Cut	Count	Efficiency (%)
No cut	4418	
E_{EM} cut	4297	$97.26^{+0.24}_{-0.28}$
E_{HAD} cut	4335	$98.12^{+0.21}_{-0.23}$
COT hits cut	4415	$99.93^{+0.03}_{-0.06}$
d_0 cut	4387	$99.30^{+0.13}_{-0.14}$
Isolation cut	4214	$95.38^{+0.30}_{-0.34}$
Δx_{CMU} cut	4399	$99.57^{+0.09}_{-0.13}$
Δx_{CMP} cut	4323	$97.85^{+0.21}_{-0.23}$
All above cuts	3918	$88.68^{+0.50}_{-0.47}$
All cuts excl. isol.	4086	$92.49^{+0.41}_{-0.42}$
Sliding isol. cut	4287	$97.03^{+0.26}_{-0.28}$
All cuts (sliding isol.)	3981	$90.11^{+0.44}_{-0.48}$
χ^2 cut	4418	$100.00^{+0.00}_{-0.04}$
All cuts (χ^2)	3918	$88.68^{+0.50}_{-0.47}$
All track cuts	4017	$90.92^{+0.46}_{-0.47}$
All trk cuts excl. isol.	4190	$94.84^{+0.35}_{-0.33}$

TABLE I: Dataset bhmummP18: Muon ID efficiencies for CMUP

Cut	Count	Efficiency (%)
No cut	2747	
E_{EM} cut	2659	$96.80^{+0.35}_{-0.39}$
E_{HAD} cut	2696	$98.14^{+0.27}_{-0.32}$
COT hits cut	2745	$99.93^{+0.05}_{-0.10}$
d_0 cut	2740	$99.75^{+0.09}_{-0.14}$
Isolation cut	2628	$95.67^{+0.40}_{-0.43}$
Δx_{CMX} cut	2732	$99.45^{+0.14}_{-0.17}$
All above cuts	2484	$90.43^{+0.54}_{-0.63}$
All cuts excl. isol.	2587	$94.18^{+0.43}_{-0.50}$
Sliding isol. cut	2657	$96.72^{+0.32}_{-0.36}$
All cuts (sliding isol.)	2511	$91.41^{+0.53}_{-0.56}$
χ^2 cut	2747	$100.00^{+0.00}_{-0.07}$
All cuts (χ^2)	2484	$90.43^{+0.54}_{-0.63}$
All track cuts	2499	$90.97^{+0.58}_{-0.59}$
All trk cuts excl. isol.	2602	$94.72^{+0.42}_{-0.46}$

TABLE II: Dataset bhmummP18: Muon ID efficiencies for CMX

Cut	Count	Efficiency (%)
No cut	2229	
E_{EM} cut	2153	$96.59^{+0.41}_{-0.42}$
E_{HAD} cut	2190	$98.25^{+0.26}_{-0.33}$
COT hits cut	2227	$99.91^{+0.06}_{-0.12}$
d_0 cut	2224	$99.78^{+0.10}_{-0.15}$
Isolation cut	2134	$95.74^{+0.43}_{-0.45}$
Δx_{CMX} cut	2218	$99.51^{+0.14}_{-0.20}$
All above cuts	2017	$90.49^{+0.67}_{-0.69}$
All cuts excl. isol.	2099	$94.17^{+0.49}_{-0.54}$
Sliding isol. cut	2158	$96.81^{+0.38}_{-0.40}$
All cuts (sliding isol.)	2040	$91.52^{+0.62}_{-0.65}$
χ^2 cut	2229	$100.00^{+0.00}_{-0.08}$
All cuts (χ^2)	2017	$90.49^{+0.67}_{-0.69}$
All track cuts	2028	$90.98^{+0.57}_{-0.60}$
All trk cuts excl. isol.	2110	$94.66^{+0.48}_{-0.50}$

