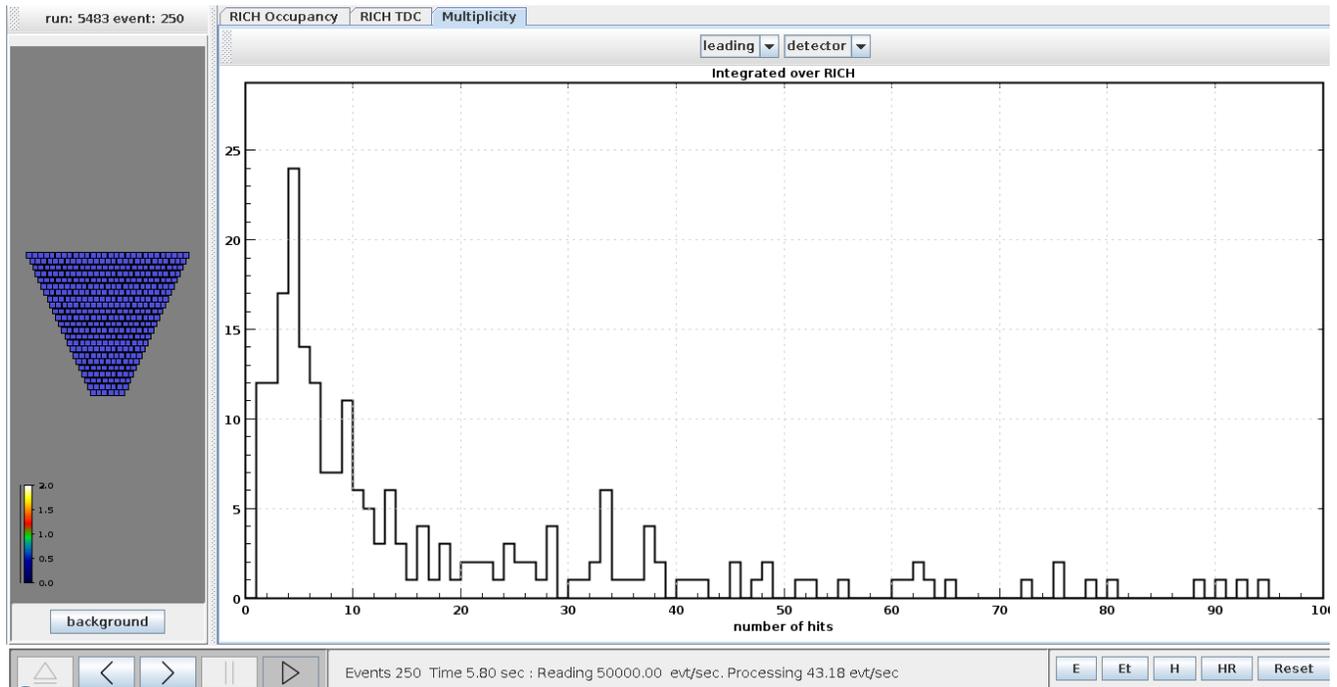


Fig. 9 Leading edge multiplicity distribution integrated over the RICH detector.