Q-factors to separate $\varphi\pi$ from $K^+K^-\pi^0$ and $a_0\pi^0$ events

Data

Dataset:

- Spring 2018 data

Restrictions:

- Incident photon timed to be within central peak
- Only best Confidence Level (*CL*) per event kept
- *CL* must be above 10^{-4}
- Kaons must be seen in TOF
- Kaons must have momentum < 3 GeV
- Missing mass within 3 standard deviations of central peak
- 0.12 GeV < Mass[π^0] < 0.15 GeV
- K^* cuts : Mass[$K^+\pi^0$] < 0.81 GeV and Mass[$K^+\pi^0$] < 0.81 GeV

Distance between events

Frames and decays:

- *KK*-isobar π breakup is analyzed in the Gottfried-Jackson frame
- *KK*-isobar breakup is analyzed in the Helicity frame

Variables:

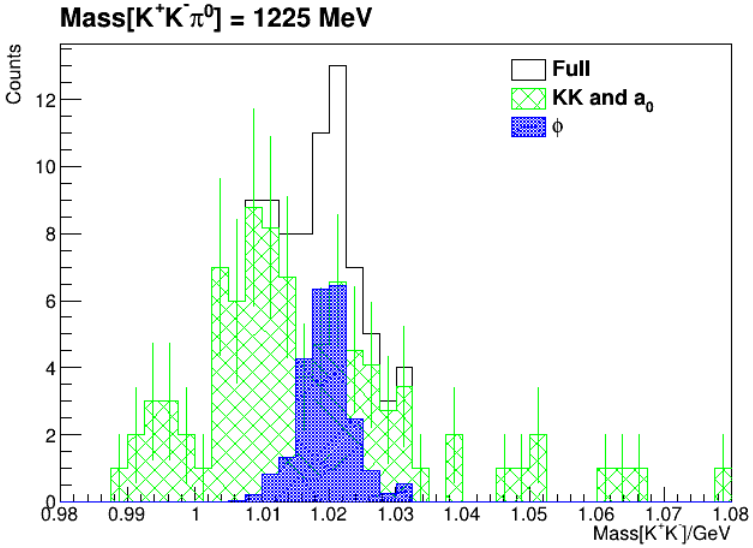
- $\cos(\theta_{GJ})$: polar angle in the Gottfried-Jackson frame
- φ_{GJ} : azimuthal angle in the Gottfried-Jackson frame
- $\cos(\theta_{H})$: polar angle in the Helicity frame
- φ_{H} : azimuthal angle in the Helicity frame

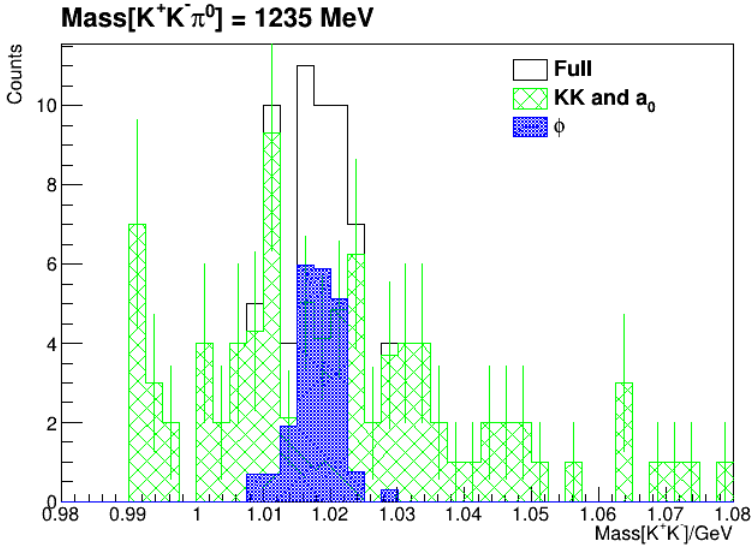
Distance between events = $\mathrm{sqrt}[\cos^2(\theta_{GJ}) + \varphi^2_{GJ} + \cos^2(\theta_{H}) + \varphi^2_{H}]$

