TDCPV skim challenge report

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Status

Skims usage in TDCPV

Pub#	Measurement	Used skims
16	B->D*π mixing frequency	❌
20	CPV in B->φKs	✅
21	CPV in B->π⁰Ks	❌
23	CPV in B->KsKsKs	❌
34	CPV in B->J/ψKs	❌
35	CPV in B->η'Ks	❌
36	CPV in B->Ksπ0γ	?
59	CPV in B->J/ψπ0	❌
69	CPV in B->ρ+ρ-	❌

Available skims for TDCPV

Physics channels: bd → ccs

Decay Channels:

- `B0 -> J/psi (ee/mm) K_S0`
- `B0 -> psi(2s) (ee/mm) K_S0`
- `B0 -> J/psi (ee/mm) K* (K+ pi- / K_S0 pi0)`
- `B+ -> J/psi (ee/mm) K+`
- `B0 -> J/psi (ee/mm) KL`
- `B0 -> J/psi (ee/mm) eta (pi+ pi- pi0 / pi+ pi-)`
- `B0 -> J/psi (ee/mm) pi0`
- `B0 -> J/psi (ee/mm) K+ pi-`
- `B+ -> J/psi (ee/mm) K*+ (pi+ K_S0 / K+ pi0)`

[tdcpv_ccs](#)

Physics channels: bd/u → qqs

Decay Channels:

