

Report of the Scrutiny Group to the LHC RRB, October 2024

Membership of the Scrutiny Group

The membership of the Scrutiny Group in 2024 was: James Cochran (Iowa State University), Nicole D'Hose (CEA/IRFU), Ariane Frey (Göttingen; chair), Thierry Gys (CERN), Philip Marshall (SLAC), Monica Pepe (INFN, Perugia), Roman Pöschl (IJCLab, IN2P3 & Université Paris-Saclay), Agata Rozycka (CERN; Service Contracts), Burkhard Schmidt (CERN; Secretary), Christoph Schwanda (HEPHY), Jan Troska (CERN), Joost Vossebeld (University of Liverpool).

At the end of 2023 Joel Goldstein (Bristol), Edoardo Mazzucato (CEA/IRFU), Kevin Pitts (Fermilab), Heidi Sandaker (Oslo) and James Yeck (BNL) retired from the group. The Scrutiny Group (SG) wishes to thank them for their dedicated services over the years, and in particular wishes to thank Heidi for many years as a very committed chair of the SG.

1 General remarks

2024 is the third year of running (Run3) after Long Shutdown 2 (LS2). The p-p physics run started end of April and will continue to mid October. In November, three weeks of Pb-Pb running are planned. The YETS will start end of November. LHC operation has been very successful and the experiments have reported high efficiency of data taking. The high-quality scientific output of all experiments continues.

The continued war in Ukraine has serious implications for the maintenance, operation, data taking and analysis work of the existing experiments as well as the upgrades, both for computing and detectors. Work is ongoing to mitigate the additional costs and lack of manpower.

The Scrutiny Group congratulates the LHC and the experimental collaborations for all their efforts and achievements in 2024.

2 Scrutiny process and general matters

Following the RRB meeting from April 22-24 the SG held its Spring meeting from May 14-15. Both in the RRB and SG meeting summary reports on 2023 expenditures and 2025 requests were presented by the collaborations. The SG met with the LHC experiments ATLAS, ALICE, CMS, LHCb, represented by their respective Resource Coordinators and other members of the

senior management. The SG and experiment representatives discussed the closing of the 2023 accounts, the status of the 2024 spending, the budget request for 2025 as well as plans for the future. Additional in-depth discussions with each experiment took place in June. During these meetings each experiment was reviewed by a subgroup of the SG, who summarised the findings in internal reports. The Scrutiny Group met again in September 17-18 with the collaborations to discuss and resolve any outstanding matters. In addition to the scrutiny of the M&O A and B budgets, the SG also discussed the status and spending profiles of the Upgrade Common Funds (Phase-1 and Phase-2) with the experiments, following the agreement in 2015 (see RRB-2015-086).

The SG thanks the Resource Coordinators and the collaborations as a whole for the excellent cooperation and the constructive spirit of the discussions.

As a follow up of the RRB discussions in April 2024 and previous years, a few specific items were discussed in more depth with each experiment; the details are in the respective experiment's section:

- A follow-up on long-term projections for the special online computing replacement account. These accounts are allowed to go negative, and should not accumulate excessive cash reserves.
- In RRB-2017-070 it was agreed that carry-over on subdetector M&O B accounts should aim to stay below approximately 30% of the yearly budget. The SG continues to follow these developments and reduction is progressing for all subprojects where substantial reserves are present.
- A more in-depth review of M&O B contributions has been done, with special emphasis on cash versus in-kind contributions. While M&O B for the subsystems of ATLAS include only cash contributions paid into M&O B accounts at CERN, the M&O B contributions for the other LHC collaborations contain substantial in-kind contributions of the participating institutes with a significant fraction of human resources. More details are given in the corresponding sections of the experiments.
- Tracking of entry fees: ALICE, ATLAS and CMS charge "entry fees" for new institutes that wish to join the collaboration, to compensate for the lack of contribution to the original detector construction. In the interest of transparency, the SG has asked the experiments to report the status of and plans for these funds. These fees are not subject to the same level of scrutiny as M&O expenditures.
- Common funds: The SG was asked to evaluate if the collection of Common Funds is proceeding according to plan or if it represents a risk.

The following specific items came up during this year's scrutiny cycle:

- The CERN Council decision to terminate the International Cooperation Agreements (ICA) with the Russian Federation and Belarus at their expiration dates in 2024, and to continue the ICA with JINR is the baseline for this year's SG report. The payment of contributions by Russia for 2024 remains uncertain.

- Over the last years the SG has noted a general development of late payment of contributions affecting several of the experiments, this trend continued in 2024 but we see some improvements.
- The cost of Service Level Agreements (SLAs) to the experiments has increased over the past years. This has an impact on the M&O A requests of the experiments.
- The decision by CERN management to postpone the start of LS3 and to extend its duration has been taken at a late stage of the 2024 scrutiny cycle. The operation of the LHC for several months in 2026 and the extension of LS3 may have an impact on future M&O A and B requests of the experiments beyond 2025, which will be commented on in the respective sections.

3 Budget requests for 2025

Table 1 gives a global overview over the 2025 budget requests of the experiments. The requests are detailed in the relevant experiment subsections.

Table 1: M&O requests for 2025 in kCHF, showing three levels of inclusion of power costs. Without power costs, including the Non Member States (NMS) share and with full power costs (NMS and Member States (MS) share).

Experiment	without power	with NMS power	with full power
ALICE M&O A	5,206	5,692	7,555
ALICE M&O B	1,335	1,335	1,335
ALICE M&O A+B	6,541	7,027	8,890
ATLAS M&O A	12,550	13,292	14,750
ATLAS M&O B	6,650	6,650	6,650
ATLAS M&O A+B	19,200	19,942	21,400
CMS M&O A	13,814	14,476	15,514
CMS M&O B	7,293	7,293	7,293
CMS M&O A+B	21,107	21,769	22,807
LHCb M&O A	3,120	3,292	4,020
LHCb M&O B	1,290	1,290	1,290
LHCb M&O A+B	4,410	4,582	5,310

4 ALICE

ALICE M&O A closing report for 2023

The ALICE M&O A closing report was submitted to the RRB meeting in April (CERN-RRB-2024-020). The 2023 budget as approved in 2022 and the closing report presented in 2024 are shown in Table 2.

Table 2: Summary of the 2023 book closing of ALICE, listing the M&O A budget as approved in 2022 and the actual spending report in this year's scrutiny cycle. All numbers in kCHF.

