Cut	Count	Efficiency (%)
No cut	3641	
E_{EM} cut	3541	$97.25^{+0.28}_{-0.31}$
E_{HAD} cut	3562	$97.83^{+0.25}_{-0.26}$
COT hits cut	3640	$99.97^{+0.02}_{-0.06}$
d_0 cut	3616	$99.31^{+0.14}_{-0.16}$
Isolation cut	3443	$94.56^{+0.38}_{-0.40}$
Δx_{CMU} cut	3628	$99.64^{+0.09}_{-0.13}$
Δx_{CMP} cut	3575	$98.19^{+0.21}_{-0.25}$
All above cuts	3192	$87.67^{+0.54}_{-0.58}$
All cuts excl. isol.	3368	$92.50^{+0.44}_{-0.49}$
Sliding isol. cut	3518	$96.62^{+0.28}_{-0.31}$
All cuts (sliding isol.)	3259	$89.51^{+0.51}_{-0.52}$
χ^2 cut	3641	$100.00^{+0.00}_{-0.05}$
All cuts (χ^2)	3192	$87.67^{+0.54}_{-0.58}$
All track cuts	3262	$89.59^{+0.52}_{-0.55}$
All trk cuts excl. isol.	3442	$94.53^{+0.36}_{-0.42}$

TABLE I: Dataset bhmumm22_SAM: Muon ID efficiencies for CMUP

Cut	Count	Efficiency (%)
No cut	2432	
E_{EM} cut	2348	$96.55^{+0.35}_{-0.43}$
E_{HAD} cut	2382	$97.94^{+0.27}_{-0.31}$
COT hits cut	2431	$99.96^{+0.03}_{-0.10}$
d_0 cut	2419	$99.47^{+0.16}_{-0.19}$
Isolation cut	2321	$95.44^{+0.44}_{-0.44}$
Δx_{CMX} cut	2418	$99.42^{+0.15}_{-0.19}$
All above cuts	2189	$90.01^{+0.57}_{-0.60}$
All cuts excl. isol.	2281	$93.79^{+0.47}_{-0.50}$
Sliding isol. cut	2357	$96.92^{+0.37}_{-0.41}$
All cuts (sliding isol.)	2222	$91.37^{+0.58}_{-0.59}$
χ^2 cut	2432	$100.00^{+0.00}_{-0.08}$
All cuts (χ^2)	2189	$90.01^{+0.57}_{-0.60}$
All track cuts	2198	$90.38^{+0.59}_{-0.68}$
All trk cuts excl. isol.	2290	$94.16^{+0.49}_{-0.53}$

TABLE II: Dataset bhmumm22_SAM: Muon ID efficiencies for CMX

Cut	Count	Efficiency (%)
No cut	1973	
E_{EM} cut	1906	$96.60^{+0.39}_{-0.44}$
E_{HAD} cut	1933	$97.97^{+0.29}_{-0.39}$
COT hits cut	1972	$99.95^{+0.04}_{-0.12}$
d_0 cut	1961	$99.39^{+0.18}_{-0.23}$
Isolation cut	1882	$95.39^{+0.49}_{-0.54}$
Δx_{CMX} cut	1961	$99.39^{+0.18}_{-0.23}$
All above cuts	1774	$89.91^{+0.66}_{-0.70}$
All cuts excl. isol.	1850	$93.77^{+0.52}_{-0.55}$
Sliding isol. cut	1911	$96.86^{+0.38}_{-0.45}$
All cuts (sliding isol.)	1800	$91.23^{+0.61}_{-0.66}$
χ^2 cut	1973	$100.00^{+0.00}_{-0.09}$
All cuts (χ^2)	1774	$89.91^{+0.66}_{-0.70}$
All track cuts	1782	$90.32^{+0.65}_{-0.72}$
All trk cuts excl. isol.	1858	$94.17^{+0.51}_{-0.57}$

