Cut	Count	Efficiency (%)
No cut	2763	
E_{EM} cut	2692	$97.43^{+0.30}_{-0.34}$
E_{HAD} cut	2708	$98.01^{+0.26}_{-0.28}$
COT hits cut	2762	$99.96^{+0.03}_{-0.08}$
d_0 cut	2746	$99.38^{+0.14}_{-0.18}$
Isolation cut	2633	$95.29^{+0.38}_{-0.45}$
Δx_{CMU} cut	2754	$99.67^{+0.11}_{-0.14}$
Δx_{CMP} cut	2709	$98.05^{+0.27}_{-0.32}$
All above cuts	2451	$88.71^{+0.60}_{-0.67}$
All cuts excl. isol.	2568	$92.94^{+0.49}_{-0.54}$
Sliding isol. cut	2660	$96.27^{+0.38}_{-0.40}$
All cuts (sliding isol.)	2475	$89.58^{+0.61}_{-0.66}$
χ^2 cut	2763	$100.00^{+0.00}_{-0.07}$
All cuts (χ^2)	2451	$88.71^{+0.60}_{-0.67}$
All track cuts	2506	$90.70^{+0.56}_{-0.61}$
All trk cuts excl. isol.	2624	$94.97^{+0.42}_{-0.46}$

TABLE I: Dataset bhmummP19: Muon ID efficiencies for CMUP

Cut	Count	Efficiency (%)
No cut	1896	
E_{EM} cut	1830	$96.52^{+0.43}_{-0.45}$
E_{HAD} cut	1861	$98.15^{+0.31}_{-0.38}$
COT hits cut	1894	$99.89^{+0.06}_{-0.14}$
d_0 cut	1893	$99.84^{+0.09}_{-0.15}$
Isolation cut	1794	$94.62^{+0.55}_{-0.55}$
Δx_{CMX} cut	1888	$99.58^{+0.14}_{-0.20}$
All above cuts	1694	$89.35^{+0.74}_{-0.72}$
All cuts excl. isol.	1787	$94.25^{+0.52}_{-0.55}$
Sliding isol. cut	1825	$96.26^{+0.45}_{-0.48}$
All cuts (sliding isol.)	1722	$90.82^{+0.63}_{-0.73}$
χ^2 cut	1896	$100.00^{+0.00}_{-0.10}$
All cuts (χ^2)	1694	$89.35^{+0.74}_{-0.72}$
All track cuts	1701	$89.72^{+0.67}_{-0.70}$
All trk cuts excl. isol.	1795	$94.67^{+0.49}_{-0.56}$

TABLE II: Dataset bhmummP19: Muon ID efficiencies for CMX

Cut	Count	Efficiency (%)
No cut	1552	
E_{EM} cut	1496	$96.39^{+0.46}_{-0.52}$
E_{HAD} cut	1522	$98.07^{+0.35}_{-0.44}$
COT hits cut	1550	$99.87^{+0.09}_{-0.17}$
d_0 cut	1550	$99.87^{+0.09}_{-0.17}$
Isolation cut	1470	$94.72^{+0.55}_{-0.62}$
Δx_{CMX} cut	1545	$99.55^{+0.17}_{-0.24}$
All above cuts	1386	$89.30^{+0.78}_{-0.88}$
All cuts excl. isol.	1460	$94.07^{+0.61}_{-0.66}$
Sliding isol. cut	1497	$96.46^{+0.49}_{-0.53}$
All cuts (sliding isol.)	1410	$90.85^{+0.70}_{-0.76}$
χ^2 cut	1552	$100.00^{+0.00}_{-0.12}$
All cuts (χ^2)	1386	$89.30^{+0.78}_{-0.88}$
All track cuts	1392	$89.69^{+0.79}_{-0.87}$
All trk cuts excl. isol.	1467	$94.52^{+0.55}_{-0.63}$

