COMPASS
Calorimeter reconstruction
(DY Case)

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Method

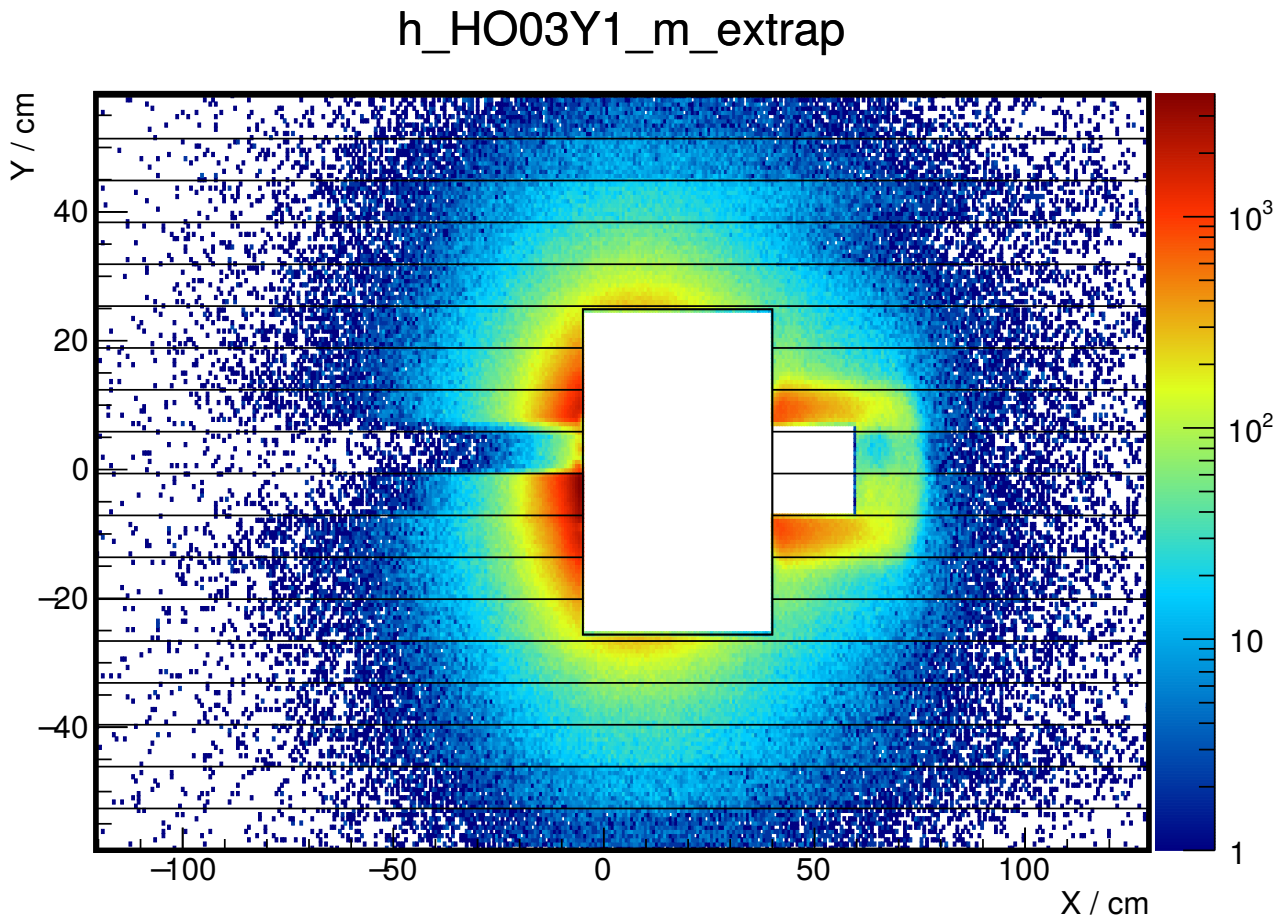
Determine Hodoscope efficiencies via check of associated hit to extrapolated track.

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)

