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First cms120 results on τ id with pixel detector at Lvl-3

current data production for Tau study

60 K signal events, 360 K qcd background events with cms120

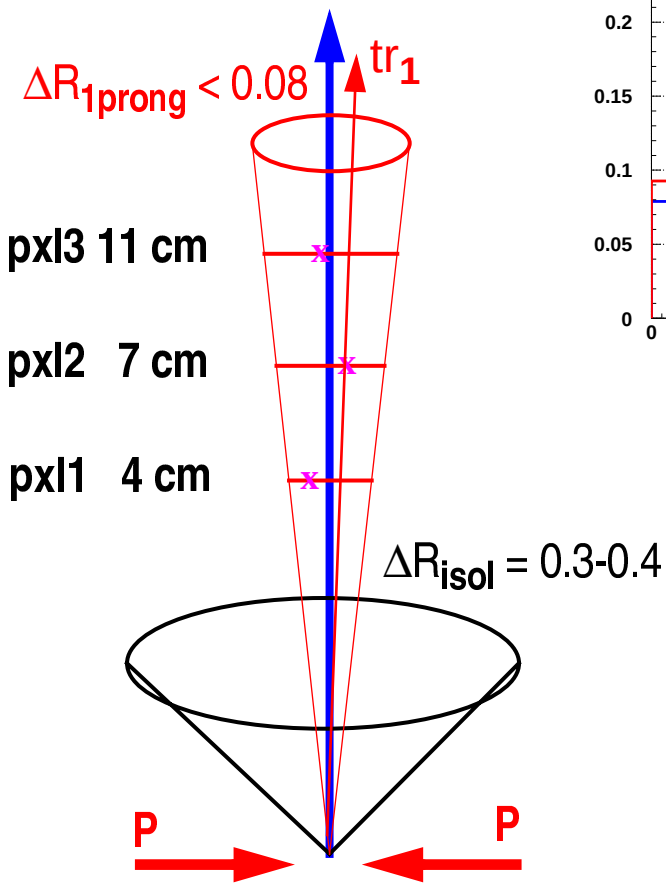
cms120 hits:	qcd bkg.	gg->bbH, H->2τ	gg->H, H->2τ
	USA	Moscow	Helsinki

ooHits, calo + muon ORCA digitization

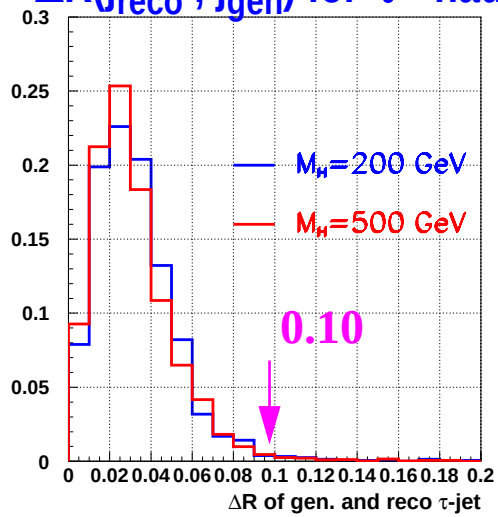
tracker digitization for events selected by L1/L2 Tau calo trigger

τ jet selection at Lvl-3

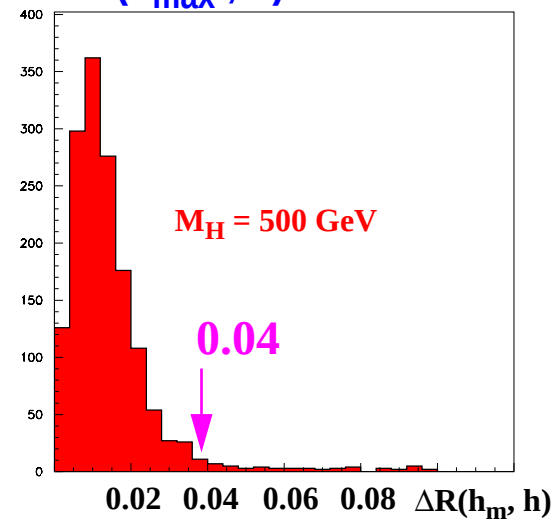
Jet direction given by L2.0 Tau object



$\Delta R(j_{reco}, j_{gen})$ for τ->hadr



$\Delta R(h_{max}, h)$ for τ->hadr



- find track (tr_1) with the best matching with Lvl-2 Tau jet
  $\Delta R(tr_1 - jet) < R_1$ (~0.10); $p_t^{tr1} > p_t^{cut\ 1}$ (~5 GeV)
- at least one track in the inner cone
  $\Delta R(tr_1 - tr_i) < R_2$ (~0.04); $p_t^{tr\ i} > p_t^{cut\ 2}$ (~1 GeV)
- no tracks in the outer cone
  $R_2 < \Delta R(tr_1 - tr_i) < R_3$ (~0.3); $p_t^{tr\ i} > p_t^{cut\ 2}$ (~1 GeV)

