D->K pi pi0 channel @ CEPC

D->K pi pi0 decay channel

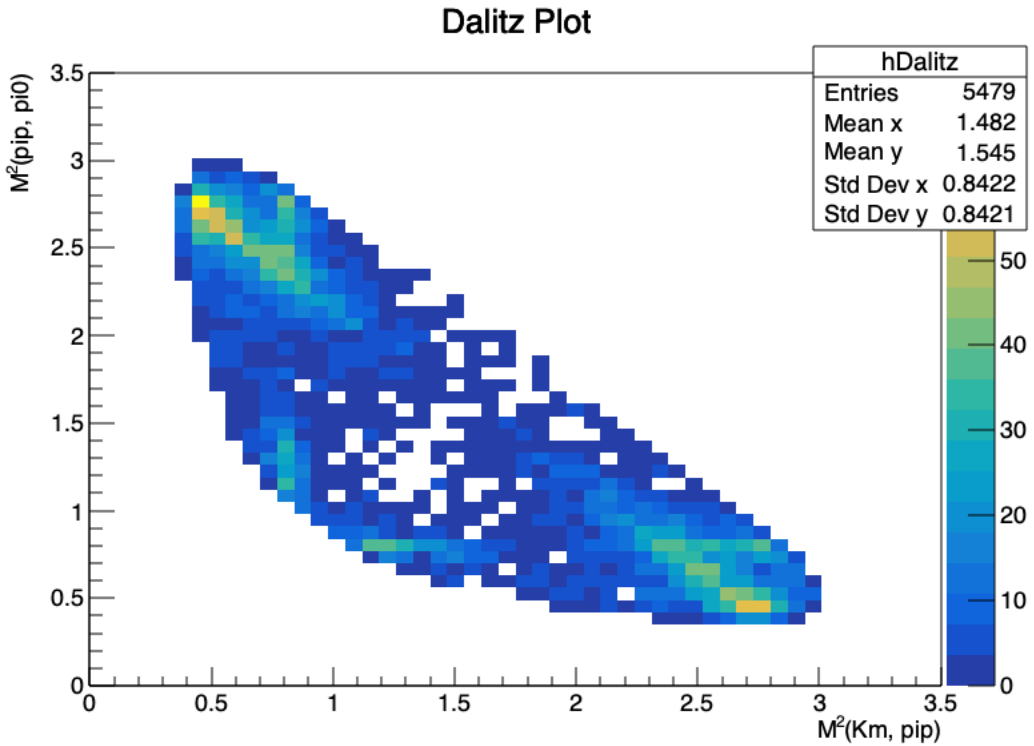
- Potentially has competitive yields compare to LHCb 300 fb^{-1}
- Reference channel for CPV searches at D->pi pi pi0

- Has K pi final states, sensitive to PID performance
- Has pi0 final state, sensitive to pi0 efficiency
- Can see clear resonance structures in Dalitz phase space

- Studied with samples produced by Kaili /cefs/higgs/zhangkl/Production/2412/E91_bb/Combined/rec_E91_qq_xxxx.root
- 40300 events in total
- 5479 reconstructed D->K pi pi0 decay events

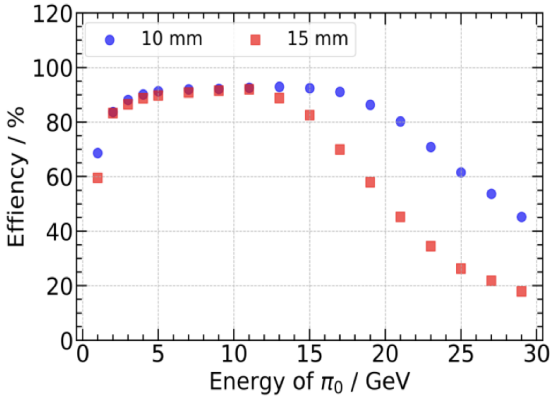
- Adding PID, pi0 efficiency, detector resolution effects step by step