TABLE III: Dataset bhmumm22_SAM: Muon ID efficiencies for CMX Arches

Cut	Count	Efficiency (%)
No cut	370	
E_{EM} cut	357	$96.49^{+0.93}_{-1.22}$
E_{HAD} cut	361	$97.57^{+0.82}_{-1.13}$
COT hits cut	370	$100.00^{+0.00}_{-0.50}$
d_0 cut	369	$99.73^{+0.25}_{-0.63}$
Isolation cut	352	$95.14^{+1.06}_{-1.48}$
Δx_{CMX} cut	368	$99.46^{+0.37}_{-0.70}$
All above cuts	333	$90.00^{+1.50}_{-1.82}$
All cuts excl. isol.	347	$93.78^{+1.24}_{-1.50}$
Sliding isol. cut	357	$96.49^{+0.93}_{-1.22}$
All cuts (sliding isol.)	338	$91.35^{+1.52}_{-1.80}$
χ^2 cut	370	$100.00^{+0.00}_{-0.50}$
All cuts (χ^2)	333	$90.00^{+1.50}_{-1.82}$
All track cuts	334	$90.27^{+1.62}_{-1.89}$
All trk cuts excl. isol.	348	$94.05^{+1.16}_{-1.57}$

TABLE IV: Dataset bhmumm22_SAM: Muon ID efficiencies for CMX Miniskirt

Cut	Count	Efficiency (%)
No cut	89	
E_{EM} cut	85	$95.51^{+1.96}_{-3.51}$
E_{HAD} cut	88	$98.88^{+1.03}_{-2.49}$
COT hits cut	89	$100.00^{+0.00}_{-2.05}$
d_0 cut	89	$100.00^{+0.00}_{-2.05}$
Isolation cut	87	$97.75^{+1.37}_{-2.93}$
Δx_{CMX} cut	89	$100.00^{+0.00}_{-2.05}$
All above cuts	82	$92.13^{+2.98}_{-4.05}$
All cuts excl. isol.	84	$94.38^{+2.30}_{-3.56}$
Sliding isol. cut	89	$100.00^{+0.00}_{-2.05}$
All cuts (sliding isol.)	84	$94.38^{+2.30}_{-3.56}$
χ^2 cut	89	$100.00^{+0.00}_{-2.05}$
All cuts (χ^2)	82	$92.13^{+2.98}_{-4.05}$
All track cuts	82	$92.13^{+2.98}_{-4.05}$
All trk cuts excl. isol.	84	$94.38^{+2.30}_{-3.56}$

TABLE V: Dataset bhmumm22_SAM: Muon ID efficiencies for CMX Keystone

Cut	Count	Efficiency (%)
No cut	459	
E_{EM} cut	442	$96.30^{+0.92}_{-1.13}$
E_{HAD} cut	449	$97.82^{+0.66}_{-0.90}$
COT hits cut	459	$100.00^{+0.00}_{-0.40}$
d_0 cut	458	$99.78^{+0.18}_{-0.50}$
Isolation cut	439	$95.64^{+0.99}_{-1.16}$
Δx_{CMX} cut	457	$99.56^{+0.26}_{-0.57}$
All above cuts	415	$90.41^{+1.48}_{-1.64}$
All cuts excl. isol.	431	$93.90^{+1.12}_{-1.42}$
Sliding isol. cut	446	$97.17^{+0.73}_{-1.03}$
All cuts (sliding isol.)	422	$91.94^{+1.32}_{-1.41}$
χ^2 cut	459	$100.00^{+0.00}_{-0.40}$
All cuts (χ^2)	415	$90.41^{+1.48}_{-1.64}$
All track cuts	416	$90.63^{+1.46}_{-1.47}$
All trk cuts excl. isol.	432	$94.12^{+1.10}_{-1.25}$