- `B0 -> phi K_S0`
- `B0 -> phi K_L0`
- `B0 -> eta K_S0`
- `B0 -> eta' K_S0`
- `B0 -> eta K*`
- `B0 -> eta' K*`
- `B0 -> K_S0 K_S0 K_S0`
- `B0 -> pi0 K_S0`
- `B0 -> rho0 K_S0`
- `B0 -> omega  K_S0`
- `B0 -> f_0 K_S0`
- `B0 -> pi0 pi0 K_S0`
- `B0 -> phi K_S0 pi0`
- `B0 -> pi+ pi- K_S0`
- `B0 -> pi+ pi- K_S0 gamma`
- `B0 -> pi0  K_S0 gamma`
- `B+ -> eta' K+`
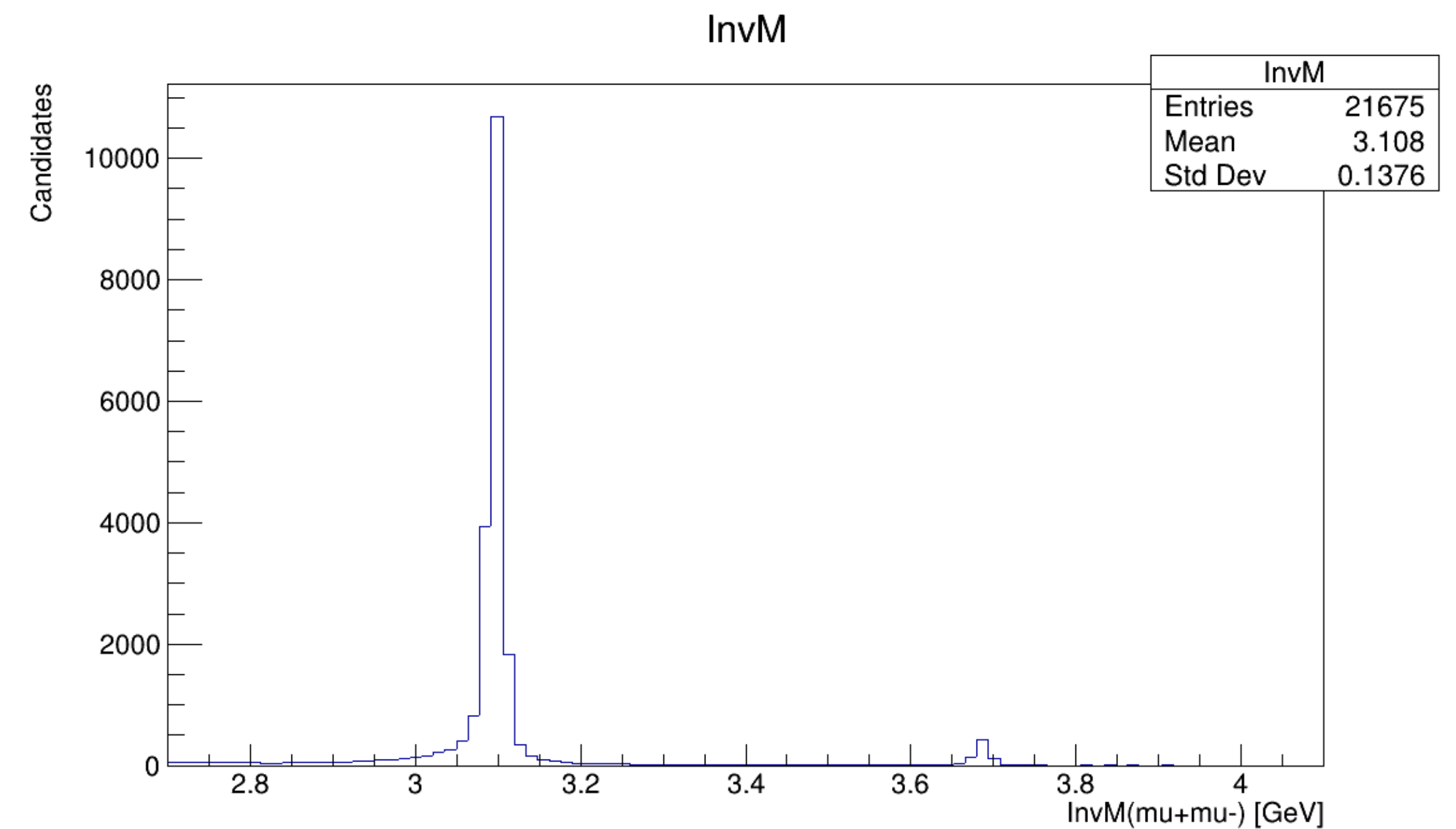- `B+ -> phi K+`
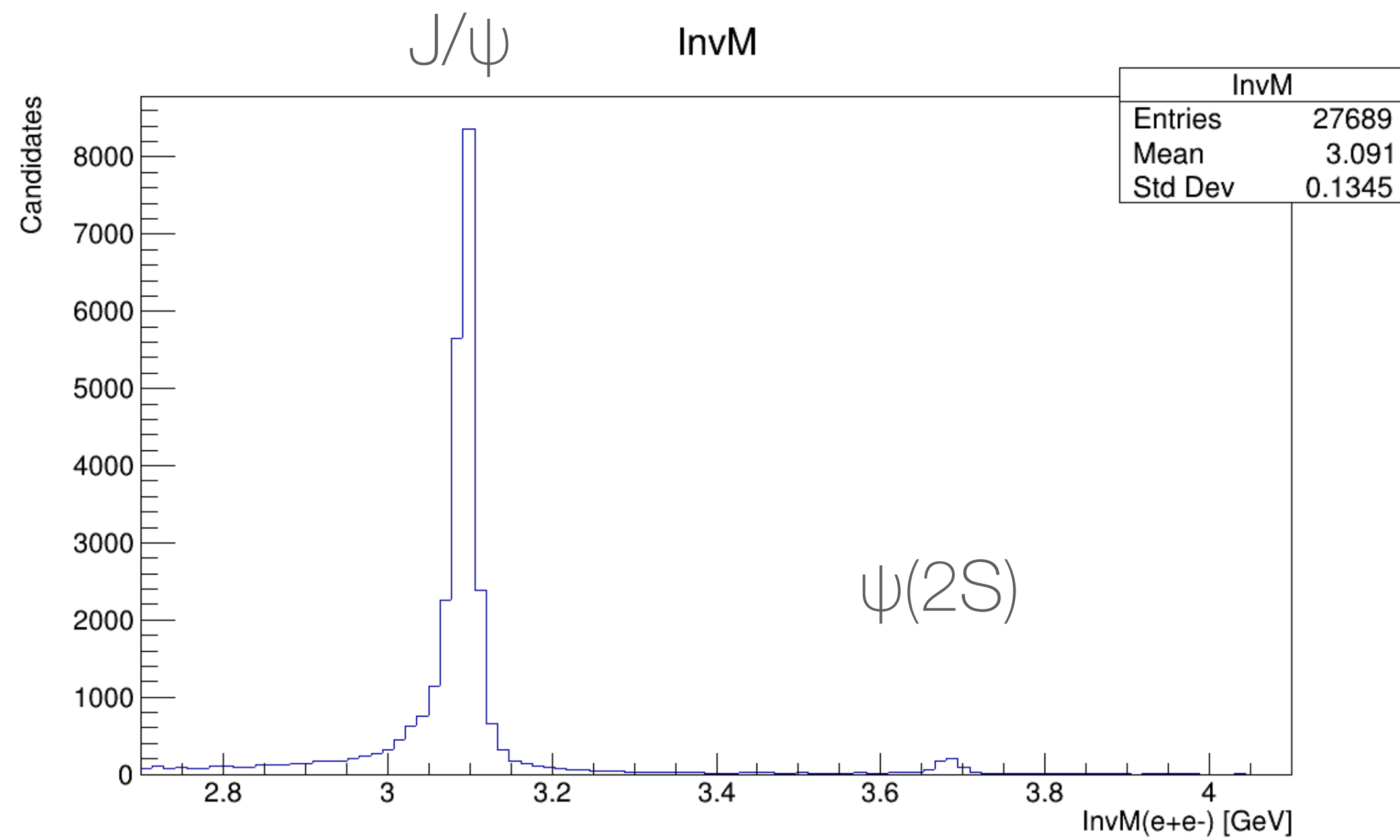- `B+ -> pi+ pi- K+ gamma`