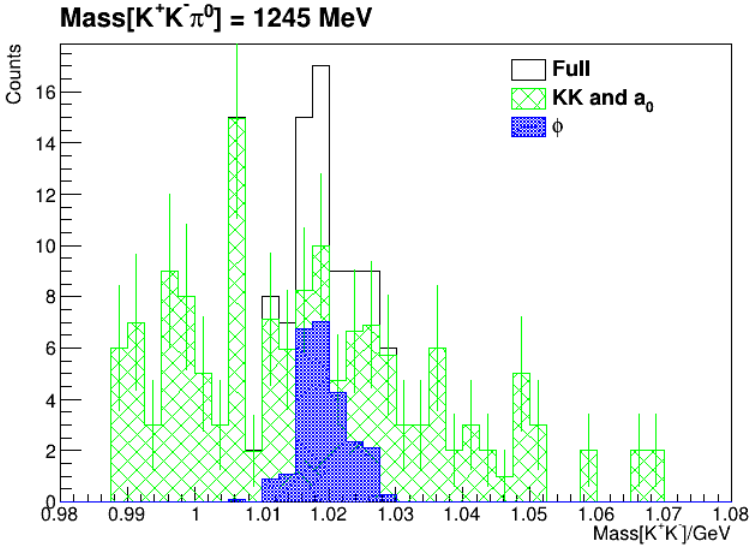
Q-factors

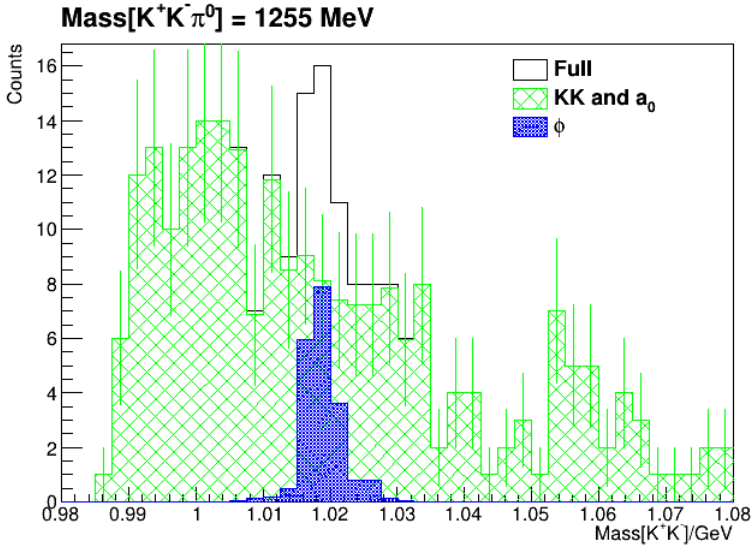
- Events are binned within files that have a bin width of $\Delta\text{Mass}[KK\pi] = 10$ MeV.
- For each event, I use the nearest 20 events within the same file to determine the Q-factor
- Log likelihood fit
- Binned fit (for now) : 1000 bins within $0.95 < \text{Mass}[KK] < 1.1$ GeV
- Signal is φ represented as gaussian (for now) with center allowed to vary +/- 1 MeV within PDG values and FWHM between 4.25 and 9.25 MeV.
- Background is represented by 1^{st} order polynomial.

Q-factors for each file









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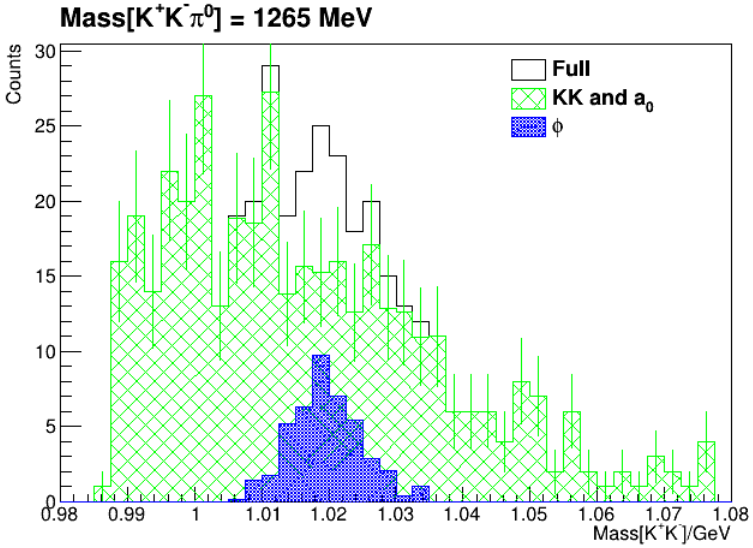

