Cut	Count	Efficiency (%)
No cut	4036	
E_{EM} cut	3922	$97.18^{+0.26}_{-0.28}$
E_{HAD} cut	3978	$98.56^{+0.18}_{-0.21}$
COT hits cut	4033	$99.93^{+0.04}_{-0.08}$
d_0 cut	4011	$99.38^{+0.12}_{-0.15}$
Isolation cut	3813	$94.47^{+0.37}_{-0.41}$
Δx_{CMU} cut	4023	$99.68^{+0.08}_{-0.11}$
Δx_{CMP} cut	3960	$98.12^{+0.21}_{-0.23}$
All above cuts	3555	$88.08^{+0.52}_{-0.51}$
All cuts excl. isol.	3756	$93.06^{+0.42}_{-0.41}$
Sliding isol. cut	3882	$96.18^{+0.32}_{-0.31}$
All cuts (sliding isol.)	3618	$89.64^{+0.47}_{-0.51}$
χ^2 cut	4036	$100.00^{+0.00}_{-0.05}$
All cuts (χ^2)	3555	$88.08^{+0.52}_{-0.51}$
All track cuts	3631	$89.97^{+0.49}_{-0.49}$
All trk cuts excl. isol.	3837	$95.07^{+0.37}_{-0.37}$

TABLE I: Dataset bhmummP21_SAM: Muon ID efficiencies for CMUP

Cut	Count	Efficiency (%)
No cut	2780	
E_{EM} cut	2705	$97.30^{+0.33}_{-0.35}$
E_{HAD} cut	2725	$98.02^{+0.25}_{-0.29}$
COT hits cut	2778	$99.93^{+0.04}_{-0.10}$
d_0 cut	2768	$99.57^{+0.13}_{-0.17}$
Isolation cut	2669	$96.01^{+0.36}_{-0.43}$
Δx_{CMX} cut	2769	$99.60^{+0.12}_{-0.16}$
All above cuts	2534	$91.15^{+0.50}_{-0.55}$
All cuts excl. isol.	2635	$94.78^{+0.41}_{-0.47}$
Sliding isol. cut	2701	$97.16^{+0.33}_{-0.36}$
All cuts (sliding isol.)	2563	$92.19^{+0.51}_{-0.52}$
χ^2 cut	2780	$100.00^{+0.00}_{-0.07}$
All cuts (χ^2)	2534	$91.15^{+0.50}_{-0.55}$
All track cuts	2543	$91.47^{+0.54}_{-0.58}$
All trk cuts excl. isol.	2644	$95.11^{+0.42}_{-0.45}$

TABLE II: Dataset bhmummP21_SAM: Muon ID efficiencies for CMX

Cut	Count	Efficiency (%)
No cut	2229	
E_{EM} cut	2167	$97.22^{+0.36}_{-0.42}$
E_{HAD} cut	2183	$97.94^{+0.28}_{-0.35}$
COT hits cut	2227	$99.91^{+0.06}_{-0.12}$
d_0 cut	2218	$99.51^{+0.14}_{-0.20}$
Isolation cut	2139	$95.96^{+0.40}_{-0.48}$
Δx_{CMX} cut	2221	$99.64^{+0.13}_{-0.17}$
All above cuts	2028	$90.98^{+0.57}_{-0.60}$
All cuts excl. isol.	2110	$94.66^{+0.48}_{-0.50}$
Sliding isol. cut	2163	$97.04^{+0.35}_{-0.38}$
All cuts (sliding isol.)	2051	$92.01^{+0.61}_{-0.66}$
χ^2 cut	2229	$100.00^{+0.00}_{-0.08}$
All cuts (χ^2)	2028	$90.98^{+0.57}_{-0.60}$
All track cuts	2034	$91.25^{+0.59}_{-0.68}$
All trk cuts excl. isol.	2116	$94.93^{+0.46}_{-0.52}$