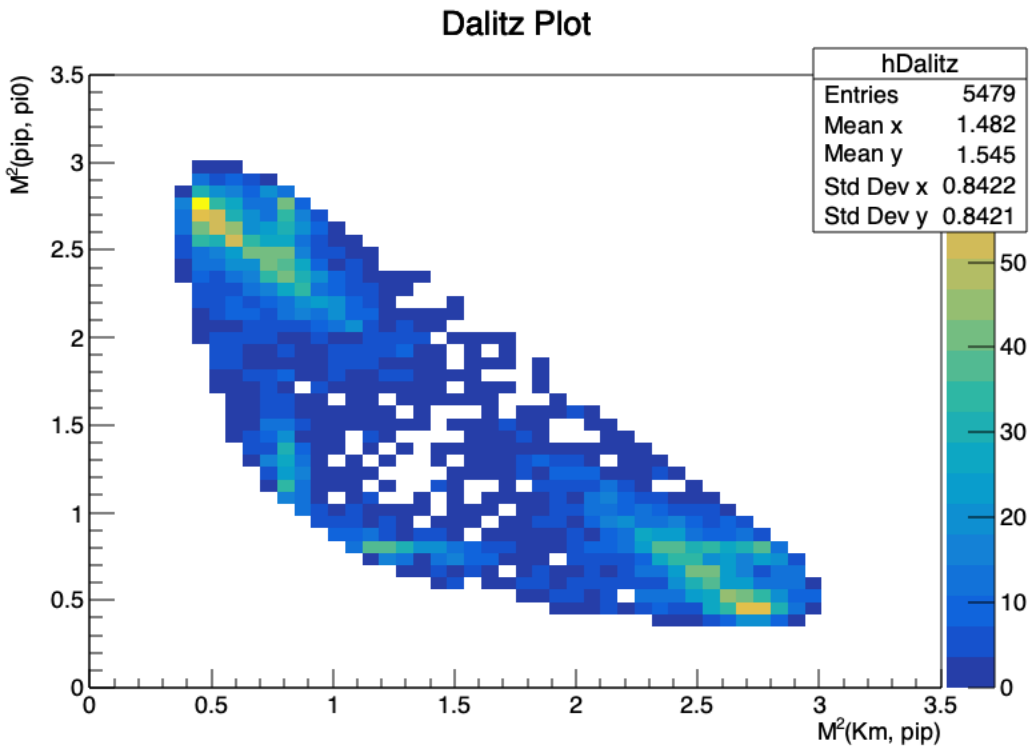
Generator level, perfect Pi0 eff, PID, *p* resol



