Cut	Count	Efficiency (%)
No cut	2611	
E_{EM} cut	2535	$97.09^{+0.35}_{-0.39}$
E_{HAD} cut	2558	$97.97^{+0.30}_{-0.34}$
COT hits cut	2610	$99.96^{+0.03}_{-0.09}$
d_0 cut	2590	$99.20^{+0.18}_{-0.21}$
Isolation cut	2481	$95.02^{+0.41}_{-0.47}$
Δx_{CMU} cut	2601	$99.62^{+0.12}_{-0.16}$
Δx_{CMP} cut	2565	$98.24^{+0.27}_{-0.31}$
All above cuts	2304	$88.24^{+0.67}_{-0.69}$
All cuts excl. isol.	2416	$92.53^{+0.51}_{-0.56}$
Sliding isol. cut	2525	$96.71^{+0.34}_{-0.39}$
All cuts (sliding isol.)	2343	$89.74^{+0.65}_{-0.62}$
χ^2 cut	2611	$100.00^{+0.00}_{-0.07}$
All cuts (χ^2)	2304	$88.24^{+0.67}_{-0.69}$
All track cuts	2349	$89.97^{+0.61}_{-0.66}$
All trk cuts excl. isol.	2465	$94.41^{+0.44}_{-0.49}$

TABLE I: Dataset bhmummP23_SAM: Muon ID efficiencies for CMUP

Cut	Count	Efficiency (%)
No cut	1779	
E_{EM} cut	1714	$96.35^{+0.46}_{-0.52}$
E_{HAD} cut	1743	$97.98^{+0.34}_{-0.39}$
COT hits cut	1776	$99.83^{+0.09}_{-0.17}$
d_0 cut	1768	$99.38^{+0.19}_{-0.25}$
Isolation cut	1697	$95.39^{+0.48}_{-0.54}$
Δx_{CMX} cut	1765	$99.21^{+0.21}_{-0.28}$
All above cuts	1586	$89.15^{+0.74}_{-0.82}$
All cuts excl. isol.	1658	$93.20^{+0.60}_{-0.67}$
Sliding isol. cut	1729	$97.19^{+0.39}_{-0.44}$
All cuts (sliding isol.)	1615	$90.78^{+0.67}_{-0.69}$
χ^2 cut	1779	$100.00^{+0.00}_{-0.10}$
All cuts (χ^2)	1586	$89.15^{+0.74}_{-0.82}$
All track cuts	1597	$89.77^{+0.71}_{-0.76}$
All trk cuts excl. isol.	1669	$93.82^{+0.57}_{-0.60}$

TABLE II: Dataset bhmummP23_SAM: Muon ID efficiencies for CMX

Cut	Count	Efficiency (%)
No cut	1442	
E_{EM} cut	1388	$96.26^{+0.50}_{-0.58}$
E_{HAD} cut	1413	$97.99^{+0.38}_{-0.45}$
COT hits cut	1439	$99.79^{+0.12}_{-0.20}$
d_0 cut	1435	$99.51^{+0.18}_{-0.26}$
Isolation cut	1377	$95.49^{+0.55}_{-0.62}$
Δx_{CMX} cut	1430	$99.17^{+0.23}_{-0.30}$
All above cuts	1283	$88.97^{+0.82}_{-0.94}$
All cuts excl. isol.	1342	$93.07^{+0.64}_{-0.73}$
Sliding isol. cut	1401	$97.16^{+0.43}_{-0.50}$
All cuts (sliding isol.)	1305	$90.50^{+0.76}_{-0.80}$
χ^2 cut	1442	$100.00^{+0.00}_{-0.13}$
All cuts (χ^2)	1283	$88.97^{+0.82}_{-0.94}$
All track cuts	1293	$89.67^{+0.81}_{-0.85}$
All trk cuts excl. isol.	1352	$93.76^{+0.63}_{-0.74}$