TABLE III: Dataset bhmummP21_SAM: Muon ID efficiencies for CMX Arches

Cut	Count	Efficiency (%)
No cut	434	
E_{EM} cut	423	$97.47^{+0.73}_{-1.03}$
E_{HAD} cut	427	$98.39^{+0.59}_{-0.88}$
COT hits cut	434	$100.00^{+0.00}_{-0.42}$
d_0 cut	433	$99.77^{+0.19}_{-0.54}$
Isolation cut	416	$95.85^{+0.97}_{-1.17}$
Δx_{CMX} cut	431	$99.31^{+0.37}_{-0.65}$
All above cuts	396	$91.24^{+1.43}_{-1.50}$
All cuts excl. isol.	412	$94.93^{+1.07}_{-1.28}$
Sliding isol. cut	423	$97.47^{+0.73}_{-1.03}$
All cuts (sliding isol.)	401	$92.40^{+1.26}_{-1.48}$
χ^2 cut	434	$100.00^{+0.00}_{-0.42}$
All cuts (χ^2)	396	$91.24^{+1.43}_{-1.50}$
All track cuts	399	$91.94^{+1.33}_{-1.60}$
All trk cuts excl. isol.	415	$95.62^{+1.01}_{-1.24}$

TABLE IV: Dataset bhmummP21_SAM: Muon ID efficiencies for CMX Miniskirt

Cut	Count	Efficiency (%)
No cut	117	
E_{EM} cut	115	$98.29^{+1.03}_{-2.29}$
E_{HAD} cut	115	$98.29^{+1.03}_{-2.29}$
COT hits cut	117	$100.00^{+0.00}_{-1.56}$
d_0 cut	117	$100.00^{+0.00}_{-1.56}$
Isolation cut	114	$97.44^{+1.49}_{-2.42}$
Δx_{CMX} cut	117	$100.00^{+0.00}_{-1.56}$
All above cuts	110	$94.02^{+2.27}_{-3.20}$
All cuts excl. isol.	113	$96.58^{+1.56}_{-2.54}$
Sliding isol. cut	115	$98.29^{+1.03}_{-2.29}$
All cuts (sliding isol.)	111	$94.87^{+2.20}_{-2.98}$
χ^2 cut	117	$100.00^{+0.00}_{-1.56}$
All cuts (χ^2)	110	$94.02^{+2.27}_{-3.20}$
All track cuts	110	$94.02^{+2.27}_{-3.20}$
All trk cuts excl. isol.	113	$96.58^{+1.56}_{-2.54}$

TABLE V: Dataset bhmummP21_SAM: Muon ID efficiencies for CMX Keystone

Cut	Count	Efficiency (%)
No cut	551	
E_{EM} cut	538	$97.64^{+0.65}_{-0.81}$
E_{HAD} cut	542	$98.37^{+0.51}_{-0.76}$
COT hits cut	551	$100.00^{+0.00}_{-0.33}$
d_0 cut	550	$99.82^{+0.14}_{-0.42}$
Isolation cut	530	$96.19^{+0.83}_{-1.02}$
Δx_{CMX} cut	548	$99.46^{+0.28}_{-0.51}$
All above cuts	506	$91.83^{+1.23}_{-1.31}$
All cuts excl. isol.	525	$95.28^{+0.86}_{-1.09}$
Sliding isol. cut	538	$97.64^{+0.65}_{-0.81}$
All cuts (sliding isol.)	512	$92.92^{+1.12}_{-1.22}$
χ^2 cut	551	$100.00^{+0.00}_{-0.33}$
All cuts (χ^2)	506	$91.83^{+1.23}_{-1.31}$
All track cuts	509	$92.38^{+1.08}_{-1.26}$
All trk cuts excl. isol.	528	$95.83^{+0.81}_{-1.05}$

