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**LHCb Global Particle ID (PID&CO Working Group)**

**PID & CO contacts**

**Convenors:** Martino Borsato, Jean-François Marchand, Donal Hill, Anton Poluektov.

**Liaisons**

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<td>B2OC</td>
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<td>Charmless</td>
<td>Vladimir Macko</td>
<td>Dong Xiao</td>
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**General information**

Particle identification in LHCb is provided by four different detectors: the calorimeter system, the two RICH detectors and the muon stations. These pages are for the LHCb Global Particle ID, the combination of the individual sub-detector PID performance measures into a single source of information to be used by the physics applications. It covers the responsibilities of the PID & Calo Objects joint working group. Links to the respective charged PID and calorimeter objects Twiki pages can be found below.
List of open operations tasks - please join us!

A list of ongoing operations tasks can be found here. Several PID&CO tasks remain unassigned, and represent an excellent opportunity to get involved in the operations side of things. If any of these appeal to you, please contact the PID&CO convenors.

Charged PID Twiki

Information on charged track PID can be found on the Link at the Charged PID Twiki Page

Calo objects Twiki

Information regarding neutral PID and related topics can be found on the Calo Objects Twiki Page

Mailing lists

Questions or comments concerning Particle Identification may be sent to the following mailing list: lhcb-phys-PID-topics@cern.ch (charged PID), lhcb-phys-caloobjectstools@cern.ch (neutral PID). Please use this mailing list for general PID topics.

Questions or comments concerning the PIDCalib packages may be sent to the following mailing list: lhcb-phys-pid-calibration@cern.ch. Please use this mailing list for any question that involves PIDCalib.

If you wish to ask a question regarding the reconstruction of particle ID information, you may post a message to the LHCb Da Vinci working group mail list.

Questions more specific to Calorimeter Objects can be sent to Calo Objects mailing list.

Regular meetings

PID&CO meetings: Particle Identification Indico category under LHCb Meetings Indico category

PPTS meetings: PPTS Indico category under LHCb Meetings Indico category

Overview of the activities

The ongoing tasks in the group can be followed in the LBPI D jira page

Documentation

PID samples in Run2 public note: LHCb-PUB-2016-005

TurboCalib stream public note: LHCb-PUB-2016-020

PIDCalib internal note: LHCb-INT-2016-028

PIDCalib public note: LHCb-PUB-2016-021

WG production internal note: LHCb-INT-2016-029

Photon reconstruction efficiency correction in Run 2 public note: Analysis page
Paper twikis

New MVA GlobalPID

Novel strategy for PID calibration in Run 2

Workshops

PID workshop (28 Jan 2014)

Charge Asymmetry workshop (22 Jan 2015)

Conferences

If you are interested in any of these or you want to suggest a conference we've missed, please get in touch with us!

Previous Conference Talks & Posters

A list of previous talks and posters given on behalf of the PID&CO WG can be found here.

Plots for conference

Useful figures to describe PID development and performance page.

PID liaisons

The Physics Analysis Working Groups provide liaisons to the Physics Performance Working Groups, like PID, Calo Objects and other key areas. The WG contacts are listed here. A list of responsibilities for the PID liaisons can be found below (have a look also at this presentation, from 24 September 2014 PID meeting):

- Attend the PID&CO meetings (for now only "on demand" meetings, usually Wednesday 11am).
- Regularly inform the PID&CO WG on status of PID, in particular announce the release of new version of PIDCalib package, updates to the neutral objects tools, and the existence of new charged and neutral PID samples.
- Collect from ongoing WG analyses information and requirements related to PID & CO, in particular anything concerning the evaluation of systematic effects.
- Notify the PID & CO conveners about the lack of calibration samples or tools that could be useful in some WG analyses, in particular anything concerning the statistics of the control samples and/or kinematic coverage.
- Even if the matter is discussed at the PPG, notify the PID & CO conveners about the request of MC samples related to PID & CO.
- Notify in advance the PID & CO conveners when there are important presentations/analyses concerning charged and neutral PID, to let the conveners decide whether to join the physics WG meeting and follow the relevant presentations.

Good examples of information/reports from liaisons: BnoC, SL, Flavor tagging, QEE.