TABLE III: Dataset bhmummP23_SAM: Muon ID efficiencies for CMX Arches

Cut	Count	Efficiency (%)
No cut	288	
E_{EM} cut	278	$96.53^{+1.03}_{-1.51}$
E_{HAD} cut	282	$97.92^{+0.86}_{-1.19}$
COT hits cut	288	$100.00^{+0.00}_{-0.64}$
d_0 cut	284	$98.61^{+0.66}_{-1.10}$
Isolation cut	272	$94.44^{+1.36}_{-1.77}$
Δx_{CMX} cut	287	$99.65^{+0.27}_{-0.80}$
All above cuts	258	$89.58^{+1.92}_{-2.18}$
All cuts excl. isol.	270	$93.75^{+1.46}_{-1.86}$
Sliding isol. cut	280	$97.22^{+0.97}_{-1.37}$
All cuts (sliding isol.)	265	$92.01^{+1.64}_{-1.88}$
χ^2 cut	288	$100.00^{+0.00}_{-0.64}$
All cuts (χ^2)	258	$89.58^{+1.92}_{-2.18}$
All track cuts	258	$89.58^{+1.92}_{-2.18}$
All trk cuts excl. isol.	270	$93.75^{+1.46}_{-1.86}$

TABLE IV: Dataset bhmummP23_SAM: Muon ID efficiencies for CMX Miniskirt

Cut	Count	Efficiency (%)
No cut	49	
E_{EM} cut	48	$97.96^{+1.85}_{-4.50}$
E_{HAD} cut	48	$97.96^{+1.85}_{-4.50}$
COT hits cut	49	$100.00^{+0.00}_{-3.69}$
d_0 cut	49	$100.00^{+0.00}_{-3.69}$
Isolation cut	48	$97.96^{+1.85}_{-4.50}$
Δx_{CMX} cut	48	$97.96^{+1.85}_{-4.50}$
All above cuts	45	$91.84^{+4.06}_{-6.09}$
All cuts excl. isol.	46	$93.88^{+3.19}_{-5.79}$
Sliding isol. cut	48	$97.96^{+1.85}_{-4.50}$
All cuts (sliding isol.)	45	$91.84^{+4.06}_{-6.09}$
χ^2 cut	49	$100.00^{+0.00}_{-3.69}$
All cuts (χ^2)	45	$91.84^{+4.06}_{-6.09}$
All track cuts	46	$93.88^{+3.19}_{-5.79}$
All trk cuts excl. isol.	47	$95.92^{+2.71}_{-5.10}$

TABLE V: Dataset bhmummP23_SAM: Muon ID efficiencies for CMX Keystone

Cut	Count	Efficiency (%)
No cut	337	
E_{EM} cut	326	$96.74^{+0.97}_{-1.28}$
E_{HAD} cut	330	$97.92^{+0.76}_{-1.10}$
COT hits cut	337	$100.00^{+0.00}_{-0.55}$
d_0 cut	333	$98.81^{+0.55}_{-0.91}$
Isolation cut	320	$94.96^{+1.24}_{-1.50}$
Δx_{CMX} cut	335	$99.41^{+0.37}_{-0.80}$
All above cuts	303	$89.91^{+1.59}_{-1.92}$
All cuts excl. isol.	316	$93.77^{+1.25}_{-1.68}$
Sliding isol. cut	328	$97.33^{+0.86}_{-1.19}$
All cuts (sliding isol.)	310	$91.99^{+1.47}_{-1.85}$
χ^2 cut	337	$100.00^{+0.00}_{-0.55}$
All cuts (χ^2)	303	$89.91^{+1.59}_{-1.92}$
All track cuts	304	$90.21^{+1.69}_{-1.83}$
All trk cuts excl. isol.	317	$94.07^{+1.34}_{-1.58}$