TABLE III: Dataset bhmummP18: Muon ID efficiencies for CMX Arches

Cut	Count	Efficiency (%)
No cut	405	
E_{EM} cut	395	$97.53^{+0.76}_{-1.00}$
E_{HAD} cut	397	$98.02^{+0.66}_{-1.00}$
COT hits cut	405	$100.00^{+0.00}_{-0.45}$
d_0 cut	404	$99.75^{+0.22}_{-0.56}$
Isolation cut	385	$95.06^{+1.13}_{-1.41}$
Δx_{CMX} cut	403	$99.51^{+0.32}_{-0.65}$
All above cuts	367	$90.62^{+1.47}_{-1.65}$
All cuts excl. isol.	384	$94.81^{+1.18}_{-1.36}$
Sliding isol. cut	390	$96.30^{+0.92}_{-1.23}$
All cuts (sliding isol.)	371	$91.60^{+1.46}_{-1.66}$
χ^2 cut	405	$100.00^{+0.00}_{-0.45}$
All cuts (χ^2)	367	$90.62^{+1.47}_{-1.65}$
All track cuts	369	$91.11^{+1.37}_{-1.56}$
All trk cuts excl. isol.	386	$95.31^{+1.08}_{-1.27}$

TABLE IV: Dataset bhmummP18: Muon ID efficiencies for CMX Miniskirt

Cut	Count	Efficiency (%)
No cut	113	
E_{EM} cut	111	$98.23^{+1.09}_{-2.23}$
E_{HAD} cut	109	$96.46^{+1.68}_{-2.81}$
COT hits cut	113	$100.00^{+0.00}_{-1.62}$
d_0 cut	112	$99.12^{+0.74}_{-2.00}$
Isolation cut	109	$96.46^{+1.68}_{-2.81}$
Δx_{CMX} cut	111	$98.23^{+1.09}_{-2.23}$
All above cuts	100	$88.50^{+3.11}_{-3.93}$
All cuts excl. isol.	104	$92.04^{+2.69}_{-3.56}$
Sliding isol. cut	109	$96.46^{+1.68}_{-2.81}$
All cuts (sliding isol.)	100	$88.50^{+3.11}_{-3.93}$
χ^2 cut	113	$100.00^{+0.00}_{-1.62}$
All cuts (χ^2)	100	$88.50^{+3.11}_{-3.93}$
All track cuts	102	$90.27^{+2.90}_{-3.74}$
All trk cuts excl. isol.	106	$93.81^{+2.09}_{-2.98}$

TABLE V: Dataset bhmummP18: Muon ID efficiencies for CMX Keystone

Cut	Count	Efficiency (%)
No cut	518	
E_{EM} cut	506	$97.68^{+0.61}_{-0.86}$
E_{HAD} cut	506	$97.68^{+0.61}_{-0.86}$
COT hits cut	518	$100.00^{+0.00}_{-0.35}$
d_0 cut	516	$99.61^{+0.26}_{-0.52}$
Isolation cut	494	$95.37^{+0.97}_{-1.08}$
Δx_{CMX} cut	514	$99.23^{+0.36}_{-0.62}$
All above cuts	467	$90.15^{+1.35}_{-1.58}$
All cuts excl. isol.	488	$94.21^{+1.06}_{-1.19}$
Sliding isol. cut	499	$96.33^{+0.79}_{-1.07}$
All cuts (sliding isol.)	471	$90.93^{+1.36}_{-1.38}$
χ^2 cut	518	$100.00^{+0.00}_{-0.35}$
All cuts (χ^2)	467	$90.15^{+1.35}_{-1.58}$
All track cuts	471	$90.93^{+1.36}_{-1.38}$
All trk cuts excl. isol.	492	$94.98^{+0.97}_{-1.18}$