First results from first cms120 “Tau dataset” in jet/met DB

first available sample from cms120 production:

gg->bbH, H->2τ->2j, M_H=500 GeV, L=$10^{33}cm^{-2}s^{-1}$

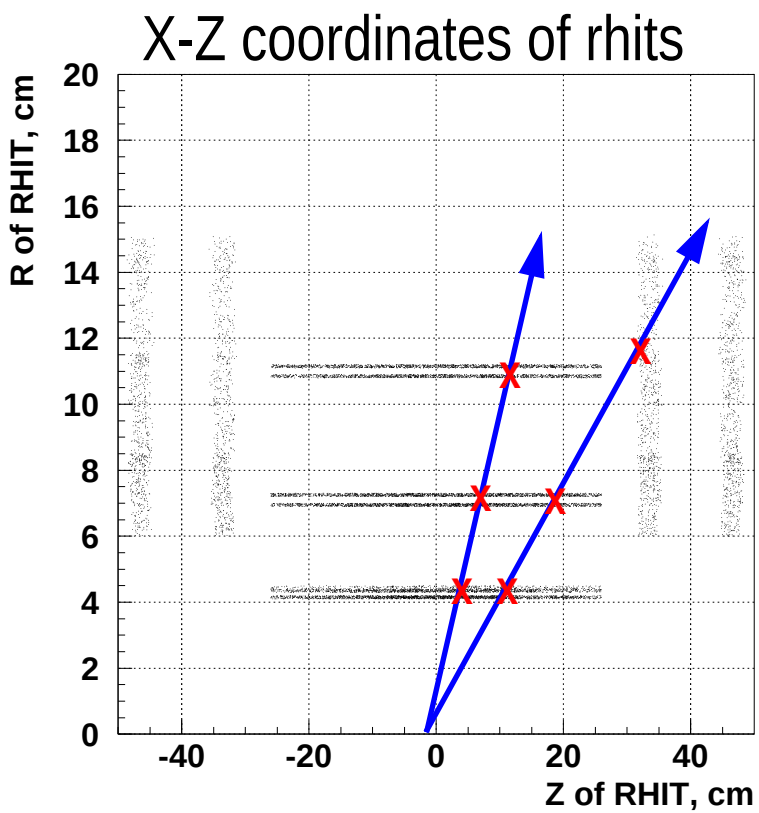
- **we merge calo code with pixel code in orca_4_4_0 to analyse these events**
- **we digitize tracker for events passed Lvl-1, Lvl-2 Tau trigger**

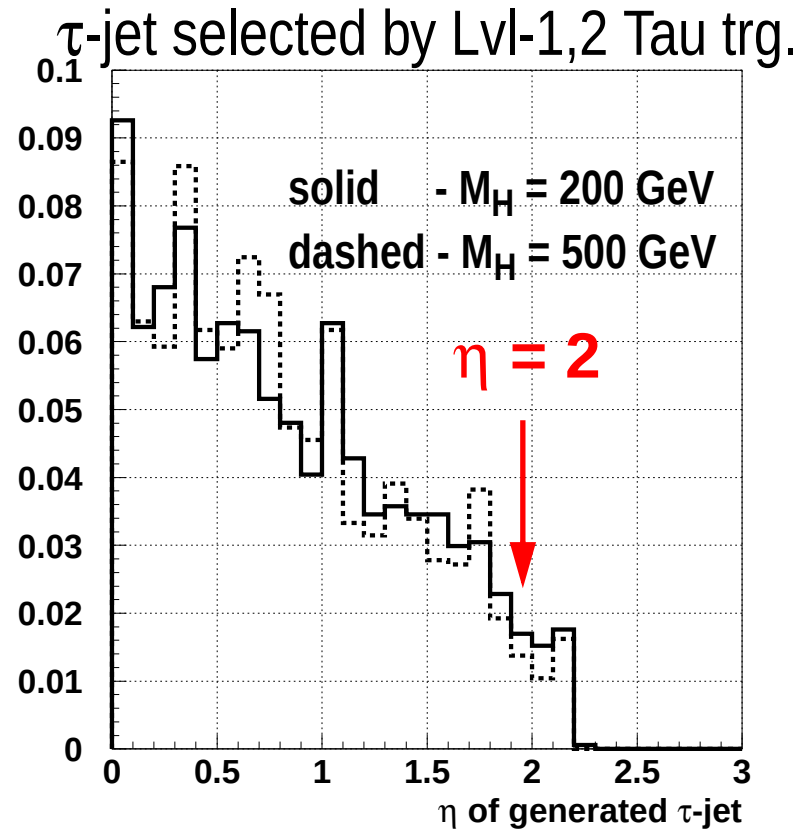
  (~ 2000 ev in DB, TkDigi size ~ 1 MB/ev)
- **we use this sample to debug our code and get first estimates waiting for QCD samples**