TABLE VI: Dataset bhmummP23_SAM: Muon ID efficiencies for MiniKey

Cut	Count	Efficiency (%)
No cut	660	
E_{EM} cut	638	$96.67^{+0.75}_{-0.82}$
E_{HAD} cut	645	$97.73^{+0.56}_{-0.71}$
COT hits cut	659	$99.85^{+0.11}_{-0.35}$
d_0 cut	656	$99.39^{+0.29}_{-0.49}$
Isolation cut	628	$95.15^{+0.80}_{-0.96}$
Δx_{CMU} cut	658	$99.70^{+0.19}_{-0.39}$
All above cuts	589	$89.24^{+1.28}_{-1.25}$
All cuts excl. isol.	619	$93.79^{+0.99}_{-1.06}$
Sliding isol. cut	639	$96.82^{+0.69}_{-0.87}$
All cuts (sliding isol.)	600	$90.91^{+1.18}_{-1.36}$
χ^2 cut	660	$100.00^{+0.00}_{-0.28}$
All cuts (χ^2)	589	$89.24^{+1.28}_{-1.25}$
All track cuts	590	$89.39^{+1.13}_{-1.41}$
All trk cuts excl. isol.	620	$93.94^{+0.93}_{-1.12}$

TABLE VII: Dataset bhmummP23_SAM: Muon ID efficiencies for CMU-only

Cut	Count	Efficiency (%)
No cut	762	
E_{EM} cut	754	$98.95^{+0.34}_{-0.54}$
E_{HAD} cut	752	$98.69^{+0.41}_{-0.57}$
COT hits cut	762	$100.00^{+0.00}_{-0.24}$
d_0 cut	746	$97.90^{+0.49}_{-0.68}$
Isolation cut	726	$95.28^{+0.77}_{-0.89}$
Δx_{CMP} cut	753	$98.82^{+0.38}_{-0.55}$
All above cuts	690	$90.55^{+1.10}_{-1.15}$
All cuts excl. isol.	721	$94.62^{+0.84}_{-0.92}$
Sliding isol. cut	736	$96.59^{+0.63}_{-0.84}$
All cuts (sliding isol.)	699	$91.73^{+0.99}_{-1.16}$
χ^2 cut	762	$100.00^{+0.00}_{-0.24}$
All cuts (χ^2)	690	$90.55^{+1.10}_{-1.15}$
All track cuts	699	$91.73^{+0.99}_{-1.16}$
All trk cuts excl. isol.	730	$95.80^{+0.73}_{-0.83}$

TABLE VIII: Dataset bhmummP23_SAM: Muon ID efficiencies for CMP-only

Cut	Count	Efficiency (%)
No cut	640	
E_{EM} cut	617	$96.41^{+0.71}_{-0.85}$
E_{HAD} cut	626	$97.81^{+0.58}_{-0.79}$
COT hits cut	632	$98.75^{+0.44}_{-0.63}$
d_0 cut	632	$98.75^{+0.44}_{-0.63}$
Isolation cut	594	$92.81^{+0.99}_{-1.16}$
Min E cut	617	$96.41^{+0.71}_{-0.85}$
All above cuts	553	$86.41^{+1.39}_{-1.54}$
All cuts excl. isol.	583	$91.09^{+1.19}_{-1.35}$
Sliding isol. cut	606	$94.69^{+0.87}_{-1.08}$
All cuts (sliding isol.)	563	$87.97^{+1.39}_{-1.35}$
χ^2 cut	640	$100.00^{+0.00}_{-0.29}$
All cuts (χ^2)	553	$86.41^{+1.39}_{-1.54}$

TABLE IX: Dataset bhmummP23_SAM: Muon ID efficiencies for CMIO

Cut	Count	Efficiency (%)
No cut	563	
E_{EM} cut	534	$94.85^{+0.90}_{-1.15}$
E_{HAD} cut	531	$94.32^{+0.95}_{-1.20}$
COT hits cut	562	$99.82^{+0.14}_{-0.40}$
d_0 cut	551	$97.87^{+0.62}_{-0.85}$
Isolation cut	514	$91.30^{+1.18}_{-1.36}$
Min E cut	558	$99.11^{+0.38}_{-0.60}$
All above cuts	480	$85.26^{+1.56}_{-1.57}$
All cuts excl. isol.	504	$89.52^{+1.40}_{-1.53}$
Sliding isol. cut	523	$92.90^{+1.15}_{-1.20}$
All cuts (sliding isol.)	486	$86.32^{+1.47}_{-1.66}$
χ^2 cut	563	$100.00^{+0.00}_{-0.33}$
All cuts (χ^2)	480	$85.26^{+1.56}_{-1.57}$