TABLE VI: Dataset bhmummP21_SAM: Muon ID efficiencies for MiniKey

Cut	Count	Efficiency (%)
No cut	1032	
E_{EM} cut	997	$96.61^{+0.61}_{-0.66}$
E_{HAD} cut	1009	$97.77^{+0.45}_{-0.58}$
COT hits cut	1031	$99.90^{+0.08}_{-0.23}$
d_0 cut	1024	$99.22^{+0.26}_{-0.37}$
Isolation cut	979	$94.86^{+0.69}_{-0.77}$
Δx_{CMU} cut	1024	$99.22^{+0.26}_{-0.37}$
All above cuts	918	$88.95^{+0.94}_{-1.11}$
All cuts excl. isol.	963	$93.31^{+0.78}_{-0.88}$
Sliding isol. cut	994	$96.32^{+0.61}_{-0.66}$
All cuts (sliding isol.)	933	$90.41^{+0.95}_{-1.00}$
χ^2 cut	1032	$100.00^{+0.00}_{-0.18}$
All cuts (χ^2)	918	$88.95^{+0.94}_{-1.11}$
All track cuts	924	$89.53^{+0.94}_{-1.01}$
All trk cuts excl. isol.	970	$93.99^{+0.78}_{-0.88}$

TABLE VII: Dataset bhmummP21_SAM: Muon ID efficiencies for CMU-only

Cut	Count	Efficiency (%)
No cut	1111	
E_{EM} cut	1084	$97.57^{+0.45}_{-0.57}$
E_{HAD} cut	1101	$99.10^{+0.29}_{-0.39}$
COT hits cut	1110	$99.91^{+0.07}_{-0.21}$
d_0 cut	1107	$99.64^{+0.18}_{-0.29}$
Isolation cut	1043	$93.88^{+0.70}_{-0.76}$
Δx_{CMP} cut	1090	$98.11^{+0.40}_{-0.53}$
All above cuts	993	$89.38^{+0.90}_{-1.05}$
All cuts excl. isol.	1050	$94.51^{+0.66}_{-0.81}$
Sliding isol. cut	1058	$95.23^{+0.62}_{-0.75}$
All cuts (sliding isol.)	1007	$90.64^{+0.91}_{-0.94}$
χ^2 cut	1111	$100.00^{+0.00}_{-0.17}$
All cuts (χ^2)	993	$89.38^{+0.90}_{-1.05}$
All track cuts	1013	$91.18^{+0.86}_{-0.90}$
All trk cuts excl. isol.	1071	$96.40^{+0.52}_{-0.65}$

TABLE VIII: Dataset bhmummP21_SAM: Muon ID efficiencies for CMP-only

Cut	Count	Efficiency (%)
No cut	894	
E_{EM} cut	857	$95.86^{+0.67}_{-0.79}$
E_{HAD} cut	873	$97.65^{+0.54}_{-0.63}$
COT hits cut	883	$98.77^{+0.38}_{-0.50}$
d_0 cut	883	$98.77^{+0.38}_{-0.50}$
Isolation cut	838	$93.74^{+0.84}_{-0.91}$
Min E cut	857	$95.86^{+0.67}_{-0.79}$
All above cuts	768	$85.91^{+1.11}_{-1.24}$
All cuts excl. isol.	800	$89.49^{+0.99}_{-1.16}$
Sliding isol. cut	852	$95.30^{+0.74}_{-0.82}$
All cuts (sliding isol.)	778	$87.02^{+1.16}_{-1.23}$
χ^2 cut	894	$100.00^{+0.00}_{-0.21}$
All cuts (χ^2)	768	$85.91^{+1.11}_{-1.24}$

TABLE IX: Dataset bhmummP21_SAM: Muon ID efficiencies for CMIO

Cut	Count	Efficiency (%)
No cut	705	
E_{EM} cut	674	$95.60^{+0.74}_{-0.93}$
E_{HAD} cut	668	$94.75^{+0.80}_{-0.95}$
COT hits cut	704	$99.86^{+0.11}_{-0.33}$
d_0 cut	697	$98.87^{+0.38}_{-0.55}$
Isolation cut	635	$90.07^{+1.04}_{-1.30}$
Min E cut	702	$99.57^{+0.25}_{-0.42}$
All above cuts	590	$83.69^{+1.37}_{-1.56}$
All cuts excl. isol.	639	$90.64^{+1.06}_{-1.28}$
Sliding isol. cut	652	$92.48^{+1.02}_{-1.12}$
All cuts (sliding isol.)	606	$85.96^{+1.25}_{-1.48}$
χ^2 cut	705	$100.00^{+0.00}_{-0.26}$
All cuts (χ^2)	590	$83.69^{+1.37}_{-1.56}$