TABLE III: Dataset bhmummP19: Muon ID efficiencies for CMX Arches

Cut	Count	Efficiency (%)
No cut	278	
E_{EM} cut	270	$97.12^{+1.02}_{-1.37}$
E_{HAD} cut	273	$98.20^{+0.77}_{-1.18}$
COT hits cut	278	$100.00^{+0.00}_{-0.66}$
d_0 cut	277	$99.64^{+0.29}_{-0.84}$
Isolation cut	262	$94.24^{+1.36}_{-1.76}$
Δx_{CMX} cut	277	$99.64^{+0.29}_{-0.84}$
All above cuts	248	$89.21^{+1.90}_{-2.20}$
All cuts excl. isol.	263	$94.60^{+1.39}_{-1.73}$
Sliding isol. cut	266	$95.68^{+1.29}_{-1.64}$
All cuts (sliding isol.)	252	$90.65^{+1.83}_{-2.07}$
χ^2 cut	278	$100.00^{+0.00}_{-0.66}$
All cuts (χ^2)	248	$89.21^{+1.90}_{-2.20}$
All track cuts	249	$89.57^{+1.94}_{-2.17}$
All trk cuts excl. isol.	264	$94.96^{+1.23}_{-1.70}$

TABLE IV: Dataset bhmummP19: Muon ID efficiencies for CMX Miniskirt

Cut	Count	Efficiency (%)
No cut	66	
E_{EM} cut	64	$96.97^{+2.05}_{-3.81}$
E_{HAD} cut	66	$100.00^{+0.00}_{-2.75}$
COT hits cut	66	$100.00^{+0.00}_{-2.75}$
d_0 cut	66	$100.00^{+0.00}_{-2.75}$
Isolation cut	62	$93.94^{+2.74}_{-4.68}$
Δx_{CMX} cut	66	$100.00^{+0.00}_{-2.75}$
All above cuts	60	$90.91^{+3.43}_{-5.17}$
All cuts excl. isol.	64	$96.97^{+2.05}_{-3.81}$
Sliding isol. cut	62	$93.94^{+2.74}_{-4.68}$
All cuts (sliding isol.)	60	$90.91^{+3.43}_{-5.17}$
χ^2 cut	66	$100.00^{+0.00}_{-2.75}$
All cuts (χ^2)	60	$90.91^{+3.43}_{-5.17}$
All track cuts	60	$90.91^{+3.43}_{-5.17}$
All trk cuts excl. isol.	64	$96.97^{+2.05}_{-3.81}$

TABLE V: Dataset bhmummP19: Muon ID efficiencies for CMX Keystone

Cut	Count	Efficiency (%)
No cut	344	
E_{EM} cut	334	$97.09^{+0.91}_{-1.24}$
E_{HAD} cut	339	$98.55^{+0.62}_{-0.94}$
COT hits cut	344	$100.00^{+0.00}_{-0.53}$
d_0 cut	343	$99.71^{+0.22}_{-0.66}$
Isolation cut	324	$94.19^{+1.22}_{-1.51}$
Δx_{CMX} cut	343	$99.71^{+0.22}_{-0.66}$
All above cuts	308	$89.53^{+1.58}_{-1.94}$
All cuts excl. isol.	327	$95.06^{+1.13}_{-1.41}$
Sliding isol. cut	328	$95.35^{+1.23}_{-1.50}$
All cuts (sliding isol.)	312	$90.70^{+1.59}_{-1.93}$
χ^2 cut	344	$100.00^{+0.00}_{-0.53}$
All cuts (χ^2)	308	$89.53^{+1.58}_{-1.94}$
All track cuts	309	$89.83^{+1.68}_{-1.84}$
All trk cuts excl. isol.	328	$95.35^{+1.23}_{-1.50}$