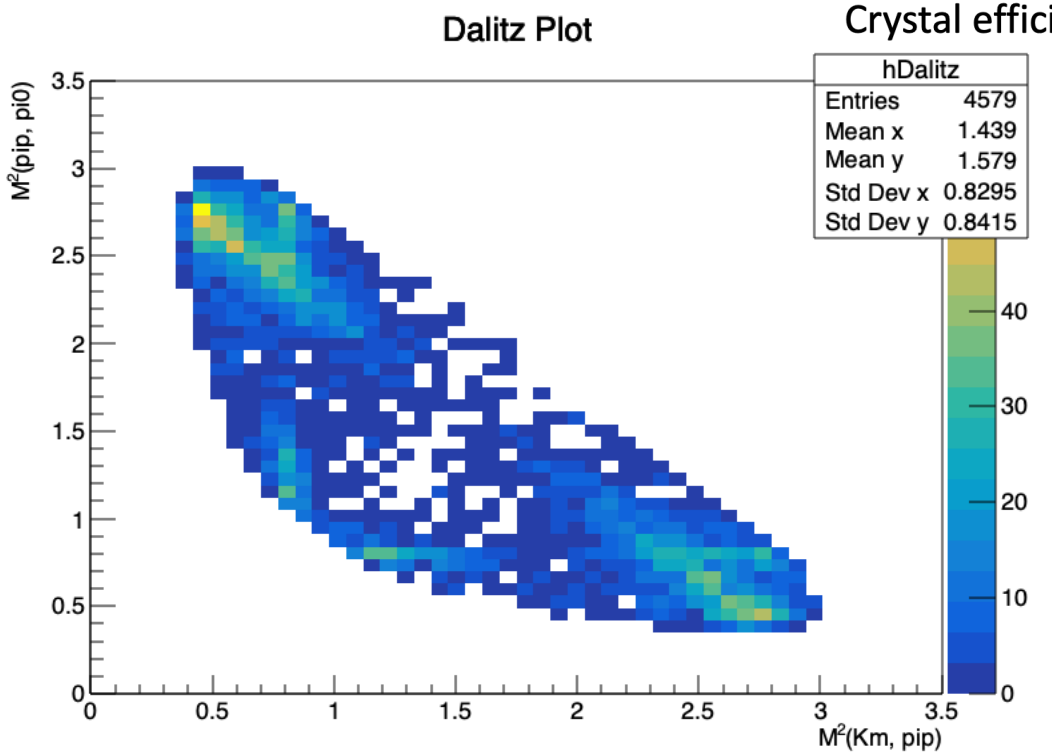
Resonance structure can be seen clearly

+Pi0 efficiency (10mm case)