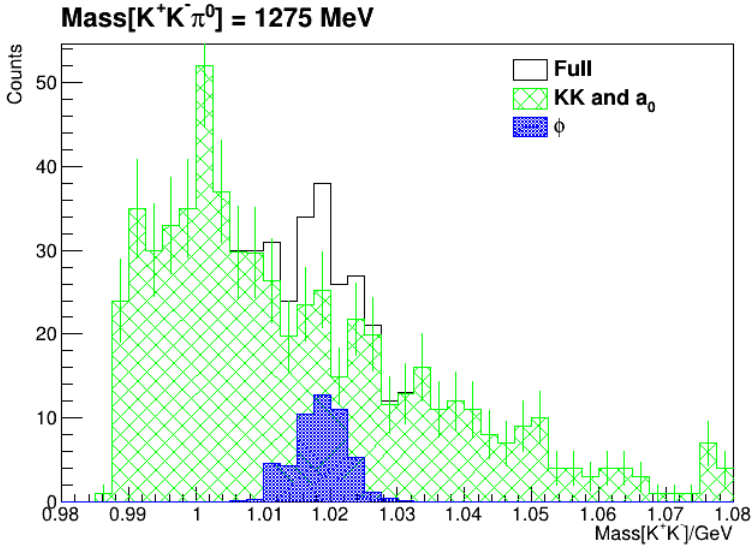

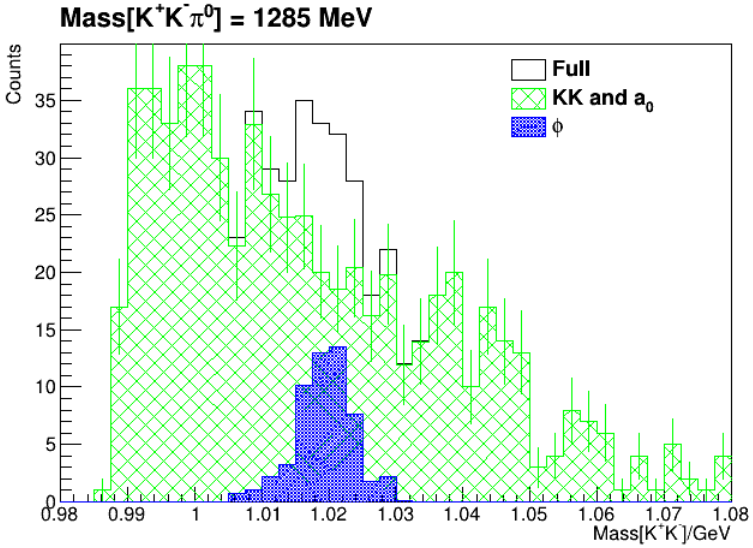

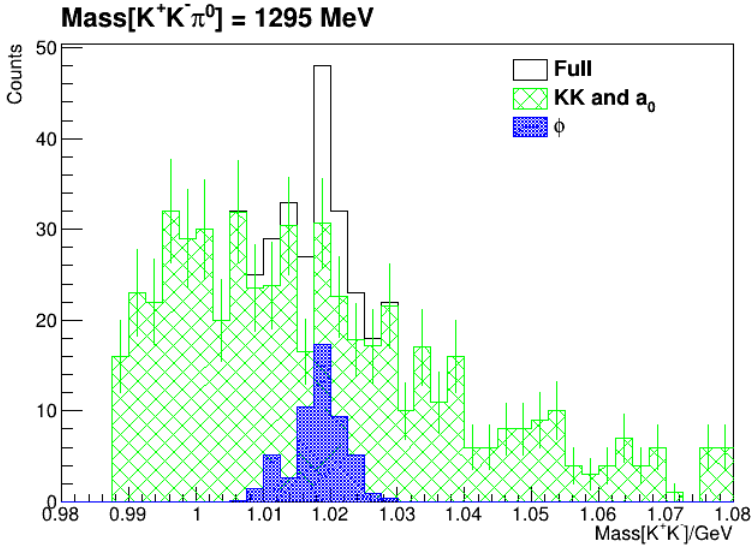

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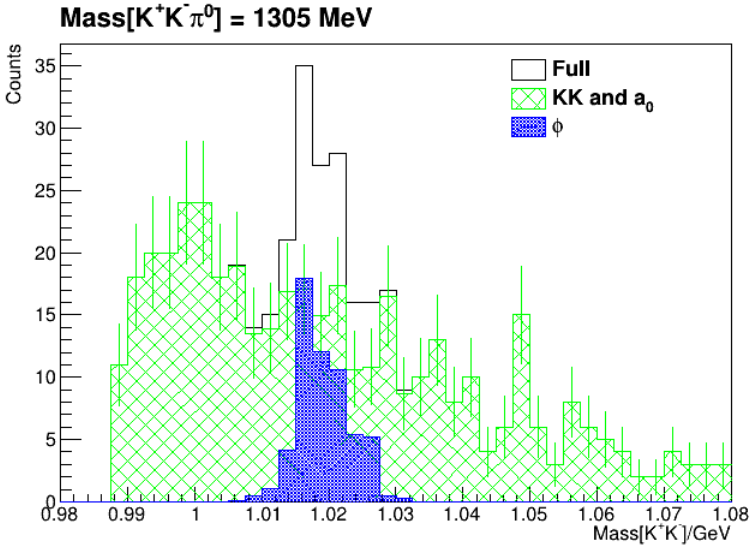