TABLE VI: Dataset bhmumm22_SAM: Muon ID efficiencies for MiniKey

Cut	Count	Efficiency (%)
No cut	854	
E_{EM} cut	823	$96.37^{+0.65}_{-0.72}$
E_{HAD} cut	834	$97.66^{+0.54}_{-0.64}$
COT hits cut	854	$100.00^{+0.00}_{-0.22}$
d_0 cut	852	$99.77^{+0.15}_{-0.32}$
Isolation cut	801	$93.79^{+0.79}_{-0.97}$
Δx_{CMU} cut	850	$99.53^{+0.21}_{-0.37}$
All above cuts	756	$88.52^{+1.03}_{-1.17}$
All cuts excl. isol.	800	$93.68^{+0.81}_{-0.95}$
Sliding isol. cut	814	$95.32^{+0.73}_{-0.83}$
All cuts (sliding isol.)	766	$89.70^{+1.08}_{-1.17}$
χ^2 cut	854	$100.00^{+0.00}_{-0.22}$
All cuts (χ^2)	756	$88.52^{+1.03}_{-1.17}$
All track cuts	760	$88.99^{+1.09}_{-1.15}$
All trk cuts excl. isol.	804	$94.15^{+0.83}_{-0.93}$

TABLE VII: Dataset bhmumm22_SAM: Muon ID efficiencies for CMU-only

Cut	Count	Efficiency (%)
No cut	983	
E_{EM} cut	961	$97.76^{+0.46}_{-0.57}$
E_{HAD} cut	973	$98.98^{+0.31}_{-0.42}$
COT hits cut	982	$99.90^{+0.08}_{-0.23}$
d_0 cut	978	$99.49^{+0.23}_{-0.33}$
Isolation cut	933	$94.91^{+0.74}_{-0.82}$
Δx_{CMP} cut	960	$97.66^{+0.46}_{-0.57}$
All above cuts	879	$89.42^{+0.96}_{-1.09}$
All cuts excl. isol.	928	$94.40^{+0.76}_{-0.80}$
Sliding isol. cut	953	$96.95^{+0.56}_{-0.61}$
All cuts (sliding isol.)	898	$91.35^{+0.88}_{-0.97}$
χ^2 cut	983	$100.00^{+0.00}_{-0.19}$
All cuts (χ^2)	879	$89.42^{+0.96}_{-1.09}$
All track cuts	899	$91.45^{+0.88}_{-0.98}$
All trk cuts excl. isol.	949	$96.54^{+0.58}_{-0.69}$

TABLE VIII: Dataset bhmumm22_SAM: Muon ID efficiencies for CMP-only

Cut	Count	Efficiency (%)
No cut	839	
E_{EM} cut	809	$96.42^{+0.60}_{-0.77}$
E_{HAD} cut	825	$98.33^{+0.42}_{-0.55}$
COT hits cut	831	$99.05^{+0.34}_{-0.49}$
d_0 cut	828	$98.69^{+0.41}_{-0.52}$
Isolation cut	776	$92.49^{+0.92}_{-1.04}$
Min E cut	811	$96.66^{+0.65}_{-0.72}$
All above cuts	722	$86.05^{+1.15}_{-1.39}$
All cuts excl. isol.	767	$91.42^{+1.01}_{-1.04}$
Sliding isol. cut	792	$94.40^{+0.77}_{-0.89}$
All cuts (sliding isol.)	737	$87.84^{+1.12}_{-1.27}$
χ^2 cut	839	$100.00^{+0.00}_{-0.22}$
All cuts (χ^2)	722	$86.05^{+1.15}_{-1.39}$

TABLE IX: Dataset bhmumm22_SAM: Muon ID efficiencies for CMIO

Cut	Count	Efficiency (%)
No cut	695	
E_{EM} cut	664	$95.54^{+0.80}_{-0.96}$
E_{HAD} cut	671	$96.55^{+0.67}_{-0.79}$
COT hits cut	693	$99.71^{+0.18}_{-0.38}$
d_0 cut	688	$98.99^{+0.35}_{-0.53}$
Isolation cut	655	$94.24^{+0.92}_{-1.03}$
Min E cut	688	$98.99^{+0.35}_{-0.53}$
All above cuts	605	$87.05^{+1.33}_{-1.41}$
All cuts excl. isol.	634	$91.22^{+1.06}_{-1.23}$
Sliding isol. cut	663	$95.40^{+0.84}_{-0.91}$
All cuts (sliding isol.)	613	$88.20^{+1.15}_{-1.39}$
χ^2 cut	695	$100.00^{+0.00}_{-0.26}$
All cuts (χ^2)	605	$87.05^{+1.33}_{-1.41}$