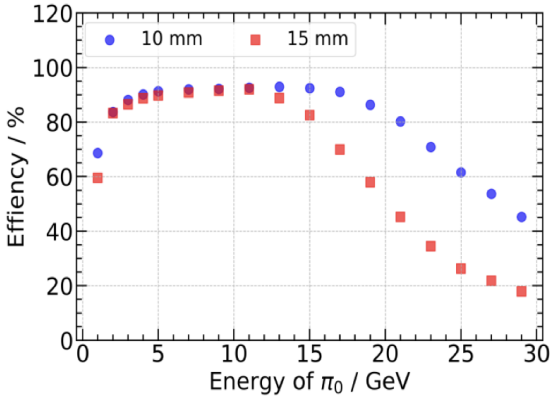


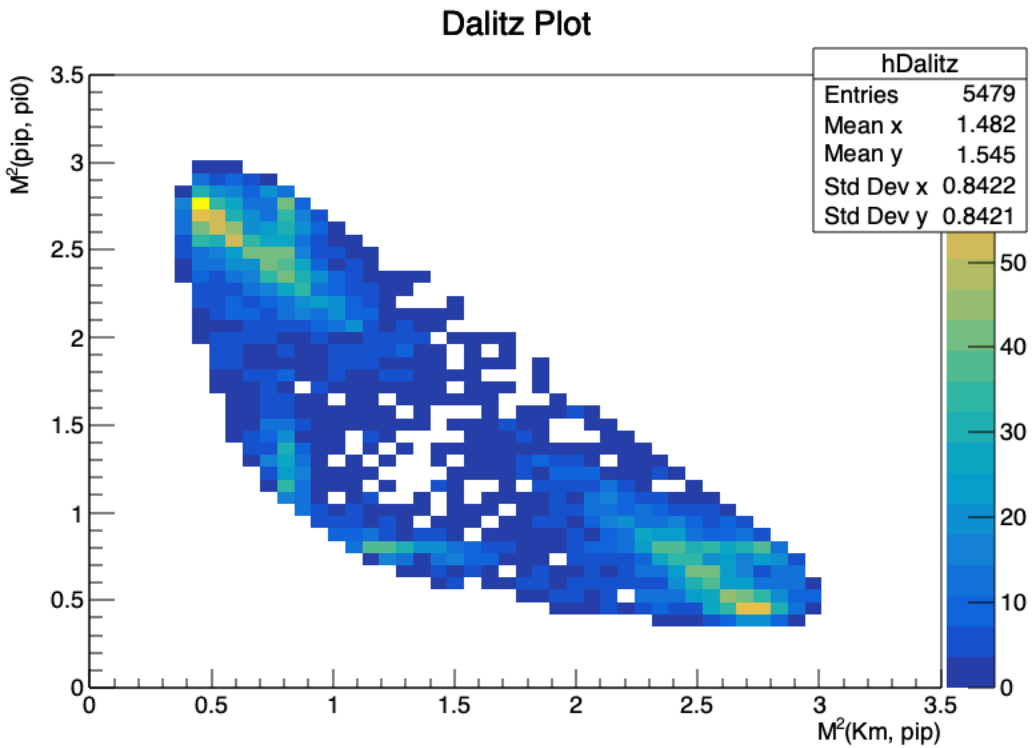


Crystal efficiency

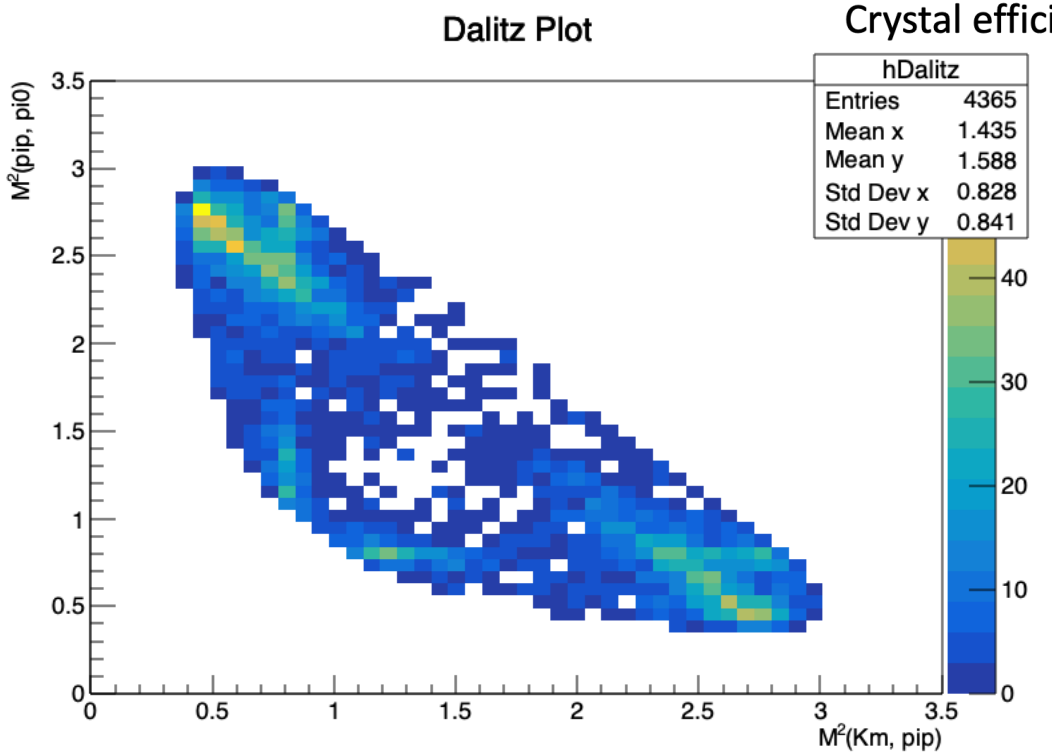


+Pi0 efficiency (15mm case)