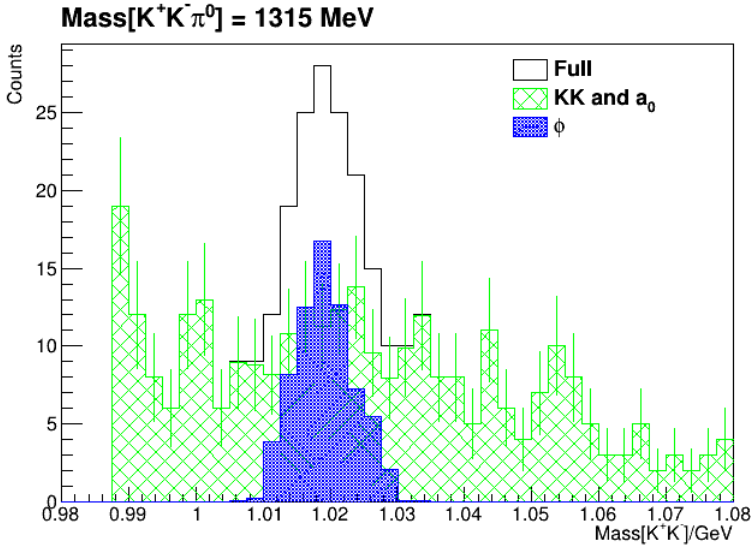

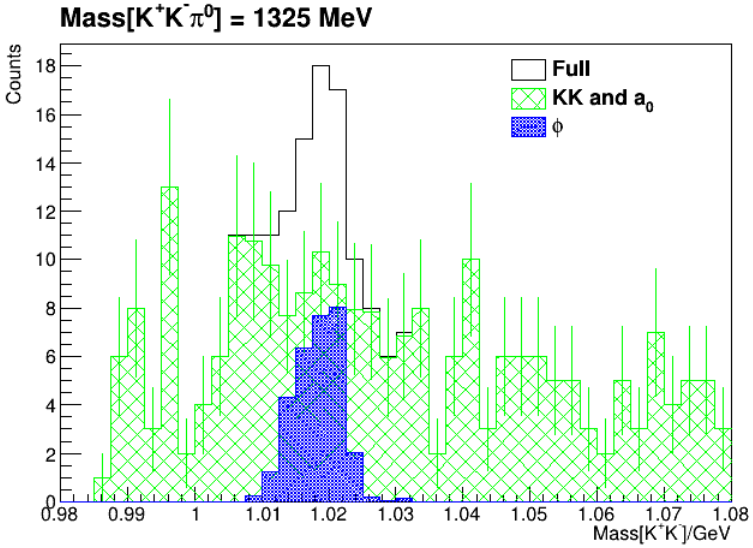

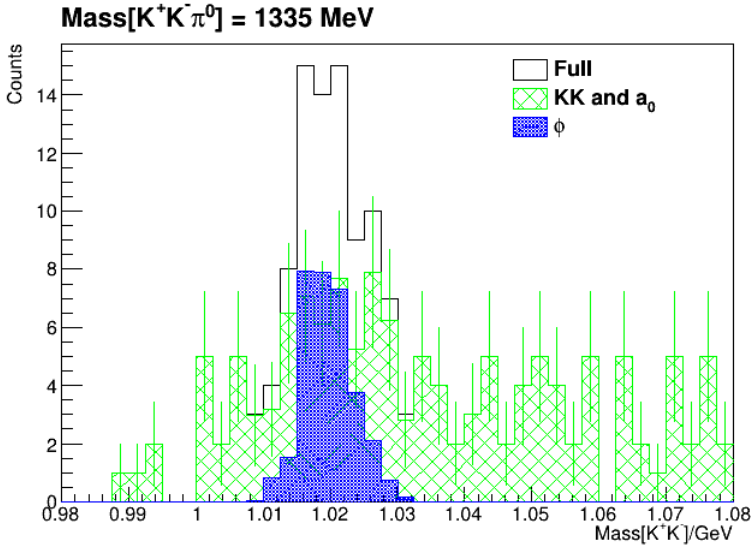

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