[tdcpv_qqs](#)

Activities

- Unify skims used for flavor tagger calibration -> flagged skims

- Replace ccs skim (exclusive decay modes with J/psi) -> inclusive J/psi skim

- Add KLong skim for ϕK_L and $\eta' K_L$

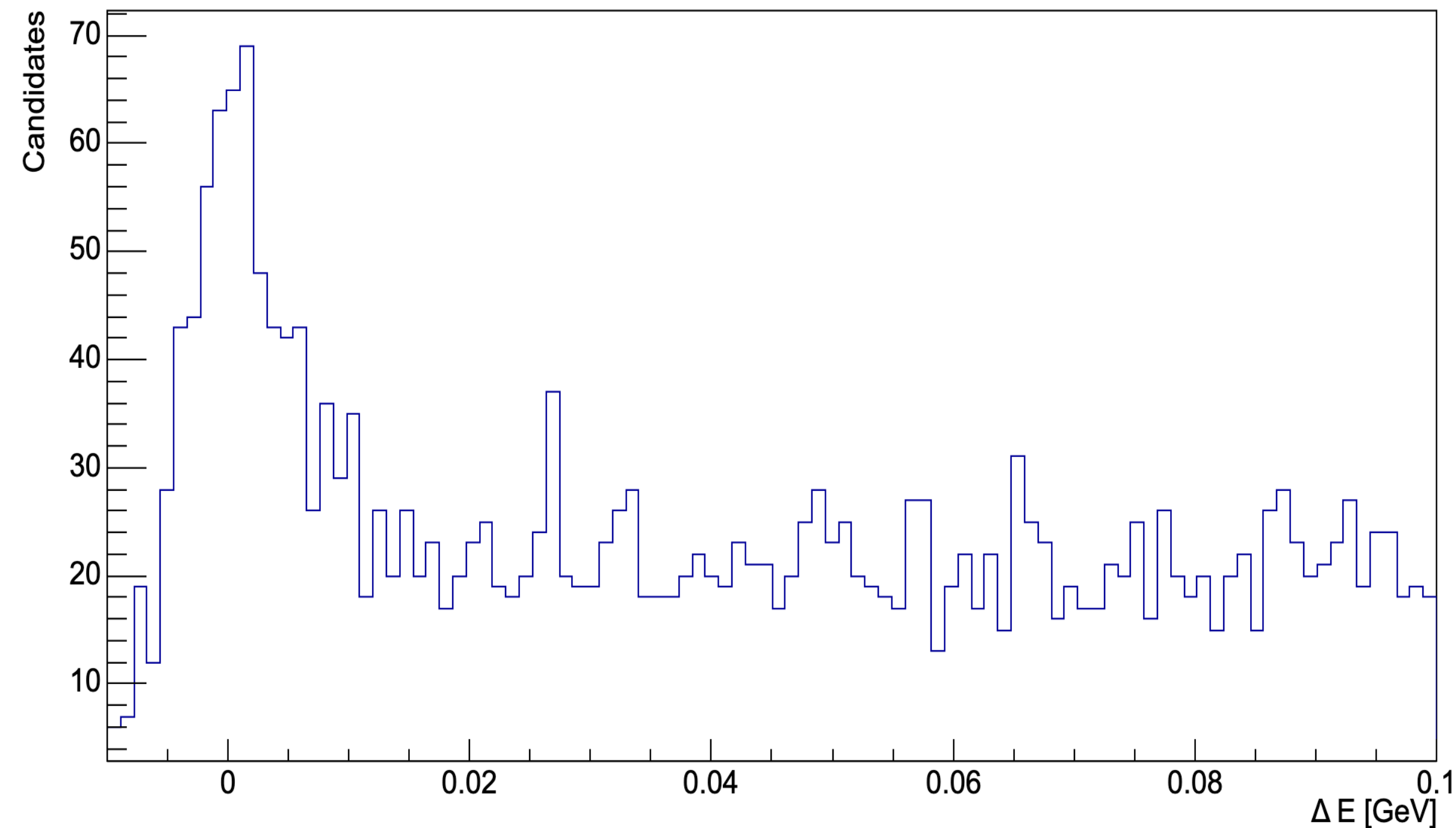- Check efficiencies for modes with pi0 and gamma in qqs skim

