Cut	Count	Efficiency (%)
No cut	2917	
E_{EM} cut	2841	$97.39^{+0.29}_{-0.35}$
E_{HAD} cut	2868	$98.32^{+0.23}_{-0.29}$
COT hits cut	2914	$99.90^{+0.06}_{-0.10}$
d_0 cut	2873	$98.49^{+0.23}_{-0.26}$
Isolation cut	2774	$95.10^{+0.39}_{-0.44}$
Δx_{CMU} cut	2906	$99.62^{+0.11}_{-0.15}$
Δx_{CMP} cut	2846	$97.57^{+0.31}_{-0.32}$
All above cuts	2558	$87.69^{+0.64}_{-0.63}$
All cuts excl. isol.	2679	$91.84^{+0.52}_{-0.56}$
Sliding isol. cut	2821	$96.71^{+0.34}_{-0.35}$
All cuts (sliding isol.)	2599	$89.10^{+0.60}_{-0.57}$
χ^2 cut	2917	$100.00^{+0.00}_{-0.06}$
All cuts (χ^2)	2558	$87.69^{+0.64}_{-0.63}$
All track cuts	2627	$90.06^{+0.52}_{-0.56}$
All trk cuts excl. isol.	2754	$94.41^{+0.44}_{-0.44}$

TABLE I: Dataset bhmummP20: Muon ID efficiencies for CMUP

Cut	Count	Efficiency (%)
No cut	1985	
E_{EM} cut	1926	$97.03^{+0.36}_{-0.42}$
E_{HAD} cut	1943	$97.88^{+0.33}_{-0.40}$
COT hits cut	1984	$99.95^{+0.04}_{-0.12}$
d_0 cut	1959	$98.69^{+0.26}_{-0.33}$
Isolation cut	1896	$95.52^{+0.46}_{-0.52}$
Δx_{CMX} cut	1977	$99.60^{+0.15}_{-0.20}$
All above cuts	1773	$89.32^{+0.67}_{-0.70}$
All cuts excl. isol.	1854	$93.40^{+0.59}_{-0.58}$
Sliding isol. cut	1921	$96.78^{+0.42}_{-0.46}$
All cuts (sliding isol.)	1795	$90.43^{+0.64}_{-0.73}$
χ^2 cut	1985	$100.00^{+0.00}_{-0.09}$
All cuts (χ^2)	1773	$89.32^{+0.67}_{-0.70}$
All track cuts	1779	$89.62^{+0.66}_{-0.71}$
All trk cuts excl. isol.	1860	$93.70^{+0.58}_{-0.59}$

TABLE II: Dataset bhmummP20: Muon ID efficiencies for CMX

Cut	Count	Efficiency (%)
No cut	1576	
E_{EM} cut	1532	$97.21^{+0.42}_{-0.50}$
E_{HAD} cut	1544	$97.97^{+0.35}_{-0.44}$
COT hits cut	1575	$99.94^{+0.06}_{-0.15}$
d_0 cut	1551	$98.41^{+0.29}_{-0.39}$
Isolation cut	1503	$95.37^{+0.58}_{-0.59}$
Δx_{CMX} cut	1569	$99.56^{+0.16}_{-0.23}$
All above cuts	1404	$89.09^{+0.81}_{-0.85}$
All cuts excl. isol.	1471	$93.34^{+0.66}_{-0.71}$
Sliding isol. cut	1522	$96.57^{+0.47}_{-0.50}$
All cuts (sliding isol.)	1422	$90.23^{+0.74}_{-0.82}$
χ^2 cut	1576	$100.00^{+0.00}_{-0.12}$
All cuts (χ^2)	1404	$89.09^{+0.81}_{-0.85}$
All track cuts	1409	$89.40^{+0.78}_{-0.88}$
All trk cuts excl. isol.	1476	$93.65^{+0.63}_{-0.64}$