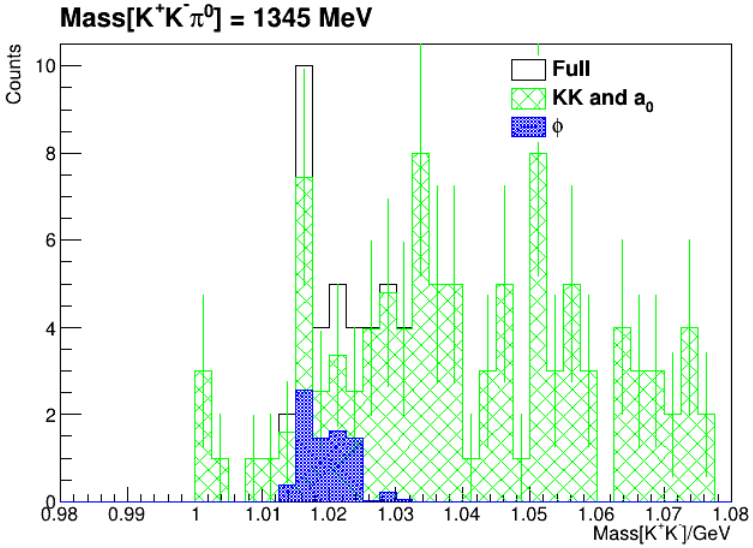
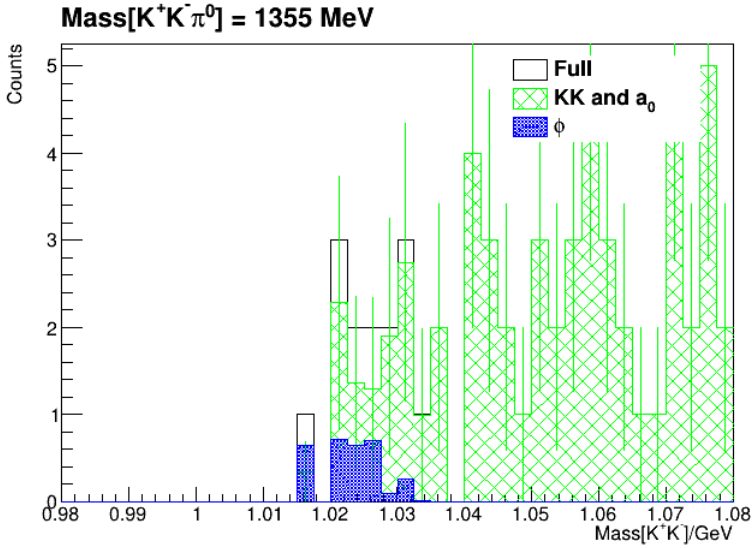
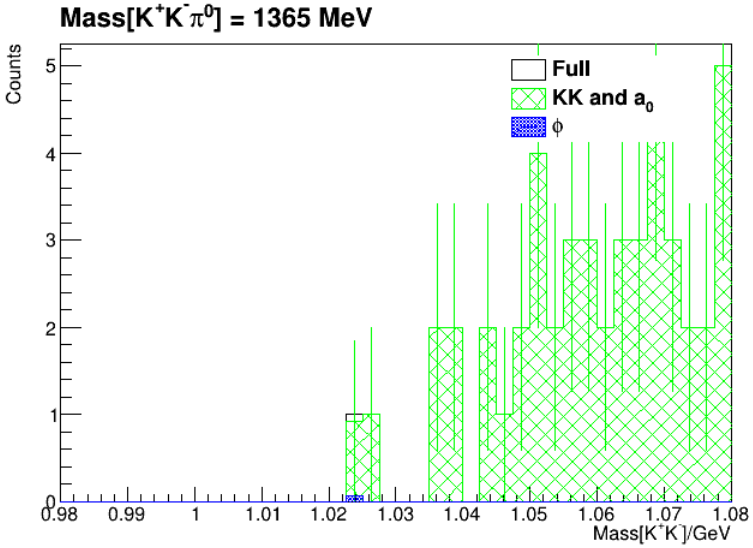
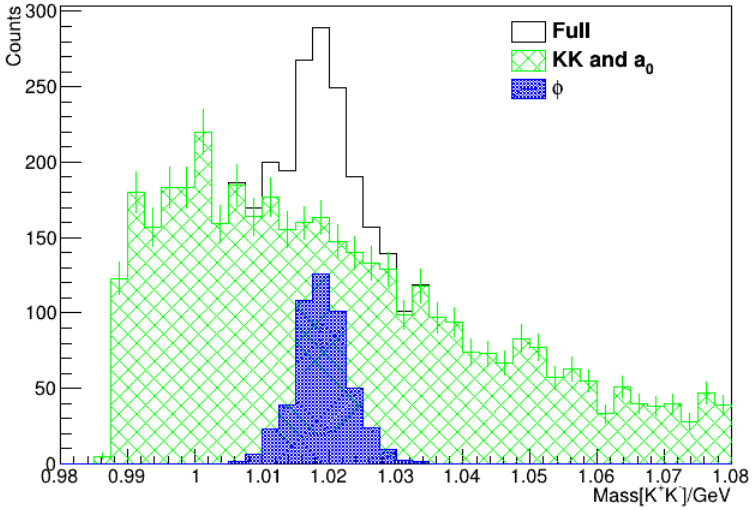