Inclusive J/ψ skim

!3769

- All B0->[J/psi,Y(2S)]X decays, including KS->pi0pi0 and KL0

- Higher signal efficiency than previous ccs skim

- Could also be used for B0->J/psiX dalitz analyses

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KL skim !3774

- Added only B->φKL and B->η'[->η(ɣɣ)π+π-]KL modes for now

- Retention rate << 10%

- Working on B->η'[->ρɣ]KL and B->η'[->η(π+π-π0)π+π-]KL

TDCPV_qqs skim test on $B_d \rightarrow K_s\pi^0$

- Replaced pi0:Skim list with **pi0:charmlessfit** $\longrightarrow$

- Further checks on pi0:charmlessfit:
    - **foxWolframR2 < 0.6**

- **gamma:all list**
- **Photon Energy:**
    - <u>**Barrel and EndCap: > 20 MeV**</u>
    - <u>**Fwd: > 22.5 MeV**</u>
- **105 < M < 150 MeV/c^2**

Signal MC retention rate without any skim: **32.05%**

Signal MC Retention

Skim	udst retention rate on MC	Steering file retention rate on udst
TDCPV_qqs skim	53.42%	30.80%
TDCPV_qqs skim with pi0:charmlessfit	57.31%	34.16%
TDCPV_qqs skim with pi0:charmlessfit + foxWolframR2 cut	53.75%	32.21%

Combined MC BGx1 Retention

Skim	Combined MC BGx1 Retention
TDCPV_qqs skim	6.37%
TDCPV_qqs skim with pi0:charmlessfit	9.92%
TDCPV_qqs skim with pi0:charmlessfit + foxWolframR2 cut	7.57%

Similar results in data as well!

BtoXgamma skim in TDCPV analysis

A. Biswas

Reconstructed decay modes:

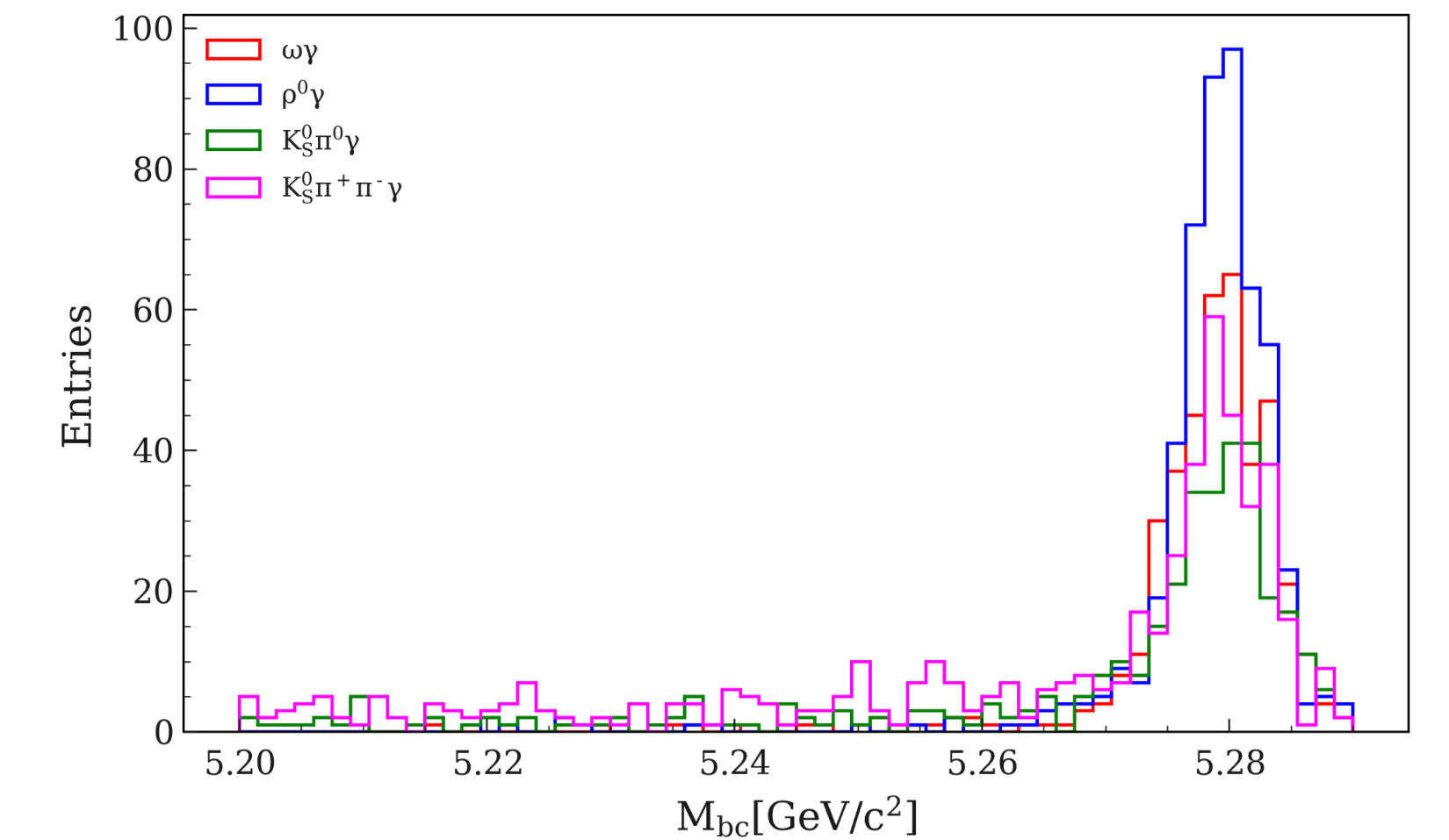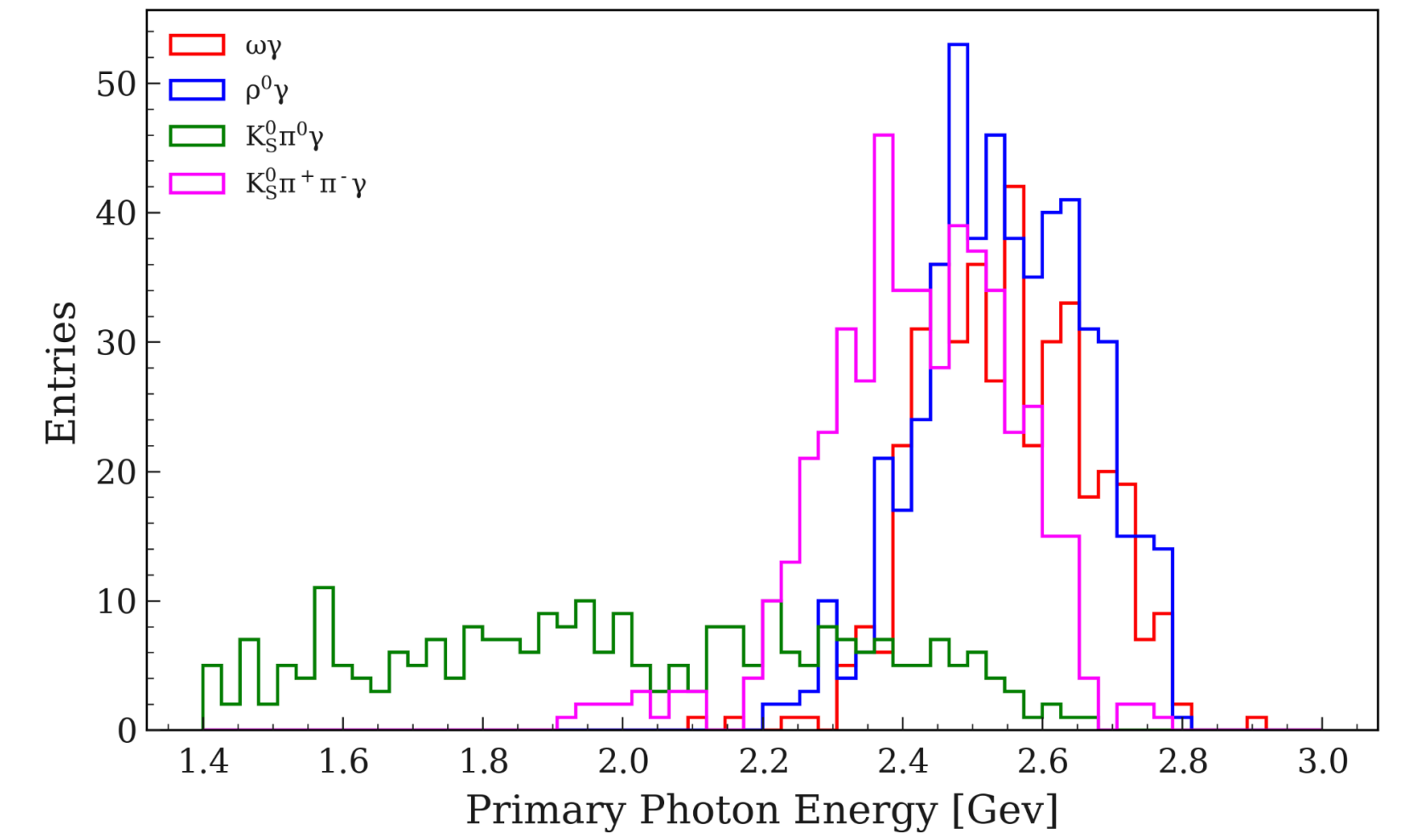$B^0 \to X\gamma$ radiative modes