η coverage

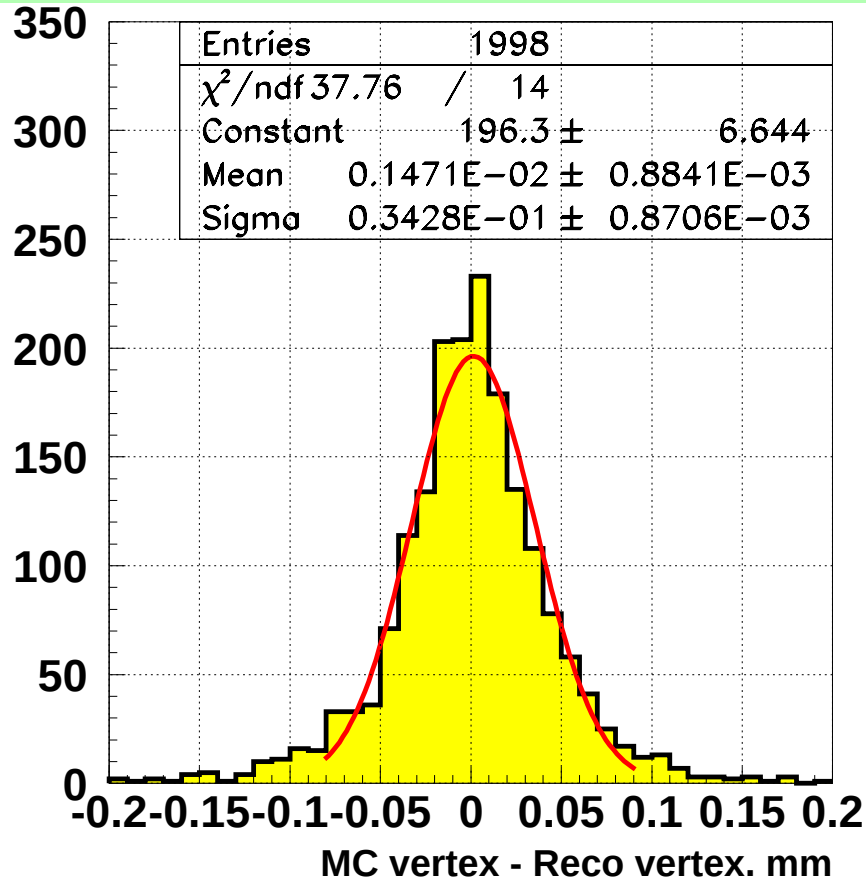
present pixel track finder works up to |η| < 2