M&O A Categories	Budget for 2023	Actual in 2023	Difference
Detector related	1,207	1,143	64
Secretariat	193	191	2
Communications	0	0	0
Offline computing	776	785	-9
Online computing	1,930	1,955	-25
Test beams & calibration facilities	30	15	15
Laboratory operations	245	232	13
General services	553	552	1
TOTAL without power	4,935	4,875	60
Power (NMS only)	665	669	-4
Power (MS + NMS)	2,502	2,516	-14
Grand Total	7,437	7,391	46

Spending: Total expenditure in 2023 excluding power was 4,875 kCHF, 60 kCHF below the budgeted sum of 4,935 kCHF. Including NMS power of 669 kCHF, the total expenditure was 5,544 kCHF. There were 51 kCHF in open commitments.

Carry-over: The cumulative balance between the budgeted amount and the actual expenditure at the end of 2023 was 776 kCHF (without power or open commitments). Including the NMS power contributions, it increased from 1,620 kCHF at the end of 2022 to 1,625 kCHF at the end of 2023. Taking into account received contributions (including advance contributions), the cash balance at the end of 2023 was -562 kCHF.

Online replacement account: In 2023, 1,441 kCHF was spent from the account. With a transfer of M&O A of 986 kCHF into the account, the balance decreased from 4,590 kCHF (Dec 2022) to 4,135 kCHF (Dec 2023).

Contributions: The invoiced total for 2023 was 5,600 kCHF; of this 435 kCHF were outstanding at year end from the funding agencies for 2023, with cumulative outstanding contributions at the end of 2023 of 1,300 kCHF. This is a deterioration compared to the previous year (876 kCHF cumulative outstanding contributions at year end).

CERN finance report: The SG confirms that the numbers reported by the experiment are in agreement with the figures reported by CERN finance.

The Scrutiny Group recommends approval of the ALICE 2023 M&O A closing report.

ALICE M&O B closing report for 2023

The M&O B budget for 2023 was 1,385 kCHF, while the actual spending reached 1,371 kCHF with 25 kCHF open commitments. This corresponds to an underspend of 14 kCHF of the approved annual budget. For the years 2021 - 2023, about 71% of the M&O B contributions are paid into accounts at CERN, while the remaining 29% are contributions managed by the collaborating institutes, either as cash or in-kind. For all subsystems the cash reserves on CERN accounts are well below the 30% of their annual budget.

The Scrutiny Group recommends approval of the ALICE 2023 M&O B closing report.

ALICE M&O situation in 2024

The spending of the 2024 M&O A budget proceeds according to plan. As of September 9, 70% of the budget of 5,064 kCHF (without power) is spent, including commitments. The planned transfer to the online replacement account in 2024 is 989 kCHF, which (as in the last few years) will be paid at the end of the year to help with late payments and avoid cash flow problems.

Special topics 2024

War in Ukraine:

There is a sizeable contribution to M&O A from Russia and JINR (around 10% of the total).

The PHOS subdetector is 100% under the responsibility of Russia and JINR, and there is also a large Russian contribution to the FIT. The collaboration has dedicated M&O A funding to facilitate the transfer of FIT responsibilities to other institutes, but has decided to switch off the PHOS.

The Scrutiny Group supports the proposal of the ALICE collaboration to waive the contribution from Ukraine for 2024 and 2025.

ALICE M&O A budget request for 2025

The budget request for 2025 is shown in Table 3 together with the previously approved budget for 2024 and the projections up to 2028. The request is based on LHC operation until June 2026 with a year-end-technical-stop of 3 months in the winter of 2025/2026.

The M&O A budget request for 2025 is 5,206 kCHF excluding power. The total power cost is 2,349 kCHF of which the NMS share is expected to be 486 kCHF. The reduction compared to the previous year is due to the termination of the ICA with the Russian Federation and the new status of Brazil as associated member of CERN. There are small increases due to changes to the CERN Service Level Agreements. The increase of 0.5 MCHF per year for Run 3 in the overall computing budget (split between offline and online), due to the new O2 data centre as agreed in 2018, will continue. The request includes the rent of 60 PB disk space for temporary data storage and small expenditures for system management, related to the Drupal migration.

Table 3: ALICE M&O A budget request for 2025, shown together with the 2024 budget and the projections up to 2028. All numbers in kCHF.

M&O A Categories	2024	2025	2026	2027	2028
Detector related	1,265	1,282	1,298	1,416	1,419
Secretariat	193	193	193	193	193
Communications	0	0	0	0	0
Core computing	776	776	776	776	776
Online computing	1,933	2,015	1,994	1,774	1,771
Test beams & calibration facilities	30	16	9	0	0
Laboratory operations	245	245	250	255	255
General services	623	678	686	792	792
TOTAL without power	5,064	5,206	5,206	5,206	5,206
Power (MS + NMS)	2,700	2,349	1,719	404	404
Grand Total	7,764	7,555	6,925	5,609	5,609

The Scrutiny Group recommends approval of the ALICE 2025 M&O A budget request.

ALICE Online Replacement Account Projections

During LS2, the online system was replaced by the substantially bigger O2 system (~ 9 MCHF), resulting in a significant increase of replacement costs in the long term (this differs from other experiments). These costs are partially funded through the online replacement account, consistent with direct replacements. The sum of 2,991 kCHF was spent during LS2 as planned. At the end of 2023 the account had a balance of 4,135 kCHF.

After LS2, the online account accumulates funds until the O2 system will be replaced in 2029 (8 MCHF), when the balance according to the latest projection is expected to go to 300 kCHF.

ALICE M&O B budget request for 2025

The budget requests for 2025 are shown in Tables 4 and 5 together with the 2024 budget and projections up to 2028. The M&O B budgets of each system are scrutinised internally in the collaboration and also at the national level during approval of the relevant budgets, as a fraction of about 30% is not paid into M&O B accounts at CERN. This concerns in particular the contributions for the Central Trigger and TOF, where the M&O B contributions are entirely managed by the collaborating institutes without payment into a CERN account. The Scrutiny Group has discussed the requests with ALICE in detail.

The requested M&O B budget for 2025 is 1,335 kCHF. This request takes also into account changes in some subsystems, such as the end of operation of the PHOS detector at the end of 2024.

The Scrutiny Group recommends approval of the ALICE 2025 M&O B budget request.

Table 4: ALICE M&O B budget planning by categories for the years 2024–2028. All numbers except the last row are in kCHF. The last row is in staff-months.