- ■ $B^0 \to \omega\gamma$

- ■ $B^0 \to \rho^0\gamma$

- ■ $B^0 \to K_S^0\pi^0\gamma$

- ■ $B^0 \to K_S^0\pi^+\pi^-\gamma$

● 1000 signal MC Events generated using release_08_00_10

Decay Mode	Retention Rate with Skim	Reconstructed events without Skim	Reconstructed events with Skim
$B^0 \to \omega\gamma$	82.8%	41%	40.8%
$B^0 \to \rho^0\gamma$	82.9%	52.7%	52.2%
$B^0 \to K_S^0\pi^0\gamma$	69.1%	42.9%	34.6%
$B^0 \to K_S^0\pi^+\pi^-\gamma$	86.2%	49.9%	48.6%

TDCPV_qqs Skim →

Decay Mode	Retention Rate with Skim	Reconstructed events without Skim	Reconstructed events with Skim
$B^0 \to K_S^0\pi^0\gamma$	55.8%	42.9%	38.0%
$B^0 \to K_S^0\pi^+\pi^-\gamma$	67.2%	49.9%	48.6%

Conclusions

- Opened two MR for the tdcpv skims (!3769 and !3774)

- Compared retention rates between tdcpv, bhadronic and ewp skims for B->Ksπ0 and B->(Ksπ0,Ksππ,ρ,ω)ɣ

- Please use them for your analysis