h_c analysis status

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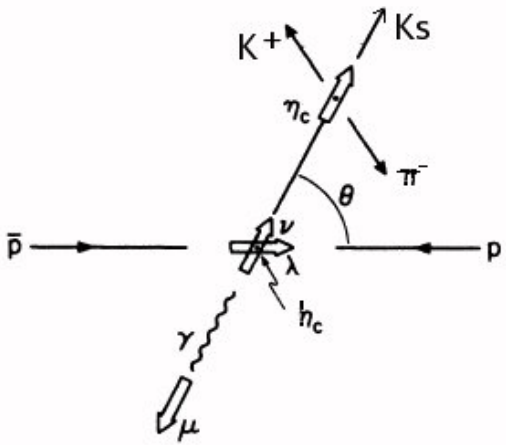
Description of the studied channel



$$p\bar{p} \to h_c \to \eta_c + \gamma \to K_s K^{\pm}\pi^{\mp}\gamma,$$

E_γ=503 MeV

$$\eta_c \to K^0_S K^{\pm}\pi^{\mp},\ BR = 1.9 \cdot 10^{-2}$$

E_{CM}=3526 MeV, p_z=5609 MeV

$$\sigma_{p\bar{p}\to h_c \to \eta_c + \gamma} = 40nb\ (E835)$$

Background

$$p\bar{p} \to K_s K^{\pm}\pi^{\mp}\pi^0$$

$\sigma_=$ 100 μb

Event selection

- 20 k events
  $p\bar{p} \to h_c \to \eta_c + \gamma, \eta_c \to K_s K^{\pm}\pi^{\mp} \quad (E_{CM} = 3526 MeV)$
- background
  100 k events $p\bar{p} \to K_s K^{\pm}\pi^{\mp}\pi^0$

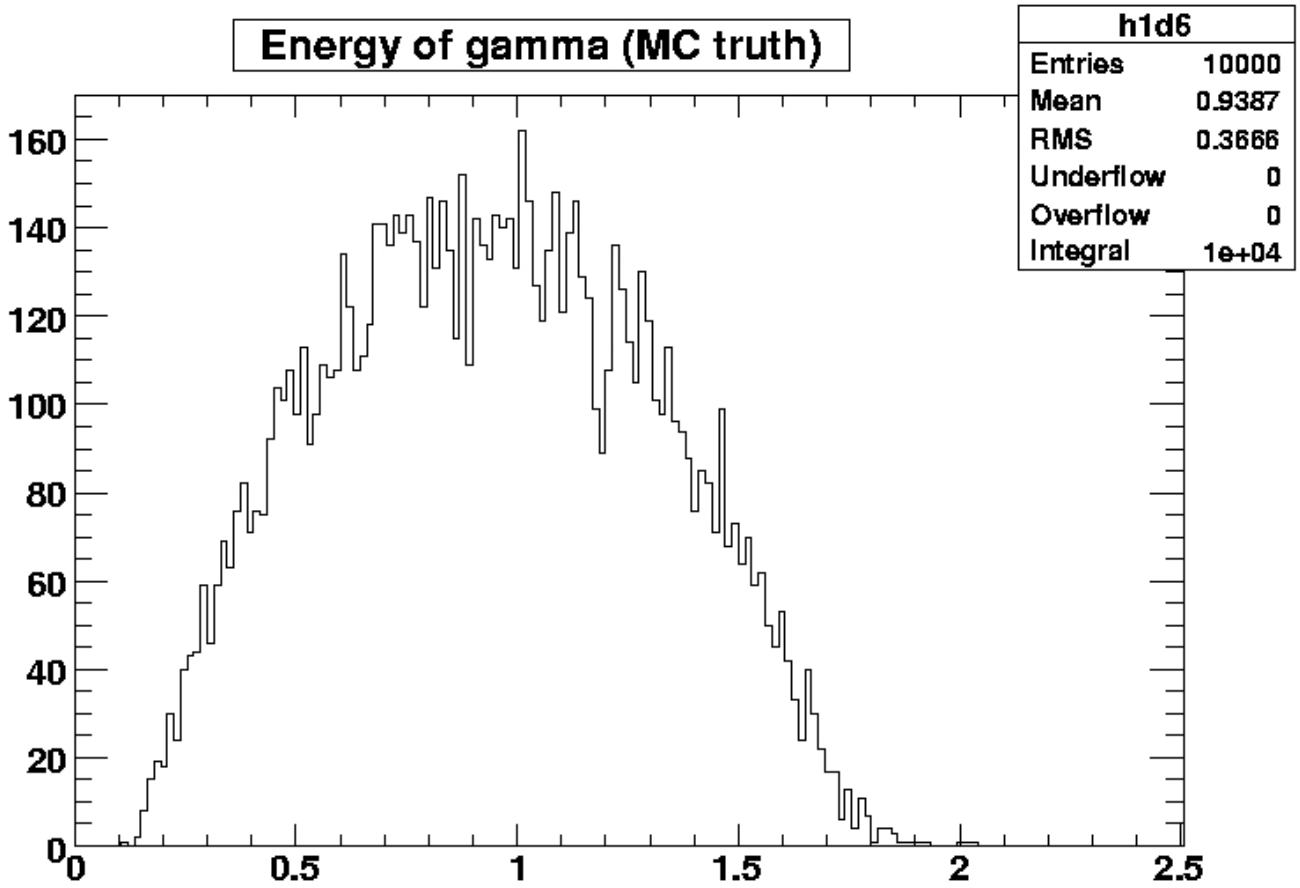
Selection cuts:

- 4C-fit to beam energy and momentum + additional constraint on K_s mass, CL> 0.1%
- η_c pre-fit selection [2.6:3.2] GeV
- η_c post-fit selection [2.9:3.1] GeV
- K_s common vertex constraint, with pre-fit mass selection [0.3:0.8] GeV
- using PID information for K/π separation.
- E_γ within [0.4:0.6] GeV
- No π^0 candidate

Direction for improvement

- Beter selection of γ candidate. (Hadronic split-off suppression)
- Influence of different PID options
- Refine cut on no π^0 candidate

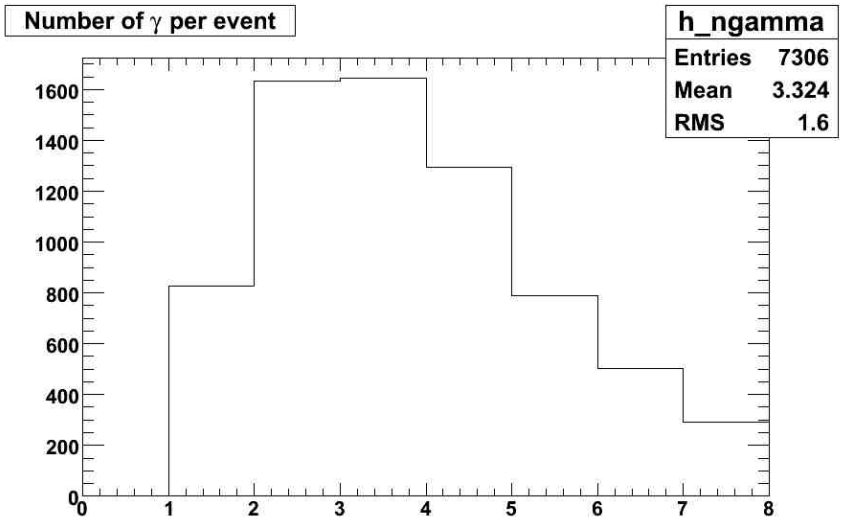
E_γ in laboratory system (MC truth)



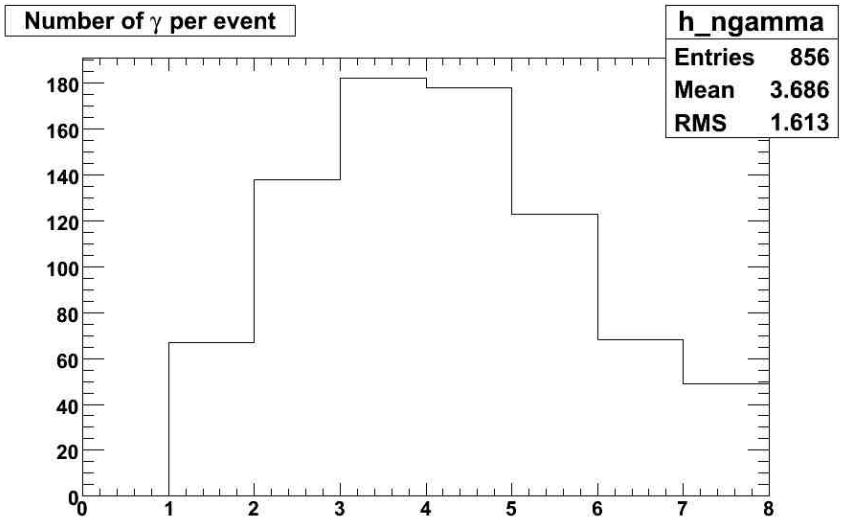
Additional cut: 0.15 GeV < E_γ < 2 GeV.