M&O B Categories	2024	2025	2026	2027	2028
Mechanics	83	31	33	33	33
Gas Systems	19	18	9	9	14
Cooling Systems	49	45	43	41	46
FEE Spares	61	57	53	50	50
Standard Electronics LV/HV PS	155	139	124	117	124
Standard Electronics Crates	41	36	32	32	32
Standard Electronics R/O modules	69	60	140	130	133
Controls (DCS & DSS)	24	24	25	48	33
Sub-Detector Spares	13	11	11	11	11
Areas	47	42	47	37	37
Communications	105	94	89	89	89
Store Items	69	59	62	57	57
Techn. Personpower@CERN: Industrial Support	9	9	12	7	7
Techn. Personp.@CERN from Collab. Institutes	713	711	680	655	649
Grand Total	1,456	1,335	1,360	1,316	1,315
Techn. Personp.@CERN from Inst.(staff months)	226	146	156	156	138

Table 5: ALICE M&O B budget planning by subsystem for the years 2024–2028. All numbers are in kCHF.

M&O B by Subsystem	2024	2025	2026	2027	2028
Central Trigger	11	11	11	11	11
EMCAL-DCAL	50	50	50	50	50
FIT	94	93	93	93	93
HMPID	25	25	25	0	0
ITS	360	360	360	360	360
MFT	82	74	74	74	74
MID	82	82	82	82	82
Muon tracking	130	130	130	130	130
PHOS	88	0	0	0	0
TOF	68	68	74	78	69
TPC	274	271	274	271	274
TRD	155	155	174	154	154
ZDC	16	16	13	13	13
Grand Total	1,456	1,335	1,360	1,316	1,315

ALICE Upgrade Common Fund and Entry Fees

The ALICE Phase-1 upgrade Common Fund budget is 5.8 MCHF. The actual costs have been 5,545 kCHF, leading to a balance of 255 kCHF. Of the invoiced contributions, 70 kCHF were still outstanding by the end of 2023. The total amount of received contributions to the upgrade Common Fund is 5,660 kCHF.

ALICE collects entry fees from new members. These funds are normally used for upgrade-related projects or other projects not covered, or going beyond, the Common Fund. In 2023, 66 kCHF of entry fees were received. The total amount of entry fees received by December 2023 is 1,033 kCHF. The total spending from the upgrade Common Fund has been 5947 kCHF. A cash balance of 747 kCHF remains (116 kCHF of upgrade Common Fund and 631 kCHF of entry fees). The cash balance of the Upgrade Common Fund Phase-I was moved to the new Common Fund and the old books were closed at the end of 2023. No further contributions to the Common Fund nor entry fees were received in 2024 so far.

5 ATLAS

ATLAS M&O A closing report for 2023

The ATLAS M&O A closing report was submitted to the RRB meeting in April (CERN-RRB-2024-029). The 2023 budget as approved in 2022 and the closing report presented in 2024 are shown in Table 6.

Table 6: Summary of the 2023 book closing of ATLAS, listing the M&O A budget as approved in 2022 and the actual spending report in this year's scrutiny cycle. All numbers in kCHF.

M&O A Categories	Budget for 2023	Actual in 2023	Difference
Detector related	4,897	5,080	-183
Secretariat	440	565	-125
Collaborative tools	173	224	-51
Core computing	2,354	2,397	-43
Online computing	4,000	1,623	2,377
Test beams & calibration facilities	145	116	29
Laboratory operations	90	36	54
General services	1,131	1,291	-160
TOTAL without power	13,230	11,331	1,899
Power (NMS only)	742	742	0
Power (MS + NMS)	2,200	2,200	0
Grand Total	15,430	13,531	1,899

Spending: The 2023 M&O A budget without power costs amounted to 13,230 kCHF. The total power costs were budgeted at 2,200 kCHF including a NMS share of 742 kCHF. The total budget was thus 15,430 kCHF. The actual expenditure in 2023 excluding power was 11,331 kCHF, 13,531 kCHF including power costs. This corresponds to an underspending of 1,899 kCHF.

This underspending is partially covered by a transfer to the Online replacement account of 1,853 kCHF. Deducting this from the underspending results in a net underspending of 46 kCHF, which should be compared to outstanding commitments of 1,163 kCHF.

Carry-over: The cash status went from 1,854 kCHF to 2,616 kCHF, which corresponds to 17% of the 2023 total budget (including power).

Online replacement account: In 2023, 1,853 kCHF were transferred to the Online replacement account, no withdrawals. The cumulative cash balance amounted to 2,478 kCHF at the end of 2023.

Contributions: The contributions received from Funding Agencies in 2023 were 14,687 kCHF, while the due contributions was 13,971 kCHF. The outstanding contributions in 2023 slightly decreased to 1,404 kCHF compared to 1,903 kCHF at the end of 2022.

CERN finance report: There is very good agreement between the Finance Department report (CERN-RRB-2024-026 and 027) and the numbers from the experiment.

The Scrutiny Group recommends approval of the ATLAS 2023 M&O A closing report.

ATLAS M&O B closing report for 2023

The M&O B budget in 2023 was 5,970 kCHF, with an actual spending of 6,256 kCHF including 4,803 kCHF for hired effort at CERN, with an overspending of 286 kCHF. At the end of 2023 the open commitments were 207 kCHF. All contributions to the ATLAS M&O B are cash payments, no in kind payments are received. The carry-over, summed over all subsystems at the end of the year, has decreased from 2,252 kCHF in 2022 to 1,965 kCHF in 2023, reduced by the open commitments to 1,758 kCHF. Globally, the M&O B carry-over is thus 29% of the annual budget and hence slightly below the target limit of 30%.

The Scrutiny Group recommends approval of the ATLAS 2023 M&O B closing report.

ATLAS M&O situation in 2024

The amount spent so far at the end of August 2024 on M&O A budget, including open commitments, is 8,766 kCHF, i.e. 67% of the 2024 approved budget of 13,108 kCHF (without power). A deposit to the Online replacement account of 2,354 kCHF is foreseen.

Special topics 2024

War in Ukraine:

ATLAS has a strong participation of Russian institutes, JINR and Belarus with 374 members. In June 2024 the Council decided not to terminate the ICAs agreement with JINR, which participation in CERN's activities continues. (ICAs with Russia and Belarus is maintained until November 2024). The preliminary M&O budget sharing for 2025 has been presented to the SG with only the contribution from JINR.

The contribution of Russia, JINR and Belarus to the Phase II upgrade CORE amounts to 7,914 kCHF (at least 3,500 kCHF expected in-kind) which is about 3.3% of the total CORE.

The contribution of Russia and Belarus alone is 5,255 kCHF corresponding to about 2.2% of the total CORE. In addition, the contributions of Russia and Belarus expected to the Phase II Common Fund up to 2026 is 852 kCHF corresponding to about 3.5%.