TABLE VI: Dataset bhmummP19: Muon ID efficiencies for MiniKey

Cut	Count	Efficiency (%)
No cut	678	
E_{EM} cut	654	$96.46^{+0.76}_{-0.90}$
E_{HAD} cut	663	$97.79^{+0.60}_{-0.77}$
COT hits cut	677	$99.85^{+0.11}_{-0.33}$
d_0 cut	675	$99.56^{+0.22}_{-0.41}$
Isolation cut	648	$95.58^{+0.76}_{-0.90}$
Δx_{CMU} cut	676	$99.71^{+0.19}_{-0.38}$
All above cuts	612	$90.27^{+1.24}_{-1.30}$
All cuts excl. isol.	637	$93.95^{+0.92}_{-1.03}$
Sliding isol. cut	660	$97.35^{+0.65}_{-0.81}$
All cuts (sliding isol.)	622	$91.74^{+1.13}_{-1.16}$
χ^2 cut	678	$100.00^{+0.00}_{-0.27}$
All cuts (χ^2)	612	$90.27^{+1.24}_{-1.30}$
All track cuts	613	$90.41^{+1.09}_{-1.25}$
All trk cuts excl. isol.	638	$94.10^{+0.87}_{-1.08}$

TABLE VII: Dataset bhmummP19: Muon ID efficiencies for CMU-only

Cut	Count	Efficiency (%)
No cut	764	
E_{EM} cut	750	$98.17^{+0.49}_{-0.63}$
E_{HAD} cut	753	$98.56^{+0.44}_{-0.59}$
COT hits cut	762	$99.74^{+0.18}_{-0.34}$
d_0 cut	763	$99.87^{+0.12}_{-0.30}$
Isolation cut	718	$93.98^{+0.89}_{-0.96}$
Δx_{CMP} cut	740	$96.86^{+0.65}_{-0.81}$
All above cuts	677	$88.61^{+1.13}_{-1.21}$
All cuts excl. isol.	716	$93.72^{+0.86}_{-0.99}$
Sliding isol. cut	730	$95.55^{+0.79}_{-0.87}$
All cuts (sliding isol.)	687	$89.92^{+1.19}_{-1.20}$
χ^2 cut	764	$100.00^{+0.00}_{-0.24}$
All cuts (χ^2)	677	$88.61^{+1.13}_{-1.21}$
All track cuts	697	$91.23^{+1.01}_{-1.14}$
All trk cuts excl. isol.	737	$96.47^{+0.65}_{-0.81}$

TABLE VIII: Dataset bhmummP19: Muon ID efficiencies for CMP-only

Cut	Count	Efficiency (%)
No cut	640	
E_{EM} cut	608	$95.00^{+0.85}_{-1.01}$
E_{HAD} cut	618	$96.56^{+0.75}_{-0.91}$
COT hits cut	635	$99.22^{+0.32}_{-0.51}$
d_0 cut	633	$98.91^{+0.39}_{-0.59}$
Isolation cut	586	$91.56^{+1.11}_{-1.23}$
Min E cut	614	$95.94^{+0.79}_{-0.97}$
All above cuts	534	$83.44^{+1.43}_{-1.70}$
All cuts excl. isol.	565	$88.28^{+1.27}_{-1.46}$
Sliding isol. cut	593	$92.66^{+1.04}_{-1.20}$
All cuts (sliding isol.)	539	$84.22^{+1.43}_{-1.50}$
χ^2 cut	640	$100.00^{+0.00}_{-0.29}$
All cuts (χ^2)	534	$83.44^{+1.43}_{-1.70}$

TABLE IX: Dataset bhmummP19: Muon ID efficiencies for CMIO

Cut	Count	Efficiency (%)
No cut	522	
E_{EM} cut	497	$95.21^{+0.93}_{-1.12}$
E_{HAD} cut	493	$94.44^{+1.01}_{-1.23}$
COT hits cut	522	$100.00^{+0.00}_{-0.35}$
d_0 cut	515	$98.66^{+0.51}_{-0.76}$
Isolation cut	486	$93.10^{+1.13}_{-1.21}$
Min E cut	518	$99.23^{+0.35}_{-0.63}$
All above cuts	451	$86.40^{+1.59}_{-1.73}$
All cuts excl. isol.	472	$90.42^{+1.28}_{-1.46}$
Sliding isol. cut	493	$94.44^{+1.01}_{-1.23}$
All cuts (sliding isol.)	457	$87.55^{+1.42}_{-1.71}$
χ^2 cut	522	$100.00^{+0.00}_{-0.35}$
All cuts (χ^2)	451	$86.40^{+1.59}_{-1.73}$