Q-factors for full $KK\pi$ mass range



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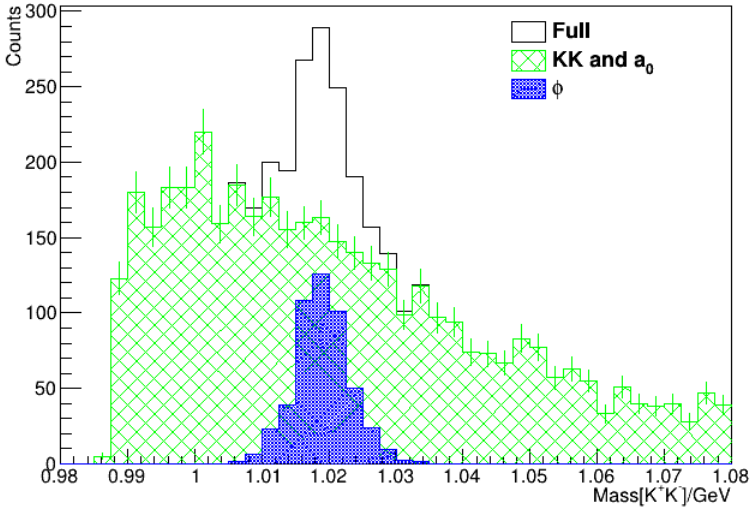