Other items:

The ATLAS collaboration will maintain the 2024 budget request for M&O A+B stable at 21.4 MCHF. The flat budget profile, despite the large increase in cost of gases and coolants, is possible at the moment due to underspending in previous years caused in large parts to the prolonged LS2 due to Covid. Considering also the large inflation, it seems unavoidable that eventually the budget has to be adjusted.

ATLAS M&O A budget request for 2025

The budget request for 2025 is shown in Table 7 together with the approved budget for 2024 and the projections up to 2028. The numbers are based on the assumption of taking physics data in 2026.

Table 7: ATLAS M&O A budget request for 2025, shown together with the 2024 budget and the projections up to 2028. All numbers in kCHF.

M&O A Categories	2024	2025	2026	2027	2028
Detector related	4,842	6,222	5,356	5,085	5,323
Secretariat	440	480	480	480	480
Communications	173	173	173	173	173
Core computing	2,354	2,354	2,354	2,354	2,354
Online computing	3,819	1,629	1,615	1,585	2,852
Test beams & calibration facilities	145	345	895	970	510
Laboratory operations	90	140	140	140	140
General services	1,246	1,207	1,207	1,810	1,660
TOTAL without power	13,108	12,550	12,220	12,597	13,492
Power (MS + NMS)	2,200	2,200	2,200	2,200	2,200
Grand Total	15,308	14,750	14,420	14,797	15,692

The ATLAS M&O A budget request without power is 12,550 kCHF, down by 558 kCHF compared to the corresponding budget approved for 2024. The power cost is 2,200 kCHF of which the NMS share is 742 kCHF. The total request for 2025 of 14,750 kCHF is down by 462 kCHF compared to the 2025 budget anticipated in autumn 2023.

The projections for the M&O A budgets for the years 2025-2028 show a rise in budget from 2027 on, due to the foreseen LS3.

In 2025, a withdrawal of 336 kCHF from the TDAQ Online replacement account is planned.

The Scrutiny Group recommends approval of the ATLAS 2025 M&O A budget request.

ATLAS Online Replacement Account Projections

At the end of 2023, following a deposit of 1,853 kCHF, the Online replacement account had

a positive balance of 2,478 kCHF. After the replacement of the HLT server, it was originally planned to accumulate funds in the Online replacement account in the years 2023 to 2025 up to around 5.5 MCHF, with large deposits foreseen in 2023 and 2024. According to the current plans, a positive balance of about 4.8 MCHF is foreseen in 2024 after a deposit of 2,354 kCHF. Starting from 2026 the balance will be decreased and the account is projected to go substantially negative in 2028.

ATLAS M&O B budget request for 2025

The actual and planned budgets from 2024 to 2028 are given in Tables 8 and 9. The M&O B budgets of each subsystem have been scrutinised internally in the ATLAS collaboration and discussed with the SG during the June meetings. The numbers are based on the assumption of taking physics data in 2026.

The M&O B budget request for 2025 is 6,650 kCHF, compared to 6,188 kCHF planned last year. The budget invoiced to the funding agencies for 2024 was slightly reduced due to the return of funds (the budget reduction last year was mainly due to reduced funds for SCT and ITk while the FD budget was slightly increased).

The cost overlap of ID and ITK in 2023-2027 will result in an increased budget peaking in 2026 at around 3 MCHF and expected to fall below the level of the current ID budget from 2028 on.

Table 8: ATLAS M&O B budget planning for the years 2024 - 2028 by categories. All numbers except last row in kCHF.

M&O B Categories	2024	2025	2026	2027	2028
Mechanics	52	52	177	82	60
Gas Systems	63	68	85	35	35
Cryo System	0	0	0	0	0
Cooling System	188	428	398	483	553
FE Electronics	95	88	65	77	75
Std Electronics LV/HV PS	948	882	867	897	897
Std Electronics Crates	252	262	218	223	223
Std Electronics R/O modules	105	93	121	167	112
Controls (DCS & DSS)	100	110	136	156	160
Sub-Detector Spares	127	105	130	100	105
Areas	310	310	410	350	330
Communications	44	44	48	50	32
Store Items	254	261	277	251	198
Hired effort @ CERN	3,554	3,947	4,048	3,732	2,928
Hired effort @ Institute (90 kCHF/FTE)	0	0	0	0	0
Total expenditure	6,092	6,650	6,980	6,603	5,708
Return to FAs	-343	0	-590	0	0
Total to be invoiced to FAs	5,749	6,650	6,390	6,603	5,708
Technical Manpower OTP (FTE)	266	299	341	272	191

Table 9: ATLAS M&O B budget planning for the years 2024 - 2028 by subsystem. All numbers in kCHF.

M&O B by Subsystem	2024	2025	2026	2027	2028
PIX	555	555	555	200	0
SCT	440	415	267	325	0
TRT	665	665	550	210	0
IDGen	503	328	328	168	0
ITK	441	1,009	1,342	1,772	1822
LAr	730	795	795	795	795
TileC	604	664	647	647	647
Muons	1,370	1,420	1,455	1,495	1,520
FD	578	593	698	473	337
TDAQ	206	206	0	0	0
HGTD	0	0	343	518	587
Totals	6,092	6,650	6,980	6,603	5,708
Savings/Return to FAs (ID)	-203	0	-590	0	0
Savings/Return to FAs (ITK)	-50	0	0	0	0
Savings/Return to FAs (TDAQ)	-90	0	0	0	0
Total to be invoiced to FAs	5,749	6,650	6,390	6,603	5,708

The Scrutiny Group recommends approval of the ATLAS 2025 M&O B budget request.

ATLAS Common Funds and Entry Fees

Common Fund: This Common Fund has been used to cover Phase-1 Upgrade spendings and also to deposit the entry fees of new institutions. At the end of 2022 this account had 711 kCHF in cash balance. All Phase-1 activities were finished in 2022, therefore no expenditures were done in 2023. New member institution fees of 25 kCHF have been received, bringing the balance at the end of 2023 to 736 kCHF with outstanding contributions of 89 kCHF. The account will be kept to collect new member entry fees.

Phase-2 Upgrade Common Fund: For Phase-2 upgrades, a dedicated Common Fund account is used with a total budget of 24.4 MCHF, to be collected over 9 years from 2018 to 2026 with a flat profile of 2.7 MCHF per year. The spending profile peaks in the years 2025 to 2027. As of the end of the year 2023 a total amount of 15,091 kCHF of contributions have been received, and 1,916 kCHF spent (940 kCHF spent in 2023). The overall outstanding contributions at the end of 2023 are 1,188 kCHF, as the result of a 2,736 kCHF debt of the funding agencies to the collaboration and 1,548 kCHF paid in advance.