TABLE X: Dataset bhmummP23_SAM: Muon ID efficiencies for SCMIO

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	2969	2543	$85.65^{+0.63}_{-0.64}$
CMX	1819	1720	$94.56^{+0.51}_{-0.56}$
CMX Arches	1436	1392	$96.94^{+0.45}_{-0.52}$
CMX Miniskirt	317	274	$86.44^{+1.94}_{-2.16}$
CMX Keystone	66	54	$81.82^{+5.29}_{-5.84}$
CMU-only	739	637	$86.20^{+1.20}_{-1.33}$
CMP-only	873	755	$86.48^{+1.11}_{-1.23}$
CMX MiniKey	383	328	$85.64^{+1.76}_{-1.95}$

TABLE XI: Dataset bhmummP23_SAM: Muon reconstruction efficiencies

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	860	747	-
CMX	CMUP	1073	1008	$93.37^{+0.53}_{-0.49}$
CMUP	CMX	1116	1008	-
CMX	CMX	390	325	$90.55^{+0.80}_{-0.73}$
CMUP	ARCH	878	832	-
CMUP	MK	238	176	-
ARCH	ARCH	284	260	-
ARCH	MK	89	58	-
MK	ARCH	59	58	$95.19^{+0.64}_{-0.54}$
MK	MK	16	7	$80.51^{+2.39}_{-2.24}$

TABLE XII: Dataset bhmummP23_SAM: Muon L1 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1008	-
CMUP	820	$97.03^{+0.58}_{-0.79}$
CMX	740	$87.56^{+1.21}_{-1.33}$
CMUP-CMX	718	-
CMUPA	668	-
CMUPMK	152	-
CMUPARCH	586	$87.72^{+1.24}_{-1.49}$
CMUP-MK	132	$86.84^{+2.81}_{-3.44}$

TABLE XIII: Dataset bhmummP23_SAM: Muon L2 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1008	-
CMUP-CMUP$_S$	8	-
CMX-CMX$_S$	8	-
CMUP-CMX-CMUP$_S$	8	$1.08^{+0.53}_{-0.37}$
CMUP-CMX-CMX$_S$	8	$0.98^{+0.48}_{-0.34}$
CMUP-CMX-CMX$_S$-A	8	$1.20^{+0.59}_{-0.41}$
CMUP-CMX-CMX$_S$-MK	0	$0.00^{+1.20}_{--100.00}$

TABLE XIV: Dataset bhmummP23_SAM: Muon L2 SLAM trigger efficiencies

Category	Efficiency (%)
CMUP	$90.34^{+0.76}_{-0.93}$
CMX	$78.95^{+1.31}_{-1.39}$
ARCH	$83.37^{+1.31}_{-1.54}$
MK	$68.86^{+3.11}_{-3.59}$
CMUP$_S$	$1.01^{+0.49}_{-0.35}$
CMX$_S$	$0.88^{+0.43}_{-0.30}$
ARCH$_S$	$1.14^{+0.56}_{-0.39}$
MK$_S$	$0.00^{+0.00}_{-0.00}$

TABLE XVI: Dataset bhmummP23_SAM: Muon combined trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L2	718	-
CMUP	716	$99.72^{+0.17}_{-0.37}$
CMX	715	$99.58^{+0.24}_{-0.40}$
CMUP-CMX	713	-
CMUPA	584	-
CMUPMK	132	-
CMUPARCH	583	$99.83^{+0.13}_{-0.40}$
CMUP-MK	130	$98.48^{+1.03}_{-1.90}$

TABLE XV: Dataset bhmummP23_SAM: Muon L3 trigger efficiencies