

COMPASS

Calorimeter reconstruction

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Method

Determine Hodoscope efficiencies via check of associated hit to extrapolated track.

N_{extrap} : # extrapolated tracks to hodoscope position.
via `det.InActive($x_{extrapolated}$, $y_{extrapolated}$)`

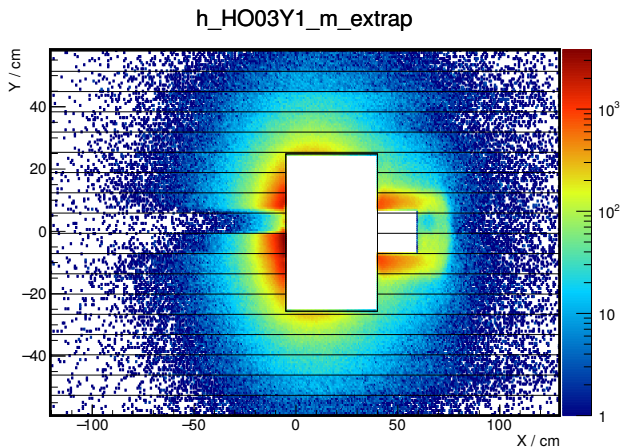
N_{hits} : # extrapolated tracks to hodoscope position with associated hits.
via `track.NHitsFoundInDetect(det)`

$$\text{Efficiency: } \epsilon = \frac{N_{hits}}{N_{extrap}}$$

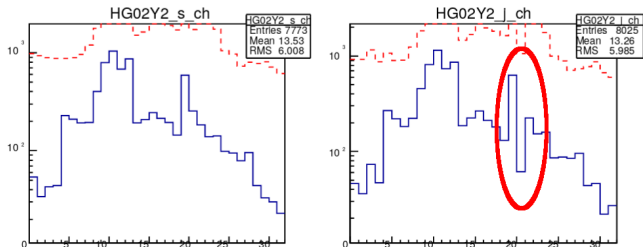
Cuts on Data

- skip if there is no CT Bit set
- skip if its not the best Vertex
- skip if there is no mu
- skip if there is no mu'
- skip if there is no track parameter of mu0
- skip if there is no track parameter of mu1
- Vertex between $Z = -330$ cm and -60 cm $R \leq 1.6$ cm
- if($\sigma_B > 10$) continue
- if ($n_{out} < 1$) continue
- if (!p.IsMuPrim()) continue
- At least six hits in Muonwalls
- Track is required to have at least one measured point
- if ($mom_h < 40$) continue;
- if ($x_0 < 20$) continue;
- if ($Q_2 < 0.1$) continue;

DVCS Extrapolated CALO Tracks:



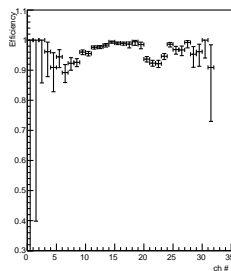
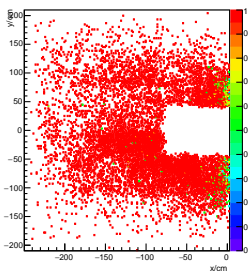
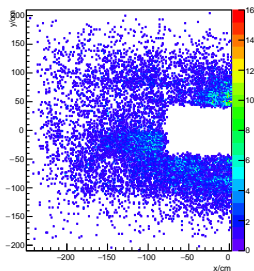
Missing Stripe in 2015 DY (262805):



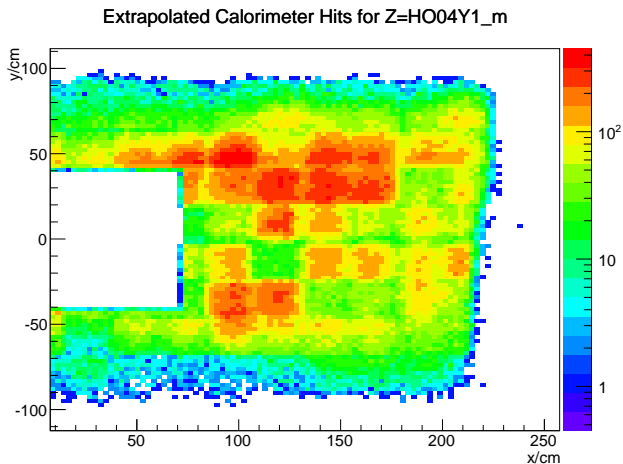
Extrapolated Calorimeter Hits for Z-HG02Y2__

HG02Y2__2D Efficiency

Stripe Efficiency



DY Extrapolated CALO Tracks:



Differences between hodoscope and calo reconstruction:

Decoding:

- CT is artificial shifted by 6 ns (hodos make timing)

Myon Identification :

Two functions for Myon Identification :

- mulDinMW1()
- PIDdoMuonID

Function mulDinMW1()

- Track without momentum
- Upstream of MA01
- $XX0 < 30$
(Hits in MAs does not ensure mulD per se. We want the track to have actually traversed the mu absorber (and not passed through its hole).)
- wrong polarity (not for DY)
- check for hits in MuonWall (MA01/MA02)

PID_doMuonID() function description

option: CsKalmanFitting, Specials , doMuonID

- exclude beam, fringe field, no P, low (<1 GeV) P.
- Same polarity as beam, which latter is determined on view of SM2 scaling factor. (not for DY)
- $XX0 > 15$ cut.
- W/in acceptance of a trigger hodo system compatible w/ event's trigger pattern.
- Compatibility of pair of hodo hits, if exist, w/ trigger correlation matrix.

Special case for CALO/LAS

- Pure calo includes both CT and highQ2T, the latter despite it's a mixture of calo and hodo (HQ) and because HQ is very special and it would have been difficult to treat it like HI/M/L/O.
- Pure means no hodo contribution. Other contributions are OK, e.g.: beam trigger.
- No other requirement than XX0, by default. Yet...

→ The threshold earlier passed may be considered too loose: it's been set so as to let through all the hodo triggering muons traveling on the rim of the muFilter central hole, which happen to collect few X0's, be it that the hodos (it's HL and HM) are partially naked in the real life or that it's their COMGeant description (ported to material map) that makes them look so from coral's point of view. → XX0 >65

Note about pure CALO events:

Note: there is a basic flaw in the μ' -ID (herein implemented): in its very interface! It returns a yes or no answer, based upon, among others, the trigger correlation matrix. This, while scanning all the bits of the trigger pattern corresponding to hodo-based triggers, if any. Now, let's consider a pure CT interaction w/ an accidentally coincident hodo trigger: it will not pass the μ' -ID, whereas it's a genuine one. A better interface would be one returning a pattern of bits, or one returning at least 2 bits: one inclusive, based upon hodo bits, if any, and one pure CT[or highQ2T], not requiring consistency w/ the trigger matrix.

Usage of these functions:

PID_doMuonID() used in build final particle

- ./CsEvent.cc:2274: PID_doMuonID(particles); // (so-called) scattered muon ID (BUILD FINAL PARTICLES)
- ./CsEvent.cc:2562: PID_doMuonID(particles);

mulDinMW1() used in VERTEX reconstruction:

- ./CsEvent.cc:2302: mulDinMW1(particles); // MW1 muID (should be moved to PIDdoMuonID"?)

Questions

- Which functions are used for DY/DVCS
- how to get unbiased CALO track reconstruction
- how to get same reconstruction efficiency for pure CALO tracks (inefficiencies) and Hodo tracks ?
- how to improve muID for CT and LAS ?