Entry fees: ATLAS collects entry fees from new collaborating institutes. The funds are accumulated in the Common Fund account (see above). The entry fees are used for detector and upgrade-related projects that extend beyond the original scope of the Common Fund.

6 CMS

CMS M&O A closing report for 2023

The CMS M&O A closing report was submitted to the RRB meeting in April (CERN-RRB-2024-038). The 2023 budget as approved in 2022 and the closing report presented in 2024 are shown in Table 10.

Table 10: Summary of the 2023 book closing of CMS, listing the M&O A budget as approved in 2022 and the actual spending report in this year's scrutiny cycle. All numbers in kCHF.

M&O A Categories	Budget for 2023	Actual in 2023	Difference
Detector related	4,633	4,736	-103
Secretariat	312	324	-12
Communications	130	153	-23
Core computing	1,964	2,007	-43
Online computing	3,665	3,754	-89
Test beams & calibration facilities	96	95	1
Laboratory operations	700	592	108
General services	2,153	2,196	-43
TOTAL without power	13,653	13,858	-205
Power (MS + NMS)	1,700	1,700	0
Power (NMS only)	664	664	0
Grand Total	15,353	15,558	-205

Spending: The 2023 M&O-A budget without power costs was 13,653 kCHF. The total power costs were budgeted at 1,700 kCHF with a non-member share (NMS) of 664 kCHF. The total budget was thus 15,353 kCHF. The actual expenditure in 2023 amounted to 13,858 kCHF without power costs, and 15,558 kCHF with power.

CMS gave a detailed justification for the 1.5% overspending (CERN person power indexation, forward shielding, person power due to CO₂ cooling system, revised SLA, compliancy of ECAL laser lab, dry air system consolidation, redundant PLC for magnet). The outstanding commitments amounted to 499 kCHF. Out of these 499 kCHF, 55% are related to industrial support contracts and 45% to consumables and goods to be delivered in 2024.

Carry-over: There is no significant accumulation of funds. The carry-over including open commitments from 2023 to 2024 is negative 704 kCHF (-205-499 kCHF). The cash balance at the end of 2023 was -819 kCHF.

Online replacement account: DAQ Expenditures amounted to 1,401 kCHF. The budget was 2,700 kCHF and 1,299 kCHF were deposited into the online replacement account, which at the end of 2023 had a positive balance of 106 kCHF.

Contributions: The amount of outstanding contributions is smaller than in previous years, i.e. 4.5% for 2023 in June 2024 compared to 6.7% in May 2023 for 2022 (and 12.4% in 2022). The

need of timely payment was pointed out by the SG in earlier years. The SG joins CMS in their satisfaction about this observation and hopes that this trend will continue in the coming years.

CERN finance report: There is good agreement between the Finance Department report and the numbers from the experiment.

The Scrutiny Group recommends approval of the CMS 2023 M&O A closing report.

CMS M&O B closing report for 2023

M&O B in CMS is organised around detector subsystem groups with varying practices. Certain systems operate completely on an in-kind basis. The total allocated M&O B budget for 2023 was 6,606 kCHF (4,475 kCHF as cash + 2,131 kCHF as in-kind contribution). Note that in-kind contributions are mainly personpower. The expenditures in 2023 were 3,417 kCHF in cash (76% of allocated budget) and 2,489 kCHF as in-kind (117% of allocated budget).

The lower cash expenditure can be largely explained by an underspending of the HGAL due to the delays in the HL-LHC upgrade. The muon system reported an underspending due to the delay of the dismounting of the GEM subsystem, but also due to less interventions on the RPCs after a careful revision in 2022. Also the Tracker reported an underspending of around 260 kCHF. As in previous years, this underspending is explained by lower hired man power. Currently the Tracker has accumulated cash reserves of much more than the agreed 30% of the recurrent budget. However, the group presented a clear plan to bring down the cash reserve in the coming years.

In view of this clear planning for the carry-over and the efforts by all CMS subsystems, the Scrutiny Group is pleased to see that CMS strictly observes the convention to keep the carry over below 30% of the annual budget.

The Scrutiny Group recommends approval of the CMS 2023 M&O B closing report.

CMS M&O situation in 2024

The M&O A budget for 2024 is 13,554 kCHF without power. As of August 2024 around 75% of the 2024 budget has been spent, which represents a normal spending profile. CMS informed the Scrutiny Group that some overspending is expected for 2024. Among others, overspending might occur due to the CERN person power indexation. An increase of about 10 kCHF is due to the new Service Level Agreement. A notable overspending of around 100 kCHF is expected due to refurbishment of space annexed to the new DAQ room that is not covered by DAQ M&O A. Finally, the investment into a crane for heavy lifting in Building 685 will cost around 300 kCHF.

Special topics 2024

War in Ukraine: CMS is heavily exposed to the consequences of the war in Ukraine for both M&O and upgrade, with the HGAL being the most critical system.

Detector Upgrade Fund: At the end of 2023 the creation of the "Detector Upgrade Fund" (DUF) has been approved by the RRB. This fund compensates shortfalls in core costs from the Russian Federation, JINR and Belarus. The additional cost to be shared among the remaining funding agencies is estimated to be around 10 MCHF (out of which around 1 MCHF for the P2UCF).

The Scrutiny Group is not charged to review this fund but takes note that as of September 2024 around 5.14 MCHF have been already paid as cash and in-kind contributions. On the other hand, CMS reported that commitments from around 3/5 of the funding agencies are still missing (these 3/5 correspond to around 4 MCHF).

Review of the increased Phase 2 Upgrade Common Fund needs: The Spring Session of this year's Scrutiny Cycle concerned mainly the revision of the upgrade cost. As result of a detailed review carried out since 2022, CMS requested an increase of the Phase 2 Upgrade Common Fund (P2UCF) from the original 25 MCHF¹ to a total of 31.7 MCHF. Detailed explanations and justifications of the need were given to the Scrutiny Group (see e.g. CERN-RRB-2023-072) and are specified in the Amendment No.1 to MoU Addendum No. 10 (c.f. CERN-MoU-2024-010). In a statement from 26th of May 2024 sent to the CERN Director of Research and Computing the Scrutiny Group has endorsed the request. The SG will monitor the allocation and the spending of the funding in the coming years. A risk is the cost for personpower needed at Point 5 for the upgrade. The continuation of the ICA with JINR as decided in the CERN Council session of June 2024 secures around 20% of the needs. Currently, CMS is setting up teams from other countries than the Russian Federation, in particular from Pakistan. The Scrutiny Group encourages all CMS members to work on a solution concerning the missing personpower.