TABLE X: Dataset bhmummP19: Muon ID efficiencies for SCMIO

Category	Fiducial	w/ Stub	Efficiency (%)
CMUP	3087	2701	$87.50^{+0.64}_{-0.63}$
CMX	1922	1833	$95.37^{+0.50}_{-0.52}$
CMX Arches	1534	1493	$97.33^{+0.40}_{-0.48}$
CMX Miniskirt	307	270	$87.95^{+1.80}_{-2.11}$
CMX Keystone	81	70	$86.42^{+4.01}_{-4.97}$
CMU-only	757	661	$87.32^{+1.26}_{-1.28}$
CMP-only	851	753	$88.48^{+1.07}_{-1.23}$
CMX MiniKey	388	340	$87.63^{+1.73}_{-1.98}$

TABLE XI: Dataset bhmummP19: Muon reconstruction efficiencies

1st leg	2nd leg	1st passes	both pass	Efficiency (%)
CMUP	CMUP	873	773	-
CMX	CMUP	1140	1071	$93.93^{+0.52}_{-0.46}$
CMUP	CMX	1246	1071	-
CMX	CMX	406	301	$85.71^{+0.87}_{-0.84}$
CMUP	ARCH	1017	931	-
CMUP	MK	229	140	-
ARCH	ARCH	284	234	-
ARCH	MK	98	58	-
MK	ARCH	65	58	$91.13^{+0.80}_{-0.71}$
MK	MK	17	9	$72.63^{+2.70}_{-2.47}$

TABLE XII: Dataset bhmummP19: Muon L1 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1071	-
CMUP	858	$98.21^{+0.45}_{-0.62}$
CMX	781	$89.39^{+1.08}_{-1.16}$
CMUP-CMX	767	-
CMUPA	757	-
CMUPMK	101	-
CMUPARCH	681	$89.96^{+1.15}_{-1.24}$
CMUP-MK	86	$85.15^{+3.72}_{-4.48}$

TABLE XIII: Dataset bhmummP19: Muon L2 trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L1	1071	-
CMUP-CMUP$_S$	814	-
CMX-CMX$_S$	755	-
CMUP-CMX-CMUP$_S$	741	$94.88^{+0.78}_{-0.88}$
CMUP-CMX-CMX$_S$	741	$86.36^{+1.23}_{-1.31}$
CMUP-CMX-CMX$_S$-A	656	$86.66^{+1.33}_{-1.40}$
CMUP-CMX-CMX$_S$-MK	85	$84.16^{+3.93}_{-4.67}$

TABLE XIV: Dataset bhmummP19: Muon L2 SLAM trigger efficiencies

Category	Efficiency (%)
CMUP	$91.77^{+0.70}_{-0.84}$
CMX	$76.31^{+1.22}_{-1.28}$
ARCH	$81.74^{+1.28}_{-1.34}$
MK	$61.12^{+3.55}_{-4.16}$
CMUP$_S$	$88.66^{+0.91}_{-1.01}$
CMX$_S$	$73.73^{+1.30}_{-1.36}$
ARCH$_S$	$78.74^{+1.40}_{-1.45}$
MK$_S$	$60.41^{+3.64}_{-4.25}$

TABLE XVI: Dataset bhmummP19: Muon combined trigger efficiencies

Category	Events Passing	Efficiency (%)
Pass L2	767	-
CMUP	763	$99.48^{+0.26}_{-0.43}$
CMX	764	$99.61^{+0.21}_{-0.38}$
CMUP-CMX	760	-
CMUPA	677	-
CMUPMK	86	-
CMUPARCH	675	$99.70^{+0.19}_{-0.40}$
CMUP-MK	85	$98.84^{+0.87}_{-2.65}$

TABLE XV: Dataset bhmummP19: Muon L3 trigger efficiencies