TABLE VI: Dataset bhmummP18: Muon ID efficiencies for MiniKey

Cut	Count	Efficiency (%)
No cut	1057	
E_{EM} cut	1028	$97.26^{+0.55}_{-0.60}$
E_{HAD} cut	1031	$97.54^{+0.48}_{-0.59}$
COT hits cut	1057	$100.00^{+0.00}_{-0.17}$
d_0 cut	1051	$99.43^{+0.21}_{-0.35}$
Isolation cut	1015	$96.03^{+0.60}_{-0.67}$
Δx_{CMU} cut	1052	$99.53^{+0.19}_{-0.32}$
All above cuts	953	$90.16^{+0.90}_{-1.05}$
All cuts excl. isol.	992	$93.85^{+0.73}_{-0.83}$
Sliding isol. cut	1026	$97.07^{+0.54}_{-0.63}$
All cuts (sliding isol.)	964	$91.20^{+0.84}_{-0.92}$
χ^2 cut	1057	$100.00^{+0.00}_{-0.17}$
All cuts (χ^2)	953	$90.16^{+0.90}_{-1.05}$
All track cuts	958	$90.63^{+0.92}_{-0.94}$
All trk cuts excl. isol.	997	$94.32^{+0.74}_{-0.82}$

TABLE VII: Dataset bhmummP18: Muon ID efficiencies for CMU-only

Cut	Count	Efficiency (%)
No cut	1247	
E_{EM} cut	1214	$97.35^{+0.47}_{-0.55}$
E_{HAD} cut	1234	$98.96^{+0.29}_{-0.40}$
COT hits cut	1247	$100.00^{+0.00}_{-0.15}$
d_0 cut	1241	$99.52^{+0.20}_{-0.29}$
Isolation cut	1187	$95.19^{+0.56}_{-0.71}$
Δx_{CMP} cut	1215	$97.43^{+0.44}_{-0.53}$
All above cuts	1112	$89.17^{+0.91}_{-0.94}$
All cuts excl. isol.	1166	$93.50^{+0.69}_{-0.78}$
Sliding isol. cut	1205	$96.63^{+0.49}_{-0.59}$
All cuts (sliding isol.)	1130	$90.62^{+0.84}_{-0.92}$
χ^2 cut	1247	$100.00^{+0.00}_{-0.15}$
All cuts (χ^2)	1112	$89.17^{+0.91}_{-0.94}$
All track cuts	1141	$91.50^{+0.83}_{-0.83}$
All trk cuts excl. isol.	1196	$95.91^{+0.53}_{-0.65}$

TABLE VIII: Dataset bhmummP18: Muon ID efficiencies for CMP-only

Cut	Count	Efficiency (%)
No cut	990	
E_{EM} cut	955	$96.46^{+0.56}_{-0.71}$
E_{HAD} cut	972	$98.18^{+0.43}_{-0.55}$
COT hits cut	979	$98.89^{+0.31}_{-0.43}$
d_0 cut	974	$98.38^{+0.42}_{-0.51}$
Isolation cut	926	$93.54^{+0.75}_{-0.91}$
Min E cut	954	$96.36^{+0.56}_{-0.71}$
All above cuts	857	$86.57^{+1.08}_{-1.17}$
All cuts excl. isol.	901	$91.01^{+0.93}_{-1.02}$
Sliding isol. cut	943	$95.25^{+0.69}_{-0.77}$
All cuts (sliding isol.)	871	$87.98^{+1.03}_{-1.11}$
χ^2 cut	990	$100.00^{+0.00}_{-0.19}$
All cuts (χ^2)	857	$86.57^{+1.08}_{-1.17}$

TABLE IX: Dataset bhmummP18: Muon ID efficiencies for CMIO

Cut	Count	Efficiency (%)
No cut	753	
E_{EM} cut	711	$94.42^{+0.84}_{-1.01}$
E_{HAD} cut	720	$95.62^{+0.72}_{-0.84}$
COT hits cut	749	$99.47^{+0.26}_{-0.42}$
d_0 cut	744	$98.80^{+0.39}_{-0.54}$
Isolation cut	692	$91.90^{+1.02}_{-1.13}$
Min E cut	747	$99.20^{+0.33}_{-0.50}$
All above cuts	651	$86.45^{+1.34}_{-1.40}$
All cuts excl. isol.	690	$91.63^{+0.99}_{-1.15}$
Sliding isol. cut	701	$93.09^{+0.90}_{-1.05}$
All cuts (sliding isol.)	660	$87.65^{+1.12}_{-1.22}$
χ^2 cut	753	$100.00^{+0.00}_{-0.24}$
All cuts (χ^2)	651	$86.45^{+1.34}_{-1.40}$