Impact of updated LHC LS3 Schedule: The Scrutiny Group was informed about the decision by CERN Management to change the LS3 schedule. According to the new schedule LS3 will start in July 2026 and will end in June 2030. So far, CMS has not explicitly taken into account the updated schedule in the budget profile. The preliminary anticipation is that the overall envelope will not change, only the spending profile for M&O A, M&O B and Common Funds. This will be subject to further scrutiny in the coming years.

CMS M&O A budget request for 2025

Table 11 shows the budget for 2024 together with the request for 2025 and the projection until 2028.

The request for 2025 is 13,814 kCHF, 503 kCHF higher than presented at the RRB Meeting in October 2023 (CERN-RRB-2023-099). This increase concerns budget adjustments for:

- a cost increase for the gas distribution system due to the updated Service Level Agreements (60 kCHF);
- a M&O A request for Outreach activities (78 kCHF). Note here that the outreach budget was stable at 222 kCHF since 2012. The estimated need of around 300 kCHF seems justified given the importance of education and outreach to provide professional support to volunteers from the collaboration;
- the Major Consolidation Project. This project enhances the safety and reliability of several systems of CMS. It includes the consolidation of the Central Detector Safety System that afterwards will be maintained by Detector Technologies Group of CERN's EP-DT. Further, the RJ45 network connections will be replaced to comply with CERN standards

¹Contributions from countries that joined CMS in recent years drive the total amount to actually 25.3 MCHF, check CERN-RRB-2017-060 Amendment No. 10.

Table 11: CMS M&O A budget request for 2025, shown together with the 2024 budget and the projections up to 2028. All numbers in kCHF.

M&O A Categories	2024	2025	2026	2027	2028
Detector related	4,380	4,750	5,832	4,787	4,577
Secretariat	312	312	312	312	312
Communications	130	130	130	130	130
Core computing	1,964	1,964	1,964	1,964	1,964
Online computing	3,665	3,665	3,665	3,665	3,665
Test beams & calibration facilities	112	99	119	119	119
Laboratory operations	852	653	533	533	533
General services	2,140	2,242	2,542	2,066	2,016
TOTAL without power	13,554	13,814	15,096	13,575	13,315
Power (MS + NMS)	1,700	1,700	1,700	1700	1,700
Grand Total	15,254	15,514	16,796	15,275	15,015

and several consolidation investments for the cryogenic system of the CMS magnet will be made. The Major Consolidation Project will generate costs of 530 kCHF in 2025 and further 1,395 kCHF until 2027 with peak expenses in 2026.

- Technical coordination support for decommissioning of legacy systems. The anticipated costs for 2025 is 200 kCHF and another 750 kCHF until 2028, again with peak expenses in 2026.

The described cost increases are partially compensated by savings of 365 kCHF in total. The biggest single saving of 150 kCHF comes from giving up on the conclusion of an insurance for Phase 2 Upgrade material.

For both the Major Consolidation Project and the Decommissioning Project CMS has presented solid numbers. The Scrutiny Group will however review these cost items in more depth in the 2025 campaign.

The Scrutiny Group recommends approval of the CMS 2025 M&O A budget request.

CMS Online Replacement Account Projections

As mentioned above, at the end of 2023 this account had a balance of 106 kCHF. The current planning is to spend 3,000 kCHF in 2024. Keeping a flat budget of 2,700 kCHF, 300 kCHF will be taken from the online replacement account. It is planned that in 2026 the account will go negative by 1,844 kCHF and continues to drop down to negative 1,964 kCHF until 2028. The reasons are expenditures on racks for the counting room and cavern, electrical distribution and installation personpower. The budget planning commensurates with the actual policy of the online replacement account.

CMS M&O B budget request for 2025

The actual and planned budgets from 2024 to 2028 are given in Tables 12 and 13. The M&O B budget request for 2025 is 7,293 kCHF (of which 5,171 kCHF are cash and 2,122 kCHF (about 30%) are in-kind), which is 191 kCHF lower than anticipated in October 2023 (CERN-RRB-2023-099) but about 285 kCHF more than requested for 2024. The increase w.r.t. 2024 is mainly driven by the increased needs of the HGAL and to minor extent by the MTD. Both are upgrade projects. The upgrade generates decommissioning costs for the ECAL that is reflected in an increased budget w.r.t. previous years. The M&O B request will increase in the coming years to up to 7,852 kCHF in total in 2027, see Tab. 12. The reason is the expected progress of the upgrade. After 2027 the anticipated requests will decrease again and projections accessible to the Scrutiny Group allow for estimating that M&O B budget will decrease below the 2024 level once the upgrade will be completed. To judge the budget requests note also that in 2025 2,122 kCHF, equivalent to 41% of the budget, is earmarked as in-kind contribution (mainly personpower) and also part of the HGAL budget currently labelled as cash is expected to be rebudgeted as in-kind contribution. A CMS taskforce in charge of evaluating the splitting between cash and in-kind contribution concerning the HGAL is in place, but hasn't concluded yet.

The Scrutiny Group recommends approval of the CMS 2025 M&O B budget request.

Table 12: CMS M&O B budget planning for the years 2024 - 2028 by categories. All numbers except for the last two rows are in kCHF.

M&O B Categories	2024	2025	2026	2027	2028
Mechanics	125	225	155	150	120
Gas Systems	75	49	74	69	69
Cryo System	n/a	n/a	n/a	n/a	n/a
Cooling System	408	441	454	394	400
FE Electronics	49	54	80	63	60
Std Electronics LV/HV PS	328	363	469	433	388
Std Electronics Crates	79	89	118	133	90
Std Electronics R/O modules	586	476	404	446	272
Controls (DCS & DSS)	91	79	128	130	105
Sub-Detector Spares	33	63	78	108	108
Areas	223	226	270	245	170
Communications	164	164	177	173	185
Store Items	156	156	197	221	236
Hired Personpower @ CERN	4,688	4,908	5,247	5,287	5,053
Material Resources Total	7,005	7,293	7,851	7,852	7,256
Technical Personpower OTP (FTE)	0	0	0	0	0
Core Computing (FTE)	8	8	8	8	8

Table 13: CMS M&O B budget planning for the years 2024 - 2028 by subsystem. All numbers are in kCHF.