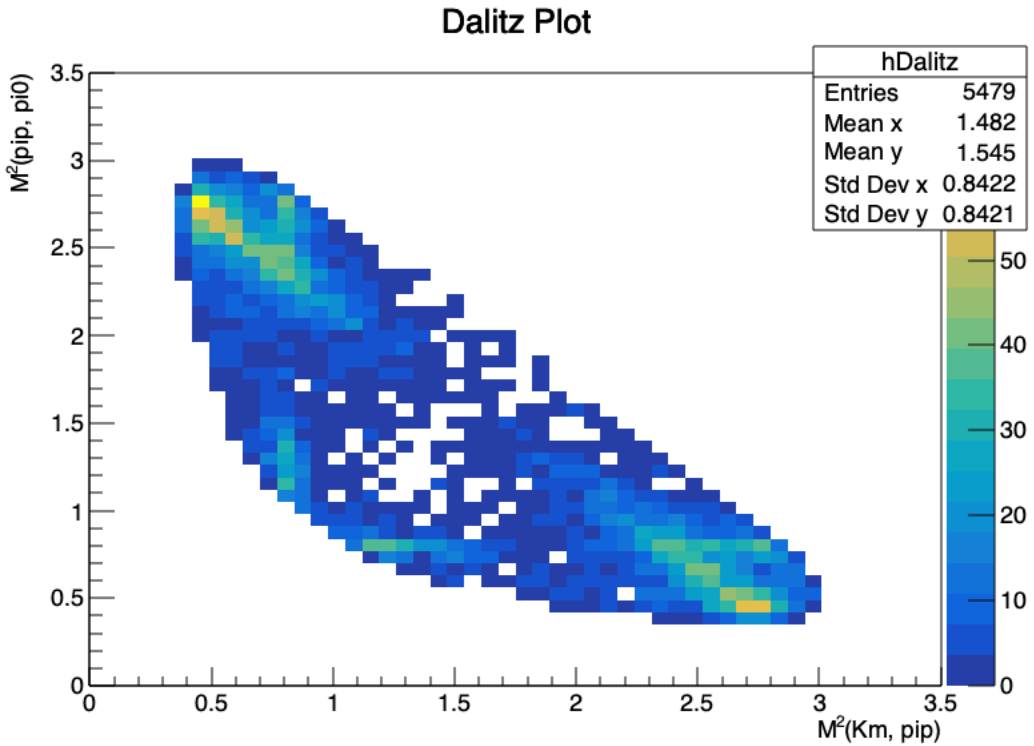


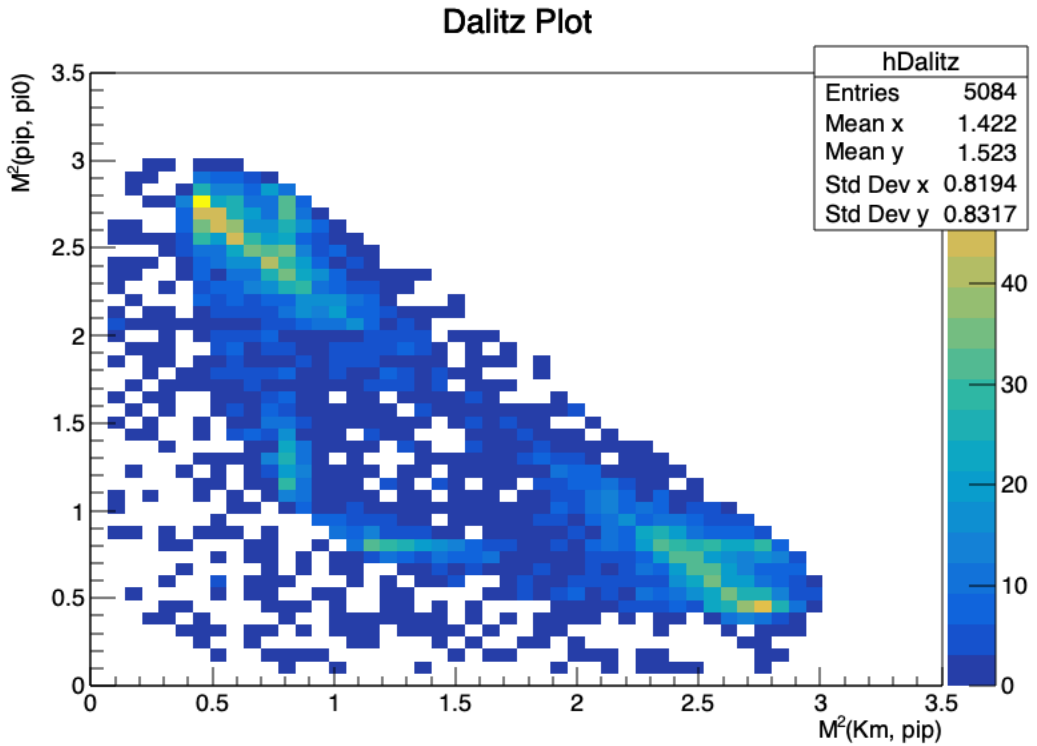


Crystal efficiency

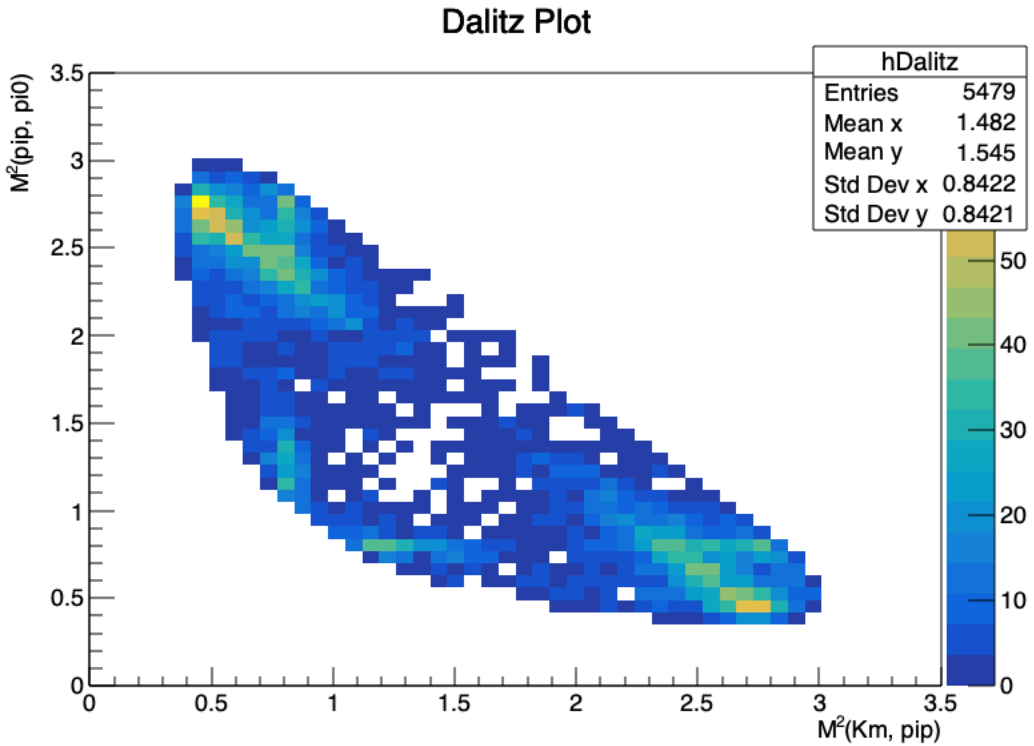


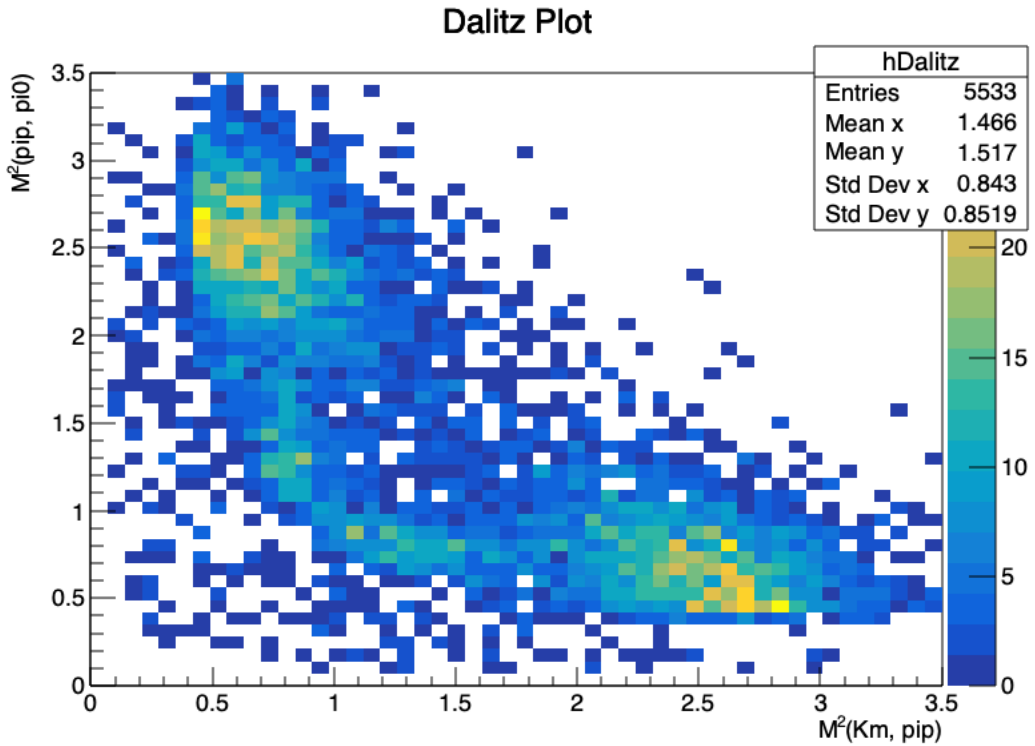
+Imperfect PID, rand K/pi combinatorial bkg





+ Imperfect momentum resolution





- In order to study PID/ momentum resolution effects closely, need:
  - The probability table of pi -> pi, pi -> K, K -> pi, K -> K, p -> pi, p -> K at each spatial /momentum region