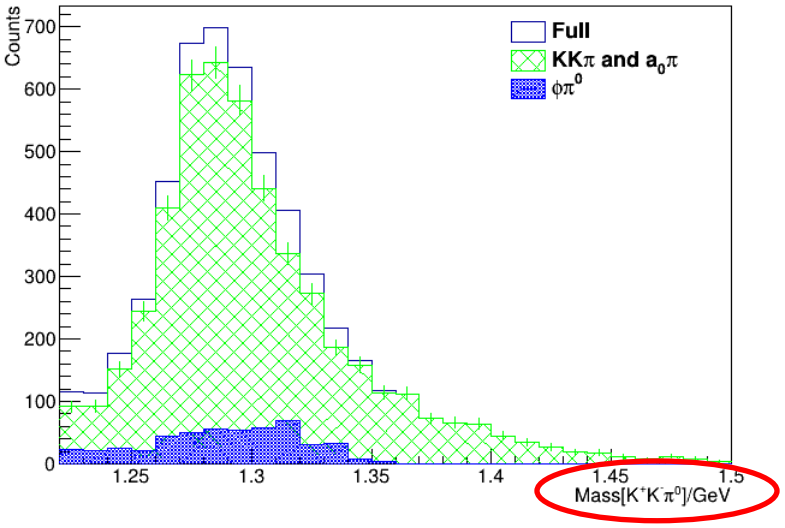

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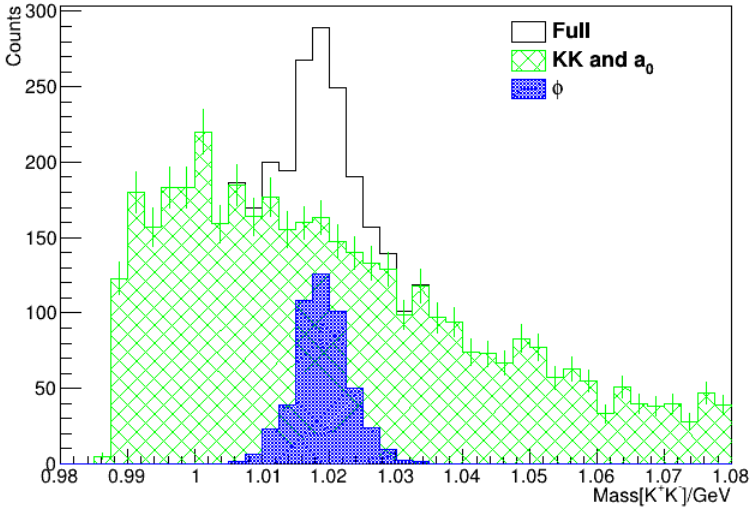

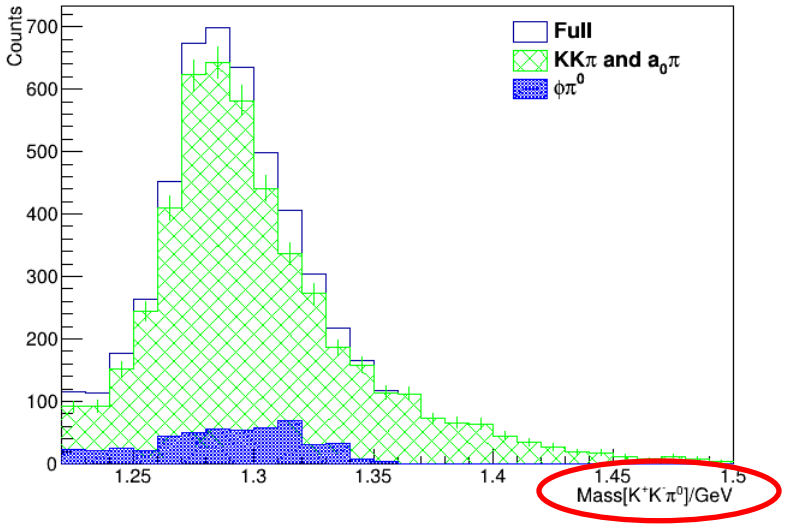

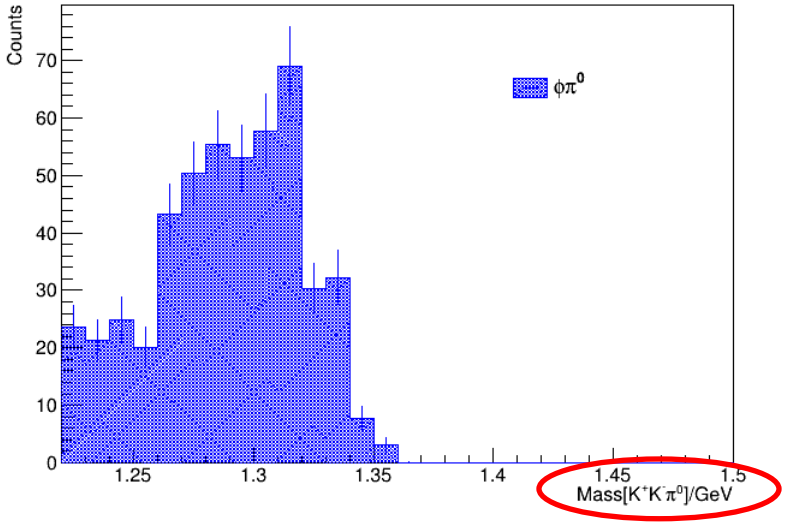

Title