M&O B by Subsystem	2024	2025	2026	2027	2028
Tracker	1,359	1,235	1,214	1,218	1,298
ECAL	555	675	880	890	685
HCAL	1,018	1,018	1,018	1,018	1,018
Muon	1,778	1,778	1,792	1,782	1,746
Trigger	533	533	533	533	379
BRIL	164	164	184	211	195
PPS	318	360	360	360	360
HGCAL	995	1,125	1,435	1,395	1,120
MTD	285	405	435	445	445
Material Resources Total	7,005	7,293	7,851	7,852	7,256

CMS Common Funds and Entry Fees

Phase-1 Upgrade Common Fund: The Phase-1 Upgrade has been completed during LS2 and the payments for the common facilities have been finalised. CMS has received all contributions except one. This contribution is pending since a few years and the Scrutiny Group strongly encourages the debtor country to agree with CMS on a solution and to honour this solution such that the account can be finally closed.

Phase-2 Upgrade Common Fund: The allocated total budget of the Phase-2 Upgrade Common Fund was 25 MCHF before the increase mentioned above. As of September 2024 contributions amounting to 19.4 MCHF have been collected. Due contributions are 5.6 MCHF (22%) compared with the original total of the P2UCF of 25 MCHF and correspondingly 12.3 MCHF (39%) compared with the updated total of the P2UCF of 31.7 MCHF. At the end of 2023 10,854 kCHF have been spent, which corresponds to 66% of the received budget. CMS plans to spend another 15.4 MCHF until the end of 2026. It is therefore important that pledged payments arrive timely in order to avoid a cash shortage.

Entry fees: CMS collects entry fees from new members. The funds are accumulated in a general account of the CMS management, with no dedicated accounting for the entry fees alone. They are used to cover items for which no alternative source of funding is available and that are considered urgent by the management. To a large extent, the entry fees are used to facilitate the integration of the new institute in CMS, for example by funding stays of institute members at CERN, or by supporting local facilities. At the end of 2023 the balance was approximately 150 kCHF.

7 LHCb

LHCb M&O A closing report for 2023

The LHCb M&O A closing report was submitted to the RRB meeting in April (CERN-RRB-2024-046). The 2023 M&O A budget as approved in 2022 and the closing figures presented for 2023 are shown in Table 14.

Table 14: Summary of the 2023 book closing of LHCb, listing the M&O A budget as approved in 2022 and the actual spending report in this year's scrutiny cycle. All numbers are in kCHF.

M&O A Categories	Requested 2023	Spent 2023	Difference
Detector related	1,015	1,074	-59
Secretariat	190	212	-22
Communications	10	5	5
Core computing	220	163	57
Online computing	1,150	538+350	262
Test beams & calibration facilities	30	17	13
Laboratory operations	50	24	26
General services	405	421	-16
TOTAL without power	3,070	2,805	265
Power (NMS only)	133	133	0
Power (MS + NMS)	600	600	0
TOTAL with power	3,670	3,405	265

Spending: The total spending excluding power was 2,805 kCHF. With power the spending was 3,405 kCHF, the power amounting to 600 kCHF of which the budgeted NMS share was 133 kCHF. The total expenditure without open commitments corresponds to an underspending of 265 kCHF, which arose mainly from a delayed delivery of cooling fluids (≈ 170 kCHF). LHCb had 98 kCHF of open commitments by the end of 2023, which are not included in the expenditure. Including open commitments and the transfer to the online account, there is an M&O A underspending (excluding power) of 167 kCHF. The NMS power share was not paid in 2023.

Carry-over: The cumulative cash balance by the end of 2023 was 906 kCHF compared to 1,038 kCHF by the end of 2022. The carry-over thus corresponds to a little less than one third of the M&O A budget.

Online replacement account: In 2023, 350 kCHF were transferred to the online replacement account and 144 kCHF were spent on online computing replacement. The balance of this fund has been brought up to 1,134 kCHF compared to 928 kCHF by the end of 2022. The spending from the online account corresponds to what has been communicated by the experiment previously and more online replacement spending is expected in the coming years.

Contributions: LHCb has received M&O A contributions amounting to 3,091 kCHF in 2023. This figure includes late and advance payments. It also includes contributions received after the Dec 31, 2023 cut-off data of CERN finance until the date of the April RBB meeting.

CERN finance report: In general, the numbers reported by the experiment agree with the figures provided by CERN finance (CERN-RRB-2024-043). Contributions received in 2023 are reported as 2,673 kCHF due to the different cut-off date. Outstanding contributions (invoiced but not received) are reported in CERN-RRB-2024-043 as 480 kCHF.

The Scrutiny Group recommends approval of the LHCb 2023 M&O A closing report.

LHCb M&O B closing report for 2023

At LHCb, the M&O B budget corresponds to about one third of M&O A, and the management of the funds, which are both cash and in-kind contributions, is under the responsibility and control of the subsystems within existing agreements. In-kind contributions correspond to about one third of M&O B. In 2023 M&O B reached to 1,290 kCHF, which is the level that should be maintained throughout run 3.

Since 2022 LHCb is disclosing details about the subsystem spending through CERN. Regarding the budget at CERN, LHCb reports 878 kCHF received in 2023 compared to 916 kCHF in 2022 (including late contributions and contributions paid in advance). The expenditure from the CERN budget in 2023 amounts to 898 kCHF compared to 681 kCHF in 2022. In addition, a spending of 483 kCHF was reported at the collaborating institutes compared to 235 kCHF in 2022. In 2021, the corresponding figures were 1,052 kCHF received, 1,161 kCHF spent on CERN budget and 251 kCHF spent at the institutes.

The Scrutiny Group recommends approval of the LHCb 2023 M&O B closing report.

LHCb M&O situation in 2024

The year 2024 corresponds to the third year of Run 3, where VeLo has been restored to full operation. During 2024 LHCb will replace old inefficient nodes of the Online System. The approved M&O Category A budget for 2024 totals to 3,070 kCHF, together with a power cost of 900 kCHF (the NMS share is 191 kCHF). At the time of the autumn scrutiny meeting, M&O A spending was higher than in previous years indicating some possible overspending in 2024.

The proposed sharing for 2024 includes contributions from Russian funding agencies and institutes as the International Collaboration Agreement with Russia is still in effect throughout 2024, although these contributions are unlikely to be paid. LHCb proposes to waive Ukraine fees for 2024.

Another area of concern are the service level agreement (SLA) costs for LHCb: From 2022 to 2023 there has been a steep rise from 458 kCHF to 566 kCHF, mainly driven by CO2 cooling and gas distribution and supply costs. With 568 kCHF the SLA costs are expected to remain at this level also in 2024. As these cost increases are not captured in the flat Run 3 M&O A budget of LHCb, they are depleting the LHCb multi-annual surplus at this point. Despite some initial optimism, it seems LHCb has not been successful in negotiating a reduction of SLA costs with CERN.