TABLE III: Dataset bhmummP20: Muon ID efficiencies for CMX Arches

Cut	Count	Efficiency (%)
No cut	335	
E_{EM} cut	322	$96.12^{+1.05}_{-1.30}$
E_{HAD} cut	326	$97.31^{+0.88}_{-1.17}$
COT hits cut	335	$100.00^{+0.00}_{-0.55}$
d_0 cut	334	$99.70^{+0.23}_{-0.70}$
Isolation cut	320	$95.52^{+1.06}_{-1.48}$
Δx_{CMX} cut	334	$99.70^{+0.23}_{-0.70}$
All above cuts	298	$88.96^{+1.77}_{-1.94}$
All cuts excl. isol.	311	$92.84^{+1.40}_{-1.72}$
Sliding isol. cut	325	$97.01^{+0.89}_{-1.26}$
All cuts (sliding isol.)	301	$89.85^{+1.65}_{-1.86}$
χ^2 cut	335	$100.00^{+0.00}_{-0.55}$
All cuts (χ^2)	298	$88.96^{+1.77}_{-1.94}$
All track cuts	299	$89.25^{+1.66}_{-2.05}$
All trk cuts excl. isol.	312	$93.13^{+1.30}_{-1.63}$

TABLE IV: Dataset bhmummP20: Muon ID efficiencies for CMX Miniskirt

Cut	Count	Efficiency (%)
No cut	74	
E_{EM} cut	72	$97.30^{+1.82}_{-3.45}$
E_{HAD} cut	73	$98.65^{+1.06}_{-3.04}$
COT hits cut	74	$100.00^{+0.00}_{-2.46}$
d_0 cut	74	$100.00^{+0.00}_{-2.46}$
Isolation cut	73	$98.65^{+1.06}_{-3.04}$
Δx_{CMX} cut	74	$100.00^{+0.00}_{-2.46}$
All above cuts	71	$95.95^{+2.30}_{-3.95}$
All cuts excl. isol.	72	$97.30^{+1.82}_{-3.45}$
Sliding isol. cut	74	$100.00^{+0.00}_{-2.46}$
All cuts (sliding isol.)	72	$97.30^{+1.82}_{-3.45}$
χ^2 cut	74	$100.00^{+0.00}_{-2.46}$
All cuts (χ^2)	71	$95.95^{+2.30}_{-3.95}$
All track cuts	71	$95.95^{+2.30}_{-3.95}$
All trk cuts excl. isol.	72	$97.30^{+1.82}_{-3.45}$

TABLE V: Dataset bhmummP20: Muon ID efficiencies for CMX Keystone

Cut	Count	Efficiency (%)
No cut	409	
E_{EM} cut	394	$96.33^{+0.88}_{-1.17}$
E_{HAD} cut	399	$97.56^{+0.74}_{-1.02}$
COT hits cut	409	$100.00^{+0.00}_{-0.45}$
d_0 cut	408	$99.76^{+0.21}_{-0.55}$
Isolation cut	393	$96.09^{+0.93}_{-1.21}$
Δx_{CMX} cut	408	$99.76^{+0.21}_{-0.55}$
All above cuts	369	$90.22^{+1.48}_{-1.65}$
All cuts excl. isol.	383	$93.64^{+1.18}_{-1.36}$
Sliding isol. cut	399	$97.56^{+0.74}_{-1.02}$
All cuts (sliding isol.)	373	$91.20^{+1.48}_{-1.65}$
χ^2 cut	409	$100.00^{+0.00}_{-0.45}$
All cuts (χ^2)	369	$90.22^{+1.48}_{-1.65}$
All track cuts	370	$90.46^{+1.43}_{-1.70}$
All trk cuts excl. isol.	384	$93.89^{+1.13}_{-1.41}$