  - Momentum resolution at each spatial /momentum region

- Not studied yet:
  - impact of vertex resolution

backup

Flavor physics channels

	LHCb ($6fb^{-1}$)	LHCb ($300fb^{-1}$)	CEPC (pi-tagged)
D0	$2.8x10^{13}$	$1.4x10^{15}$	$8.3x10^{11}$ ($3.1x10^{11}$)
D0 -> K K D0 -> pi pi D0 -> pi pi pi0 D0 -> K pi pi0	$1.14x10^{11}$ $4x10^{10}$ $4x10^{11}$ $4x10^{12}$	$5.7x10^{12}$ $2x10^{12}$ $2x10^{13}$ $2x10^{13}$	$3.4x10^{9}$ ($1.26x10^{9}$) $1.2x10^{9}$ ($4.4x10^{8}$) $1.2x10^{10}$ ($4.4x10^{9}$) $1.2x10^{11}$ ($4.4x10^{10}$)
Reconstructed D0 -> K K Reconstructed D0 -> pi pi Reconstructed D0 -> pi pi pi0 Reconstructed D0 -> K pi pi0	$5.3x10^{7}$ $1.7x10^{7}$ $(1.7+0.8)x10^{6}$ * $(1.4+0.5)x10^{7}$ **	$2.6x10^{9}$ $8x10^{8}$ $1.3x10^{8}$ $1x10^{9}$	

*Purity for resolved (merged) pi0 sample: 81% (91%)

**Purity for resolved (merged) pi0 sample: 94% (97%)