Multiplicity of γ

Signal



Background



Hadronic split-off suppression effect

Use BetaPid V01-02-01.

	signal	background	Ratio
Without	4600 (23.0%)	122 (0.12%)	1:687
With	4438 (22.2%)	118 (0.12%)	1:699

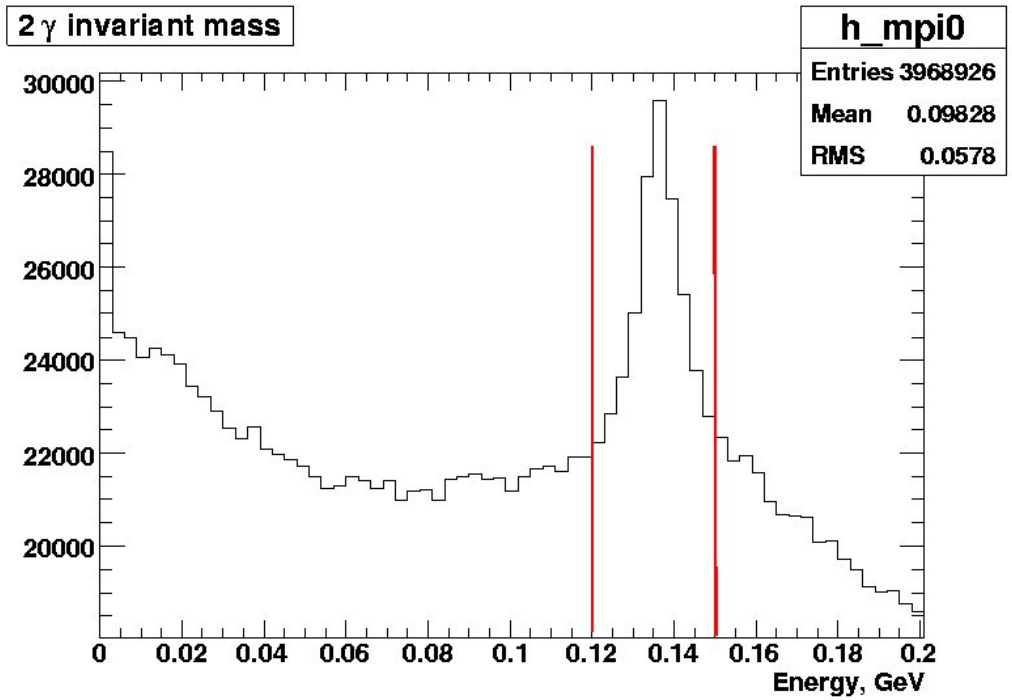
PID options

- Pion-,KaonCombinedLHVeryLoose
- Pion-,KaonCombinedLHLoose
- Pion-,KaonCombinedLHTight

	signal	background	Ratio
VeryLoose	4438 (22.2%)	118 (0.12%)	1:699
Loose	1793 (8.96%)	57 (0.057%)	1:837
Tight	1288 (6.44%)	37 (0.037%)	1:756

No π^0 criteria

nPi0 is used from the correspondent event tag.
It corresponds to pi0VeryLoose - wide mass window [0.115 - 0.15] GeV.



How to pass custome π^0 list [0.12 - 0.145] GeV to ntuple?

Summary and open questions

- With aplied cuts background supression is not sufficient, signal/background ratio = 1 : 700.
- Improvement in cut on no π^0 candidate?
- What is the cut level on 5C-fit probablility? (To maximize signal/background ratio?)