

Report of the Scrutiny Group to the LHC RRBs

On behalf of the LHC Scrutiny Group

Heidi Sandaker (chair), University of Oslo

RRB, CERN, October 2023



**UNIVERSITY
OF OSLO**

2023 Scrutiny Cycle - Membership of the Group

FREY, Ariane	Gottingen, DE
GOLDSTEIN, Joel	Bristol, UK
GYS, Thierry	CERN, EP Department
MAZZUCATO, Edoardo	CEA/IRFU, FR
PEPE, Monica	Perugia, IT
PITTS, Kevin	Fermilab, US
PÖSCHL, Roman	IN2P3, FR
ROZYCKA, Agata	CERN, Service Contacts
SANDAKER, Heidi	University of Oslo, NO, Chair
SCHMIDT, Burkhard	CERN, EP Department , Secretary
SCHWANDA, Christoph	Institute of High Energy Physics, Vienna, AT
TROSKA, Jan	CERN, EP Department
YECK, James	Brookhaven National Lab., US

Composition :
11 persons
+ Secretary
+ Service Contacts
= 13 in total

New members:
2019 - 21%
2020 - 14 %
2021 - 0 %
2022 - 35 %
2023 - 8 %

31% from CERN
31% women



2024 Scrutiny Cycle - Call for new members

FREY, Ariane	Gottingen, DE
* GOLDSTEIN, Joel	Bristol, UK
GYS, Thierry	CERN, EP Department
* MAZZUCATO, Edoardo	CEA/IRFU, FR
PEPE, Monica	Perugia, IT
* PITTS, Kevin	Fermilab, US
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Composition :
11 persons (ideal)
+ Secretary
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= 13 in total

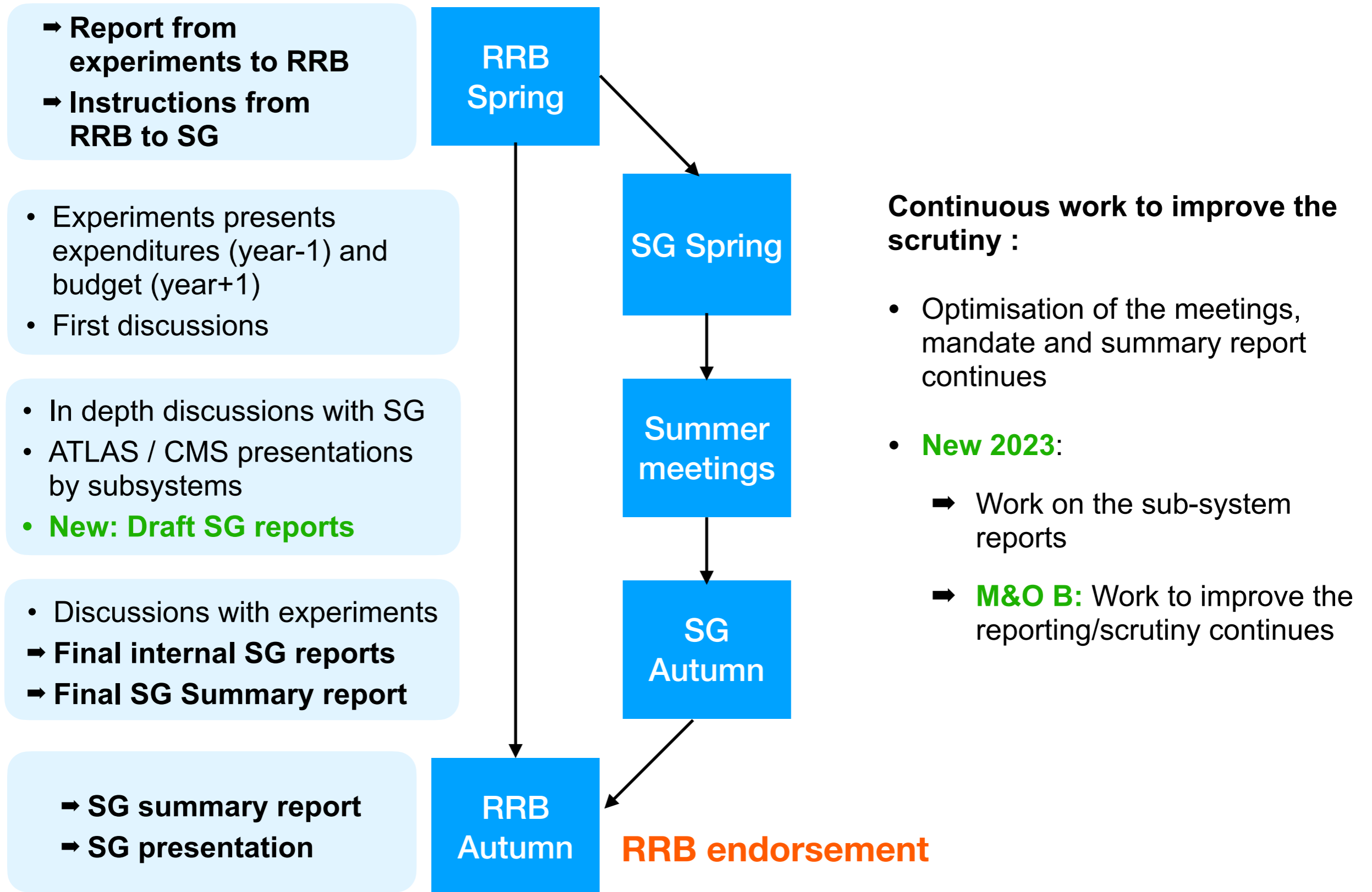
*** *Outgoing members: Many thanks to for all the excellent work over many years !***