TABLE X: Dataset bhmummP18: Muon ID efficiencies for SCMIO

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	4834	4307	$89.10^{+0.43}_{-0.45}$
CMX	2820	2673	$94.79^{+0.40}_{-0.48}$
CMX Arches	2242	2163	$96.48^{+0.37}_{-0.46}$
CMX Miniskirt	450	396	$88.00^{+1.55}_{-1.77}$
CMX Keystone	128	114	$89.06^{+2.93}_{-3.32}$
CMU-only	1171	1030	$87.96^{+0.96}_{-1.00}$
CMP-only	1377	1233	$89.54^{+0.84}_{-0.92}$
CMX MiniKey	578	510	$88.24^{+1.32}_{-1.42}$

TABLE XI: Dataset bhmummP18: Muon reconstruction efficiencies

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	1450	1276	-
CMX	CMUP	1736	1638	$93.91^{+0.41}_{-0.35}$
CMUP	CMX	1824	1638	-
CMX	CMX	579	461	$89.42^{+0.64}_{-0.58}$
CMUP	ARCH	1467	1389	-
CMUP	MK	357	249	-
ARCH	ARCH	412	366	-
ARCH	MK	124	73	-
MK	ARCH	76	73	$94.56^{+0.55}_{-0.50}$
MK	MK	40	22	$77.09^{+1.99}_{-1.97}$

TABLE XII: Dataset bhmummP18: Muon L1 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1638	-
CMUP	1353	$98.39^{+0.36}_{-0.42}$
CMX	1244	$90.47^{+0.79}_{-0.87}$
CMUP-CMX	1224	-
CMUPA	1145	-
CMUPMK	208	-
CMUPARCH	1033	$90.22^{+0.85}_{-0.91}$
CMUP-MK	191	$91.83^{+1.83}_{-2.28}$

TABLE XIII: Dataset bhmummP18: Muon L2 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1638	-
CMUP-CMUP$_S$	1288	-
CMX-CMX$_S$	1196	-
CMUP-CMX-CMUP$_S$	1178	$94.69^{+0.67}_{-0.70}$
CMUP-CMX-CMX$_S$	1178	$87.07^{+0.87}_{-0.98}$
CMUP-CMX-CMX$_S$-A	993	$86.72^{+1.02}_{-1.13}$
CMUP-CMX-CMX$_S$-MK	185	$88.94^{+2.27}_{-2.71}$

TABLE XIV: Dataset bhmummP18: Muon L2 SLAM trigger efficiencies

Category	Efficiency (%)
CMUP	$92.10^{+0.55}_{-0.57}$
CMX	$80.82^{+0.92}_{-0.95}$
ARCH	$85.22^{+0.94}_{-0.99}$
MK	$70.79^{+2.30}_{-2.61}$
CMUP$_S$	$88.64^{+0.75}_{-0.76}$
CMX$_S$	$77.79^{+0.96}_{-1.02}$
ARCH$_S$	$81.92^{+1.08}_{-1.17}$
MK$_S$	$68.57^{+2.49}_{-2.80}$

TABLE XVI: Dataset bhmummP18: Muon combined trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L2	1224	-
CMUP	1220	$99.67^{+0.17}_{-0.25}$
CMX	1223	$99.92^{+0.06}_{-0.19}$
CMUP-CMX	1219	-
CMUPA	1030	-
CMUPMK	190	-
CMUPARCH	1029	$99.90^{+0.08}_{-0.23}$
CMUP-MK	190	$100.00^{+0.00}_{-0.96}$

TABLE XV: Dataset bhmummP18: Muon L3 trigger efficiencies