Also this talk (prepared by the BnoC WG for the A&S week in Oct 2013) is a very good example of "propagation of information".
Monitoring histograms for Turcal data

In 2017, summary histograms for all of the HLT2 Turcal lines are produced in order to assist with data quality checks. PID&CO liaisons undertaking data quality shifts are required to check the histograms, in order to ensure that no problems are present in the data.

Instructions for liaisons on shift

ROOT files containing the PID&CO histograms are available at:

/eos/lhcb/wg/PID/Monitoring_histos/real_data_2018/

The .root files with histograms are updated each Monday, such that the files present in this directory are:

1. Histograms containing data taken during the previous week (weekly.root).
2. Histograms containing all of the data taken up to the previous week (total.root).
3. Histograms containing all of the data taken up to the previous week after the Z-alignment (total_afterAlignment.root).

This enables one to check whether the latest histograms follow the trend of previous data taking. The latest script to plot the histograms divided into each Turcal trigger line including new alignment is available. It can be found at:

/afs/cern.ch/user/v/vmatiuni/workspace/public/shiftPIDCO/check3Histograms.C

The script can be executed from lxplus nodes as follows:

lb-run ROOT root -l /afs/cern.ch/user/v/vmatiuni/workspace/public/shiftPIDCO/check3Histograms.C

it will produce a directory with plots of the total and weekly histograms, saved in .root and PDF format. This folder with plots can be used as input to the latex monitoring report (see below). Previous version of this script (version without new alignment) is also available (git):


This script can be executed as follows:

lb-run ROOT root -l checkHistograms.C

it will produce plots of the total and weekly histograms, saved in .root and PDF format.

Produced histograms can be conveniently reported using latex beamer template created by Mikkel Bjorn:

/afs/cern.ch/user/m/mibjoern/public/PIDHlt2Moni/real_data/presentation/pidco_template.tex

Example of plots and report can be found:

https://gitlab.cern.ch/vmacko/pid-shifter

Monitoring shift schedule:

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Jun</td>
<td>Mikkel Bjorn</td>
</tr>
<tr>
<td>20 Jun</td>
<td>Guillaume Pietrzyk</td>
</tr>
<tr>
<td>4 Jul</td>
<td>Ryan Calladine</td>
</tr>
</tbody>
</table>
Instructions to extract the PID&CO histograms from the HLT2 savesets

The histograms are saved automatically by HLT2 and can be accessed through the plus nodes. An online account is needed for this. From any lxplus node one can log into lbgw (you should have received your password when you requested your online account)

```
ssh lbgw
```

and from there to plus using ssh with an online account

```
ssh plus
```

If using a computer connected to the network at the LHCb site one can directly connect to plus.

A set of scripts to get, merge and move the histograms is provided in this gitlab repository. They rely on the RunDB python API, which can be downloaded from here. Instructions on how to install it are provided in the README file therein. To produce the weekly histograms that are checked by the liaisons, the "run_pidco_bysvset.sh" script from the hltmoni repository is used. It takes as argument a date in the format YYYYMMDD and runs on all savesets produced until this date extracting the PID&CO Turcal histograms only. The reduced savesets are stored in a folder specified in the variable "dest_folder" with the names "runnumber.root". If previous savesets have already been saved one can skip them by specifying the folder where they are present in the variable "skip_folder". Currently, all histograms processed to date are stored in "/home/cmarinbe/hltmoni/pidco/processed_runs", where this variable defaults. The script then merges all the new savesets into a file named "date.root" and copies it to the public location in lxplus where the summary histograms are stored: "/afs/cern.ch/user/c/cmarinbe/public/PIDHlt2Moni/real_data/" under the name "week.root". If a "week.root" file is already present in this directory it will be overwritten. You probably want to merge it to the "all.root" file before running this script. For this just do:

```
hadd -a all.root week.root
```

The script also saves a copy of the root file and two txt files with the integrated luminosity of the merged saveset and a list of the runs included in the "weekly" folder in that directory. All in all, one simply needs to run:

Instructions for liaisons on shift
Notice that once the histograms are merged and in order to copy the resulting files to lxplus, one needs to enter the lxplus password.