LHCb M&O A budget request for 2025

2025 will be another year of Run 3 full operation. The budget request for 2025 is shown in Table 15 together with the approved budget for 2024 and the projections up to 2028. The power cost depend on the operation time in a given year and are charged in the following year.

Table 15: LHCb M&O A budget request for 2025, shown together with the 2024 budget and the projections up to 2028. All numbers in kCHF.

M&O A Categories	2024	2025	2026	2027	2028
Detector related	1,015	1,015	1,015	1,015	1,015
Secretariat	190	190	190	190	190
Communications	10	10	10	10	10
Core computing	220	220	220	220	220
Online computing	1,150	1,150	1,150	1,150	1,150
Test beams & calibration facilities	30	30	30	30	30
Laboratory operations	50	50	50	50	50
General services	405	455	455	455	455
TOTAL request without power	3,070	3,120	3,120	3,120	3,120
Power (MS + NMS)	900	900	900	600	300
Grand Total	3,970	4,020	4,020	3,720	3,420

The budget request for 2025 is 3,120 kCHF without power and increased by 50 kCHF with respect to previous forecasts. The power cost is 900 kCHF of which the NMS share is budgeted to be 172 kCHF, corresponding to a year of full LHC operation. To capture the increase of SLA costs, LHCb proposes to increase the M&O A request by 50 kCHF from 2025. The SG supports this request – the experiment has made several though ultimately unsuccessful attempts to revert the surge in SLA costs seen between 2022 and 2023. The proposed increase corresponds to a little less than half of the SLA cost increase. Regarding the resource sharing for 2025, the Russian funding agencies and institutes do not contribute anymore due to the termination of the International Collaboration Agreement by the end of 2024. Their share will be redistributed to the remaining groups and results in an increase of about 10% of the individual contributions. LHCb proposes to waive Ukraine fees for 2025.

The impact of LHC running in 2026 on this budget projection is minor as LHCb maintains a flat M&O A budget. The power cost projection for 2027 (which is charged for the previous year) reflects the assumption of 2026 being a partial beam-year.

The Scrutiny Group recommends approval of the LHCb 2025 M&O A budget request.

LHCb Online Replacement Account Projections

LHCb has transferred 350 kCHF to the online replacement account in 2023 and used 144 kCHF bringing the balance to 1,134 kCHF by the end of 2023. A large batch of new farm-nodes for HLT2 were ordered, awaiting delivery in mid 2024. A worry are hardware issues on the EB servers creating a constant background work-load. The experiment considers a full replacement

of all EB nodes before Run 4 in 2028. This would require to accumulate 2 MCHF for this purpose on the online replacement account by this time.

LHCb M&O B budget request for 2025

The budget request for 2025 and the projections until 2028 are shown in Tables 16 and 17. The 2025 request is 1,290 kCHF, unchanged from the year 2024. This budget is managed by the respective detector collaborations and includes both cash and in-kind contributions. Part of the budget is spent at CERN, part at the collaborating institutes. LHC running in 2026 is not expected to change the M&O B projection.

The Scrutiny Group recommends approval of the LHCb 2025 M&O B budget request.

Table 16: LHCb M&O B budget planning for the years 2024 to 2028 by categories. All numbers in kCHF.

M&O B Categories	2024	2025	2026	2027	2028
Mechanics	100	100	100	100	100
Gas System	10	10	10	10	10
Cooling System	30	30	30	30	30
FEE Spares	120	120	120	120	120
Standard Electronics (all)	220	220	220	220	220
Controls (DCS & DSS)	60	60	60	60	60
Sub-Detector Spares	200	200	200	200	200
Areas	50	50	50	50	50
Communications	30	30	30	30	30
Store Items	30	30	30	30	30
Manpower CERN	440	440	440	440	440
TOTAL budget	1,290	1,290	1,290	1,290	1,290

LHCb Common Funds and Entry Fees

Phase-1 Upgrade Common Fund: The LHCb Phase-1 Upgrade Common Fund (Add. 1 to MoU, CERN/RRB 2012-119A-Rev.10.April 2014) amounts to 15,710 kCHF and is followed by the SG, while the sub-detector systems (57,243 kCHF, Add. 2 to MoU, CERN/RRB 2014-105, 5 Nov. 2014) are reported by the UCG. For Add. 1, 96% of the funds are received by June 2024 with the outstanding contributions (1,018 kCHF) being 355 kCHF from Spain and 663 kCHF from Brazil. For Spain the contribution will be given in-kind in the form of server computers for the HLT farm, which will arrive in 2024. For Brazil, which has recently joined CERN as a new member state, a plan of action with the Brazilian representatives has been prepared, which foresees payments in-kind and in cash, according to Addendum 1, Common Project Items, CERN-RRB-2012-119A, Article 4.4.

By the end of 2023, 1,641 kCHF were left in upgrade common fund, which were spent "just-in-time" on the online farm. The experiment reports in June 2024 that 19 kCHF are still left in the fund, which will also be spent by the end of 2024 when the fund will be closed.

Table 17: LHCb M&O B budget planning for the years 2024 to 2028 by subsystem. All numbers in kCHF.

M&O B by subsystem	2024	2025	2026	2027	2028
CALO	200	200	200	200	200
PCIE	60	60	60	60	60
MUONS	120	120	120	120	120
ONLINE	120	120	120	120	120
SCIFI	220	220	220	220	220
RICH	140	140	140	140	140
RTA	120	120	120	120	120
UT	90	90	90	90	90
VELO	220	220	220	220	220
TOTAL budget	1,290	1,290	1,290	1,290	1,290

Entry fees: LHCb currently does not collect cash entry fees from new institutes, there has been no change to this practice since last year. In-kind contributions for the general benefit of the collaboration are considered but currently not collected.

8 Summary

The LHC Resources Scrutiny Group has examined the closing reports of the four LHC experiments for 2023 and recommends to the RRB the approval of the 2023 M&O closing reports of ALICE, ATLAS, CMS and LHCb.

The SG has scrutinised the requested budgets for 2025 of the LHC experiments and recommends to the RRB the approval of the 2025 M&O budget request of ALICE, ATLAS, CMS and LHCb. The SG will closely follow the impact of LHC schedule changes on the M&O A and B requests of the experiments in the coming years.

The Scrutiny Group acknowledges the central role of the Resource Coordinators of the collaborations in carrying out the annual scrutiny process and wishes to thank them for their time and effort and for their positive and collegial approach.