TABLE VI: Dataset bhmummP20: Muon ID efficiencies for MiniKey

Cut	Count	Efficiency (%)
No cut	740	
E_{EM} cut	706	$95.41^{+0.74}_{-0.92}$
E_{HAD} cut	715	$96.62^{+0.69}_{-0.77}$
COT hits cut	740	$100.00^{+0.00}_{-0.25}$
d_0 cut	729	$98.51^{+0.44}_{-0.59}$
Isolation cut	698	$94.32^{+0.84}_{-1.01}$
Δx_{CMU} cut	737	$99.59^{+0.22}_{-0.39}$
All above cuts	643	$86.89^{+1.29}_{-1.44}$
All cuts excl. isol.	676	$91.35^{+1.08}_{-1.17}$
Sliding isol. cut	710	$95.95^{+0.68}_{-0.88}$
All cuts (sliding isol.)	651	$87.97^{+1.19}_{-1.35}$
χ^2 cut	740	$100.00^{+0.00}_{-0.25}$
All cuts (χ^2)	643	$86.89^{+1.29}_{-1.44}$
All track cuts	644	$87.03^{+1.16}_{-1.38}$
All trk cuts excl. isol.	677	$91.49^{+1.04}_{-1.11}$

TABLE VII: Dataset bhmummP20: Muon ID efficiencies for CMU-only

Cut	Count	Efficiency (%)
No cut	754	
E_{EM} cut	736	$97.61^{+0.58}_{-0.69}$
E_{HAD} cut	745	$98.81^{+0.39}_{-0.54}$
COT hits cut	753	$99.87^{+0.12}_{-0.29}$
d_0 cut	742	$98.41^{+0.44}_{-0.58}$
Isolation cut	709	$94.03^{+0.84}_{-1.01}$
Δx_{CMP} cut	735	$97.48^{+0.62}_{-0.75}$
All above cuts	662	$87.80^{+1.17}_{-1.37}$
All cuts excl. isol.	700	$92.84^{+0.96}_{-1.09}$
Sliding isol. cut	724	$96.02^{+0.71}_{-0.86}$
All cuts (sliding isol.)	677	$89.79^{+1.13}_{-1.26}$
χ^2 cut	754	$100.00^{+0.00}_{-0.24}$
All cuts (χ^2)	662	$87.80^{+1.17}_{-1.37}$
All track cuts	679	$90.05^{+1.06}_{-1.23}$
All trk cuts excl. isol.	717	$95.09^{+0.76}_{-0.90}$

TABLE VIII: Dataset bhmummP20: Muon ID efficiencies for CMP-only

Cut	Count	Efficiency (%)
No cut	658	
E_{EM} cut	633	$96.20^{+0.72}_{-0.94}$
E_{HAD} cut	646	$98.18^{+0.51}_{-0.67}$
COT hits cut	657	$99.85^{+0.12}_{-0.35}$
d_0 cut	652	$99.09^{+0.35}_{-0.53}$
Isolation cut	621	$94.38^{+0.89}_{-1.07}$
Min E cut	641	$97.42^{+0.58}_{-0.79}$
All above cuts	576	$87.54^{+1.23}_{-1.50}$
All cuts excl. isol.	604	$91.79^{+1.08}_{-1.22}$
Sliding isol. cut	626	$95.14^{+0.81}_{-0.95}$
All cuts (sliding isol.)	580	$88.15^{+1.21}_{-1.33}$
χ^2 cut	658	$100.00^{+0.00}_{-0.28}$
All cuts (χ^2)	576	$87.54^{+1.23}_{-1.50}$

TABLE IX: Dataset bhmummP20: Muon ID efficiencies for CMIO

Cut	Count	Efficiency (%)
No cut	625	
E_{EM} cut	583	$93.28^{+1.01}_{-1.14}$
E_{HAD} cut	588	$94.08^{+0.99}_{-1.06}$
COT hits cut	624	$99.84^{+0.12}_{-0.36}$
d_0 cut	617	$98.72^{+0.43}_{-0.65}$
Isolation cut	569	$91.04^{+1.25}_{-1.29}$
Min E cut	619	$99.04^{+0.40}_{-0.58}$
All above cuts	524	$83.84^{+1.41}_{-1.52}$
All cuts excl. isol.	554	$88.64^{+1.30}_{-1.43}$
Sliding isol. cut	581	$92.96^{+1.03}_{-1.21}$
All cuts (sliding isol.)	533	$85.28^{+1.34}_{-1.59}$
χ^2 cut	625	$100.00^{+0.00}_{-0.29}$
All cuts (χ^2)	524	$83.84^{+1.41}_{-1.52}$