TABLE X: Dataset bhmummP21_SAM: Muon ID efficiencies for SCMIO

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	4474	3926	$87.75^{+0.51}_{-0.52}$
CMX	2852	2711	$95.06^{+0.43}_{-0.45}$
CMX Arches	2235	2165	$96.87^{+0.37}_{-0.41}$
CMX Miniskirt	491	430	$87.58^{+1.58}_{-1.74}$
CMX Keystone	126	116	$92.06^{+2.27}_{-3.20}$
CMU-only	1127	1002	$88.91^{+0.98}_{-0.97}$
CMP-only	1266	1089	$86.02^{+0.94}_{-1.01}$
CMX MiniKey	617	546	$88.49^{+1.25}_{-1.48}$

TABLE XI: Dataset bhmummP21_SAM: Muon reconstruction efficiencies

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	1304	1143	-
CMX	CMUP	1640	1524	$93.23^{+0.43}_{-0.40}$
CMUP	CMX	1746	1524	-
CMX	CMX	631	508	$88.05^{+0.64}_{-0.65}$
CMUP	ARCH	1368	1283	-
CMUP	MK	378	241	-
ARCH	ARCH	449	396	-
ARCH	MK	146	92	-
MK	ARCH	95	92	$93.90^{+0.56}_{-0.49}$
MK	MK	33	20	$73.96^{+2.01}_{-1.95}$

TABLE XII: Dataset bhmummP21_SAM: Muon L1 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1524	-
CMUP	1205	$98.35^{+0.41}_{-0.47}$
CMX	1090	$88.96^{+0.93}_{-1.02}$
CMUP-CMX	1072	-
CMUPA	1012	-
CMUPMK	193	-
CMUPARCH	904	$89.33^{+0.96}_{-1.10}$
CMUP-MK	168	$87.05^{+2.60}_{-2.87}$

TABLE XIII: Dataset bhmummP21_SAM: Muon L2 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1524	-
CMUP-CMUP$_S$	1151	-
CMX-CMX$_S$	1051	-
CMUP-CMX-CMUP$_S$	1033	$94.77^{+0.69}_{-0.78}$
CMUP-CMX-CMX$_S$	1033	$85.73^{+1.04}_{-1.11}$
CMUP-CMX-CMX$_S$-A	867	$85.67^{+1.10}_{-1.15}$
CMUP-CMX-CMX$_S$-MK	166	$86.01^{+2.47}_{-3.00}$

TABLE XIV: Dataset bhmummP21_SAM: Muon L2 SLAM trigger efficiencies

Category	Efficiency (%)
CMUP	$91.34^{+0.60}_{-0.65}$
CMX	$78.04^{+1.01}_{-1.09}$
ARCH	$83.51^{+1.04}_{-1.15}$
MK	$64.38^{+2.60}_{-2.81}$
CMUP$_S$	$88.02^{+0.78}_{-0.86}$
CMX$_S$	$75.20^{+1.07}_{-1.14}$
ARCH$_S$	$80.09^{+1.14}_{-1.19}$
MK$_S$	$63.61^{+2.51}_{-2.87}$

TABLE XVI: Dataset bhmummP21_SAM: Muon combined trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L2	1072	-
CMUP	1068	$99.63^{+0.19}_{-0.30}$
CMX	1068	$99.63^{+0.19}_{-0.30}$
CMUP-CMX	1064	-
CMUPA	901	-
CMUPMK	167	-
CMUPARCH	897	$99.56^{+0.21}_{-0.35}$
CMUP-MK	167	$100.00^{+0.00}_{-1.10}$

TABLE XV: Dataset bhmummP21_SAM: Muon L3 trigger efficiencies