

Muon Alley Conditions

L0Muon confirmation

Muon PreTrigger

Logics

- Create veloR (2d) tracks
- Decode L0MuonCandidate
- Match veloR track with L0MuonCandidate
- Create Muon Segments from hits in M5-M2
- Match veloR track with Muon segments if there was at least one matching with L0MuonCandidate
- Reconstruct veloSpace (3d) tracks for those veloR flagged as muons
- Match veloSpace track with L0MuonCandidate
- Match veloSpace track with Muon segments if there was at least one matching with L0MuonCandidate
- Reconstruct 2d PV vertex
- Take muon pre trigger decision +++++ Cuts values in the Conditions Data Base
- Parameters used to calibrate the energy of an L0muonCandidate (used in the matching of 2d and 3d tracks with L0muonCandidate)
 - ◆ ptkickConstant
 - ◆ M1EcorParams0
 - ◆ M1EcorParams1
 - ◆ M1EcorParams2
 - ◆ M1EresParams0
 - ◆ M1EresParams1
- Cut applied to the matching of 2d tracks with L0muonCandidate
 - ◆ Chisquare of matching = $\chi^2_{DrDz} + \chi^2_{Phi}$, where
 - ◇ $\chi^2_{DrDz} = (\Delta DrDz * \Delta DrDz) / (err_{DrDz}^2)$
 - ◇ $\chi^2_{Phi} = (\Delta Phi * \Delta Phi) / (err_{Phi}^2 + \sigma_{Track}^2)$
 - ◇ originally determined from MC, chosen as to give the best purity, efficiency
- Cut applied to the matching of 3d tracks with L0muonCandidate
 - ◆ Chisquare of matching = $\Delta X^2 + \Delta Y^2$, where
 - ◇ $\Delta X = q * (L0_{dx} - track_{DxDz}) / err_{dx}$
 - ◇ $\Delta Y = dydz_{Sign} * (L0_{dydz} - track_{DyDz}) / err_{dydz}$
 - ◇ originally determined from MC, chosen as to give the best purity, efficiency
- Cut applied in the Muon segments reconstruction
 - ◆ distance along X and along Y from the extrapolation of partial segment (Mi+1 - M5) in station Mi The cut varies with the region, so in total we have $region * station * direction = 4 * 3 * 2 = 24$ parameters.
- Cuts applied to the matching of 2d tracks with Muon segments
 - ◆ Delta x [Region] : difference in x extrapolation of 2d track and muon segment to the zmagnet. One value for each muon region.
 - ◆ yTol : some tolerance to the extrapolation of muon segment to the r-phi velo sector
- Cuts applied to the matching of 3d tracks with Muon segments
 - ◆ Delta x [Region] : difference in x extrapolation of 3d track and muon segment to the zmagnet. One value for each muon region.
 - ◆ Delta y [Region] : difference in y extrapolation of 3d track and muon segment to M2 z position. One value for each muon region.
- Cuts applied to the HltPreMuonAlleyDecision
 - ◆ Single Muon
 - ◇ MuIPVeto - if IP for a single muon wrt any vertex < MuIPVeto, it points to a PV,

- discard it.
 - ◊ MuIPMinCut
 - ◊ PtSingleMuCut
- ◆ Dimuon
 - ◊ diMuMassCut
 - ◊ diMuIPCut - smallest Ip of the two muons
- ◆ JPsi
 - ◊ diMuMass > JPsiMass - MassWindowCut

Muon Trigger

- Cuts applied to the matching of forward tracks with Muon segments
 - ◆ Delta pos : square difference among the extrapolation of long track and muon segment at M2 Z position. The difference is evaluated as $\sqrt{\text{pow}(\Delta x, 2) + \text{pow}(\Delta y, 2) / 4}$. The applied cut is function of the momentum of the muon using the parametrized formula $\sqrt{a*a + b*b / (p*p)}$. In total we have 2 parameters: a and b.
- Cuts applied to the HltMuonAlleyDecision
 - ◆ Single Muon
 - ◊ MuIPVeto - if IP for a single muon wrt any vertex < MuIPVeto, it points to a PV, discard it.
 - ◊ MuIPMinCut
 - ◊ PtSingleMuCut
 - ◆ Dimuon
 - ◊ diMuMassCut
 - ◊ diMuIPCut - smallest Ip of the two muons
 - ◆ JPsi
 - ◊ diMuMass > JPsiMass - MassWindowCut

Muon Alley Summary Box Content

- MuonL0ConfirmationBox
- MuonPreTriggerBox
 - ◆ Chisquare of matching of 2D to L0
 - ◆ Chisquare of matching of 3D to L0
 - ◆ delta x of matching of 2D to muon segments
 - ◆ delta x of matching of 3D to muon segments
 - ◆ delta y of matching of 3D to muon segments
 - ◆ smallest distance from L0 extrapolation to VELO sector board (yTol monitoring)
 - ◆ Single muon Pt
 - ◆ Single muon Ip
 - ◆ Single Muon MuIPVeto
 - ◆ diMuMass
 - ◆ diMuIp
 - ◆ pointer to the 3D triggered tracks
- MuonTriggerBox
 - ◆ delta x of matching of forward track to muon segments
 - ◆ delta y of matching of forward track to muon segments
 - ◆ Single muon Pt
 - ◆ Single muon Ip
 - ◆ Single Muon MuIPVeto
 - ◆ diMuMass
 - ◆ diMuIp

- ◆ pointer to the forward triggered tracks

Muon Alley Monitoring

- all summary box variables
- Calibration L0 muon energy distribution
- time evolution of mean values
- Number of L0 Muon candidates
- Number of 2D tracks
- Number of 2D tracks flagged as Muons
- Number of 2D tracks in a IP window
- Number of 3D tracks in a IP window
- Number of Velo-TT tracks (in a IP Window)
- Number of 3D tracks
- Number of 3D tracks flagged as Muons
- Number of 3D tracks flagged as Muons found in TT
- Number of forward tracks (in a IP Window)
- Number of forward tracks
- Number of 2D PV
- Number of 3D PV

-- Sandra Amato - 26 May 2006

-- Alessia Satta - 12 Jun 2006

-- Sandra Amato - 20 Jun 2006

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