2 hits have to be in the barrel,
the 3-rd hit can be in the barrel or 1-st disk





vertex resolution with pixels is ~ 35 μm

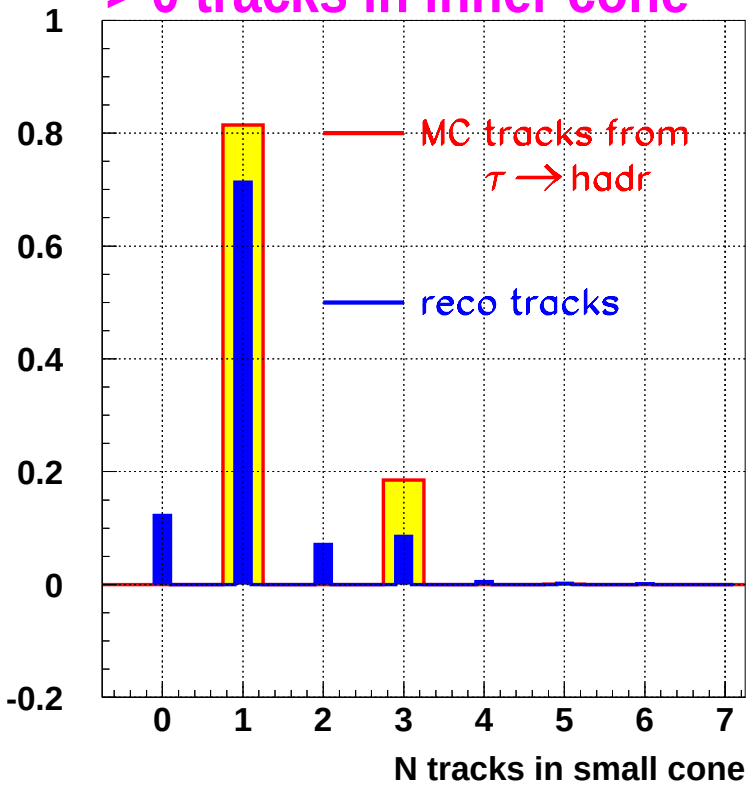


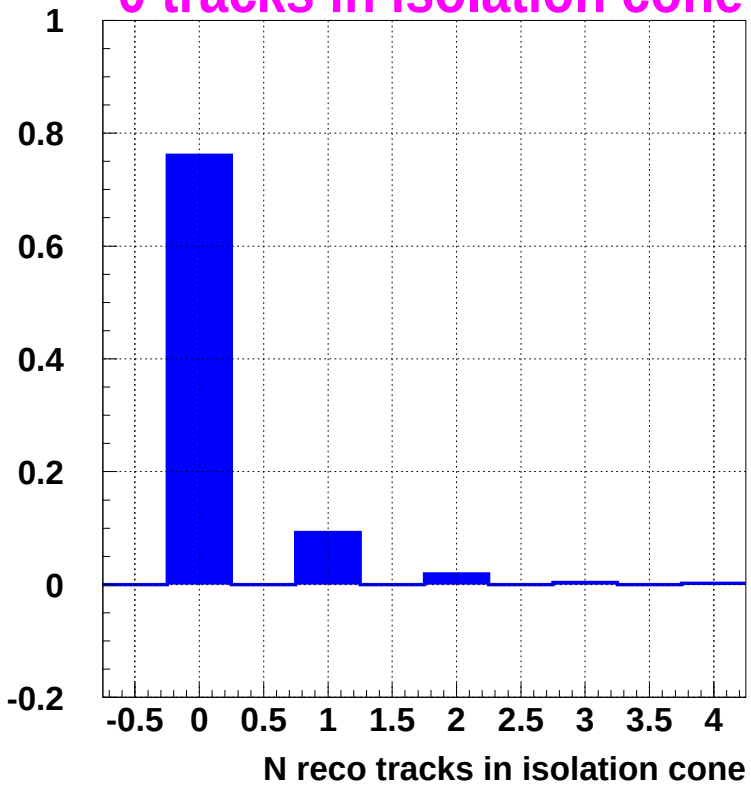
for "τ" events track with the best track-jet matching defines a "signal" vertex

Tau selection efficiency

Lvl-3 τ jet selections with Pixel Detector :

> 0 tracks in inner cone & 0 tracks in isolation cone





Agorithm parameters have to be optimized with Bkg.sample. For set:

R_1=0.1, R_2=0.04, R_3=0.3, $p_t^{cut\ 1}$= 5 GeV, $p_t^{cut\ 2}$ = 1 GeV ε = 76 %

~12 % events didn't pass 1 criteria : > 0 tracks in inner cone

why no tracks found in the inner cone

possible sourses of inefficiency	
no good track-jet match: $\Delta R > R_1$ (0.10)	~ 1.0 %
limited coverage for track finder $\|\eta\| < 2$	~ 2.5%
Lvl-1, Lvl-2 Tau jet is not τ	~ 1.3 %
internal pixel detector inefficiency	~ 2.0 % / layer
inelastic interactions	to be checked
p_t^{reco} leading track < p_t^{cut} (5 GeV)	to be checked

we may reach higher τ selection efficency (~90%), but we need to estimate what will happen with qcd background rate

now, we want to put more "analysis" tool in our code to be ready to understand possible "surprises" from the coming signal and bkg. files at high luminosity and optimise efficiency v.s. rejection factor