TABLE X: Dataset bhmummP20: Muon ID efficiencies for SCMIO

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	3284	2845	$86.63^{+0.62}_{-0.65}$
CMX	2030	1929	$95.02^{+0.51}_{-0.52}$
CMX Arches	1568	1528	$97.45^{+0.38}_{-0.45}$
CMX Miniskirt	368	322	$87.50^{+1.66}_{-2.05}$
CMX Keystone	94	79	$84.04^{+4.04}_{-4.55}$
CMU-only	785	699	$89.04^{+1.09}_{-1.25}$
CMP-only	854	742	$86.89^{+1.10}_{-1.24}$
CMX MiniKey	462	401	$86.80^{+1.58}_{-1.74}$

TABLE XI: Dataset bhmummP20: Muon reconstruction efficiencies

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	962	842	-
CMX	CMUP	1136	1074	$93.87^{+0.49}_{-0.47}$
CMUP	CMX	1249	1074	-
CMX	CMX	456	354	$86.54^{+0.84}_{-0.77}$
CMUP	ARCH	981	906	-
CMUP	MK	268	168	-
ARCH	ARCH	315	272	-
ARCH	MK	110	65	-
MK	ARCH	69	65	$92.54^{+0.75}_{-0.68}$
MK	MK	27	17	$73.83^{+2.45}_{-2.23}$

TABLE XII: Dataset bhmummP20: Muon L1 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1074	-
CMUP	903	$97.38^{+0.52}_{-0.66}$
CMX	841	$90.70^{+0.95}_{-1.10}$
CMUP-CMX	819	-
CMUPA	766	-
CMUPMK	137	-
CMUPARCH	692	$90.34^{+1.16}_{-1.23}$
CMUP-MK	127	$92.70^{+2.42}_{-3.05}$

TABLE XIII: Dataset bhmummP20: Muon L2 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1074	-
CMUP-CMUP$_S$	869	-
CMX-CMX$_S$	819	-
CMUP-CMX-CMUP$_S$	799	$95.01^{+0.75}_{-0.91}$
CMUP-CMX-CMX$_S$	799	$88.48^{+1.12}_{-1.13}$
CMUP-CMX-CMX$_S$-A	676	$88.25^{+1.10}_{-1.24}$
CMUP-CMX-CMX$_S$-MK	123	$89.78^{+2.60}_{-3.26}$

TABLE XIV: Dataset bhmummP20: Muon L2 SLAM trigger efficiencies

Category	Efficiency (%)
CMUP	$90.74^{+0.72}_{-0.87}$
CMX	$78.20^{+1.13}_{-1.20}$
ARCH	$83.36^{+1.28}_{-1.33}$
MK	$67.90^{+2.90}_{-3.28}$
CMUP$_S$	$88.52^{+0.87}_{-1.04}$
CMX$_S$	$76.29^{+1.23}_{-1.22}$
ARCH$_S$	$81.43^{+1.23}_{-1.33}$
MK$_S$	$65.76^{+2.93}_{-3.33}$

TABLE XVI: Dataset bhmummP20: Muon combined trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L2	819	-
CMUP	812	$99.26^{+0.27}_{-0.46}$
CMX	815	$99.63^{+0.21}_{-0.35}$
CMUP-CMX	809	-
CMUPA	685	-
CMUPMK	127	-
CMUPARCH	683	$99.71^{+0.18}_{-0.38}$
CMUP-MK	126	$99.21^{+0.64}_{-1.80}$

TABLE XV: Dataset bhmummP20: Muon L3 trigger efficiencies