TABLE X: Dataset bhmumm22_SAM: Muon ID efficiencies for SCMIO

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	4074	3545	$87.02^{+0.51}_{-0.57}$
CMX	2473	2351	$95.07^{+0.42}_{-0.46}$
CMX Arches	1970	1902	$96.55^{+0.40}_{-0.48}$
CMX Miniskirt	409	362	$88.51^{+1.63}_{-1.89}$
CMX Keystone	94	87	$92.55^{+2.56}_{-3.69}$
CMU-only	940	827	$87.98^{+1.03}_{-1.11}$
CMP-only	1110	967	$87.12^{+1.02}_{-1.13}$
CMX MiniKey	503	449	$89.26^{+1.46}_{-1.47}$

TABLE XI: Dataset bhmumm22_SAM: Muon reconstruction efficiencies

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	1166	1028	-
CMX	CMUP	1526	1423	$93.53^{+0.45}_{-0.41}$
CMUP	CMX	1577	1423	-
CMX	CMX	514	415	$89.94^{+0.68}_{-0.61}$
CMUP	ARCH	1260	1214	-
CMUP	MK	317	209	-
ARCH	ARCH	359	332	-
ARCH	MK	122	68	-
MK	ARCH	70	68	$96.32^{+0.47}_{-0.44}$
MK	MK	31	15	$74.87^{+2.19}_{-2.00}$

TABLE XII: Dataset bhmumm22_SAM: Muon L1 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1423	-
CMUP	1112	$96.87^{+0.54}_{-0.63}$
CMX	991	$86.33^{+1.02}_{-1.13}$
CMUP-CMX	960	-
CMUPA	936	-
CMUPMK	176	-
CMUPARCH	816	$87.18^{+1.15}_{-1.19}$
CMUP-MK	144	$81.82^{+3.14}_{-3.50}$

TABLE XIII: Dataset bhmumm22_SAM: Muon L2 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1423	-
CMUP-CMUP$_S$	872	-
CMX-CMX$_S$	796	-
CMUP-CMX-CMUP$_S$	767	$77.40^{+1.41}_{-1.32}$
CMUP-CMX-CMX$_S$	767	$68.97^{+1.44}_{-1.45}$
CMUP-CMX-CMX$_S$-A	646	$69.02^{+1.59}_{-1.54}$
CMUP-CMX-CMX$_S$-MK	121	$68.75^{+3.71}_{-3.71}$

TABLE XIV: Dataset bhmumm22_SAM: Muon L2 SLAM trigger efficiencies

Category	Efficiency (%)
CMUP	$90.23^{+0.69}_{-0.77}$
CMX	$77.16^{+1.10}_{-1.17}$
ARCH	$83.35^{+1.20}_{-1.26}$
MK	$61.26^{+2.96}_{-3.18}$
CMUP$_S$	$72.09^{+1.37}_{-1.29}$
CMX$_S$	$61.65^{+1.37}_{-1.38}$
ARCH$_S$	$65.98^{+1.56}_{-1.53}$
MK$_S$	$51.47^{+3.16}_{-3.17}$

TABLE XVI: Dataset bhmumm22_SAM: Muon combined trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L2	960	-
CMUP	955	$99.58^{+0.21}_{-0.32}$
CMX	953	$99.37^{+0.26}_{-0.37}$
CMUP-CMX	949	-
CMUPA	811	-
CMUPMK	144	-
CMUPARCH	805	$99.26^{+0.28}_{-0.46}$
CMUP-MK	144	$100.00^{+0.00}_{-1.27}$

TABLE XV: Dataset bhmumm22_SAM: Muon L3 trigger efficiencies