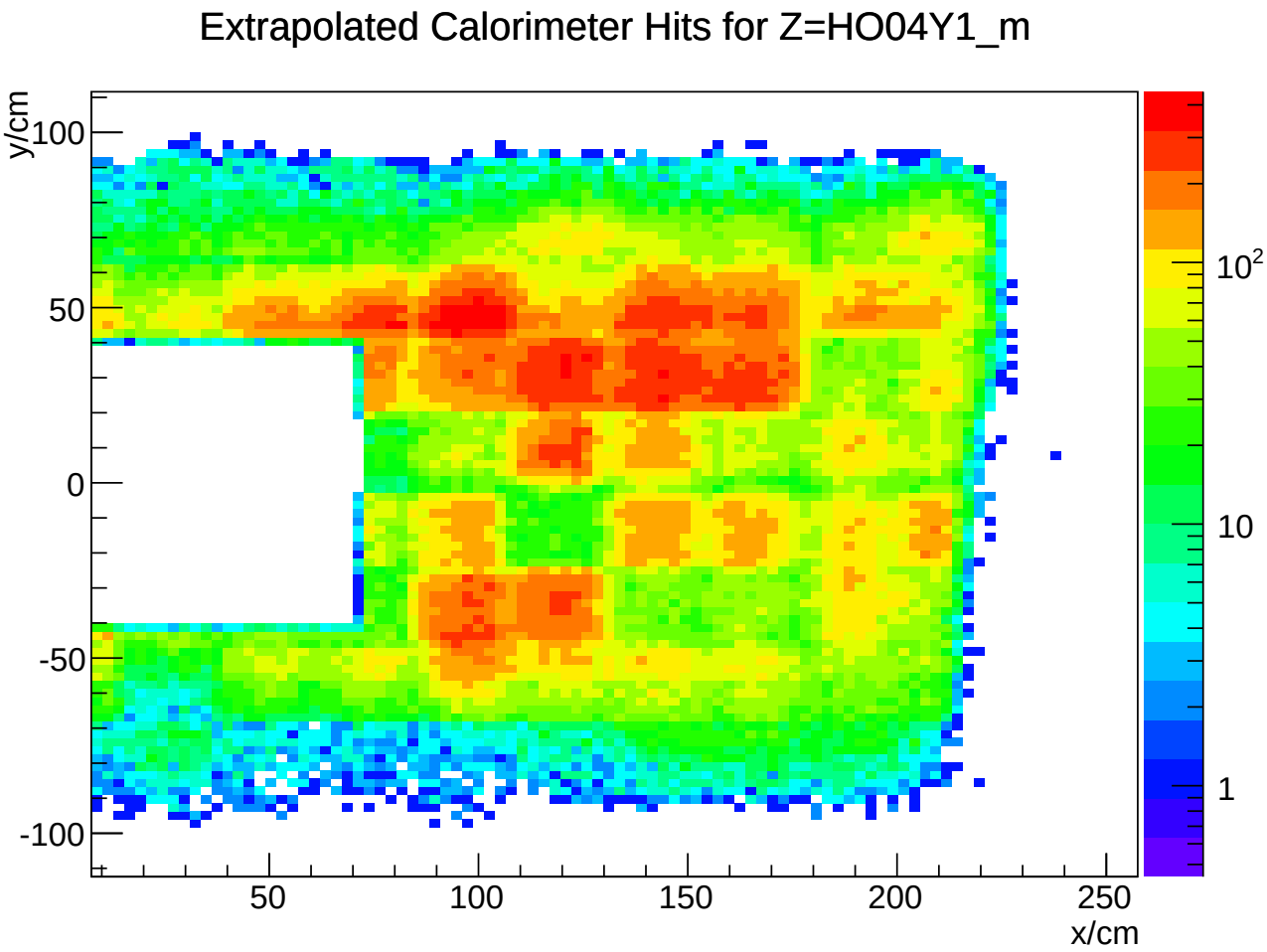
Efficiency: $\epsilon = \frac{N_{hits}}{N_{extrap}}$

DVCS Extrapolated CALO Tracks:



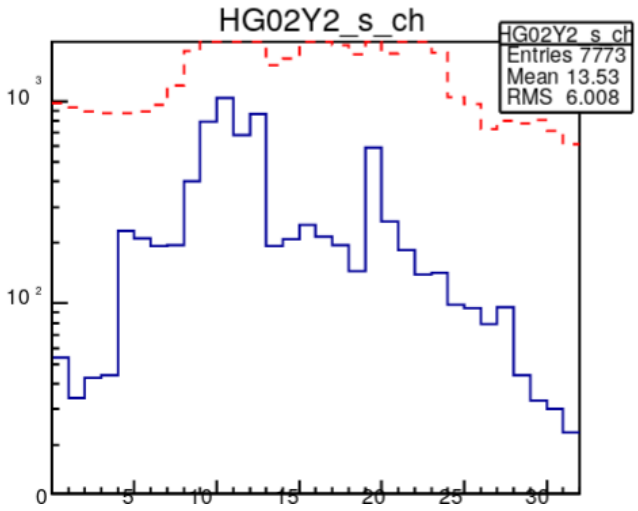
CALO Threshold 3MIPS (Hadron CALO)

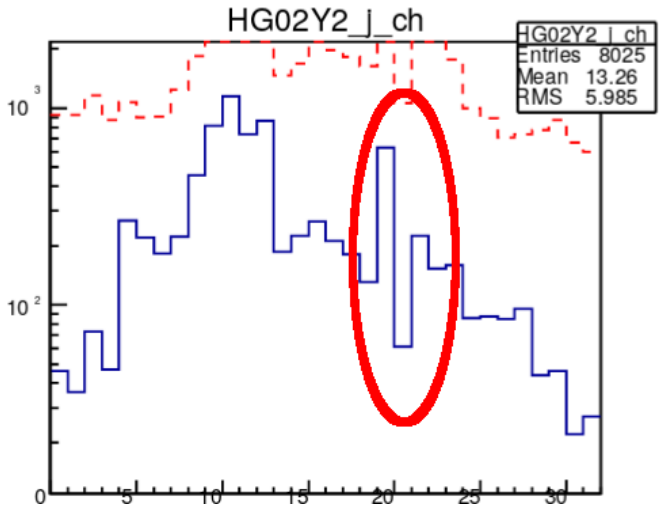
DY Extrapolated CALO Tracks:



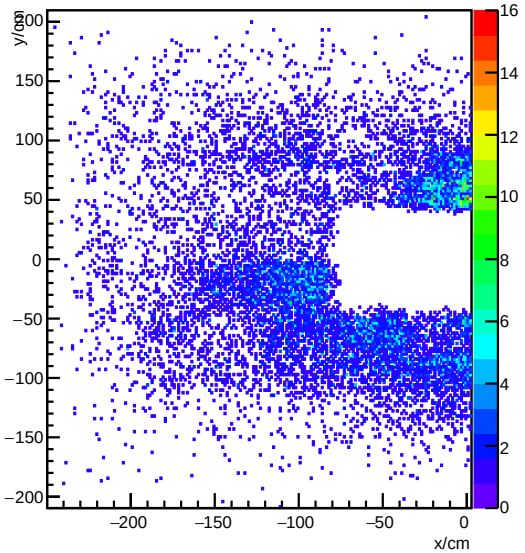
CALO Threshold <1MIPS (Muon CALO)

Missing Stripe in 2015 DY (262805):

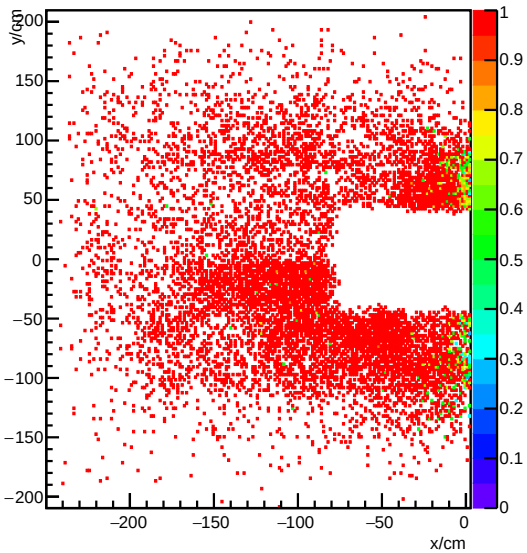




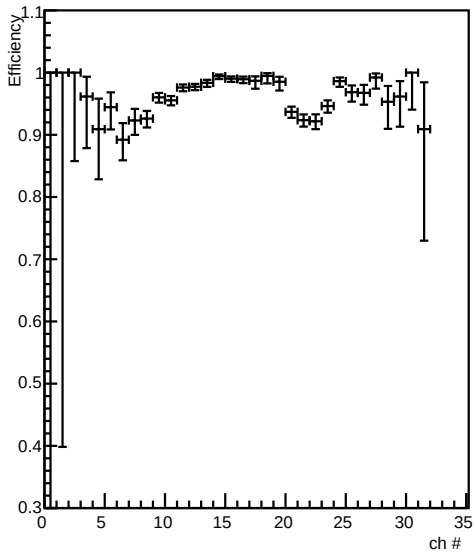
Extrapolated Calorimeter Hits for Z=HG02Y2__



HG02Y2__ 2D Efficiency



Stripe Efficiency



Differences between hodoscope and calo reconstruction:

Decoding:

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

Myon Identification :

Two functions for Myon Identification :

- muIDinMW1()
- PIDdoMuonID

Function muIDinMW1()

- Track without momentum
- Upstream of MA01
- XX0 <30
  (Hits in MAs does not ensure muID per se. We want the track to have actually traversed the mu absorber (and not passed through its hole).)
- 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.
- 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...

$\rightarrow$ 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. $\rightarrow$ XX0 $>$65

Note about pure CALO events:

Note: there is a basic flaw in the mu'-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 mu'-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);

muIDinMW1() used in VERTEX reconstruction:

- ./CsEvent.cc:2302: muIDinMW1(particles); // MW1 muID (should be moved to PIDdoMuonID"?)

Investigation with DVCS data

RUN: 275905 Event: 6323353 ID: 0

p.IsMuPrim() 1
p.IsMuPrimFast() 1
p.IsMuPrimCoral() 1
PID(): -1
XX0: 20.4268 mom: 153.468 pointshodo: 1 canbemuon: 0
TM:16 - MT:0 LT:0 OT:0 CT:1 LAST:0

Questions

- Which functions are used for DY for Muon identification
- How many interaction length did the absorber introduce
- how to get unbiased CALO track reconstruction
- how to get same reconstruction efficencie for pure CALO tracks (inefficencies) and Hodo tracks ?
- how to improve muID for CT and LAS ?
- Which option file is used for CORAL for the reconstruction of the special Muon Efficiencies runs ?