Call for new members: New member needed for 2 x US, UK, France and 1 smaller country

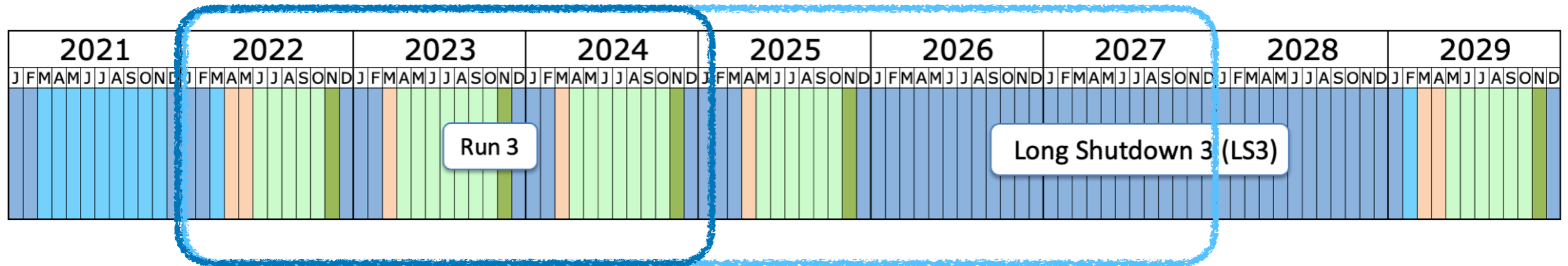
New leader: The SG has elected Ariane Frey as the new leader for 2024-2025



The Scrutiny Cycle



Scrutiny Cycle 2023 - Summary



2022: Start of operation Run 3

- Commissioning and operation of new detectors and computing systems
- Budget and expenditures reflects the inclusion of new detector and computing systems.

2023: Operation Run 3

- Expenditures largely on target. Mitigations of the effects due to war in Ukraine is ongoing.
- Short proton run has some effect on the expenditures

2024: Operation Run 3

- Budget for a full operation year.

Global sum M&O without power	MCHF
2023*	50.6
2022	50.1
2021	49.3
2020	49.0
2019	49.6
2018	47.0
2017	47.2
2016	46.9
2015	47.5

* year of reporting



2022 Scrutiny Cycle - summary

CERN Finance Reports (RRB-2017-070)	Overall very good agreement for all experiments
M&O B Carry over (RRB-2017-070)	All experiments are below the limit of 30% accumulated funds or execute down-spending
Online computing replacement account	Improved projections are presented in 2023, with down-spending to zero before and including 2028.
Delayed contributions	Trend with delayed contributions (2020-2022) has improved
Integration of new subsystems (LS2, LS3)	All new sub-detectors in LS2 are integrated, but increase in expenses not yet quite stabilised. Expenses for detectors to be installed in LS3 has started and are increasing.
Upgrade versus M&O	For most items the division is clear, some issues are discussed in more detail e.g. computing, buildings or larger spares
Collection of common funds	Proceeds according to plan, delays have been improved in 2023
Tracking of entry fees	No issues found
War in Ukraine	Affects all experiments, mitigations are ongoing and not trivial
Other issues	Concerns about the rise of cost of power, inflation, exchange rates, shortages of raw materials etc. continues



ALICE M&O - Overview

Closing report 2022 M&O:

M&O A:

- Budget w/o power: **4,982 kCHF**
- Actual costs w/o power: **5,063 kCHF**
- End of year open commitments: **24 kCHF**
- NMS power costs: **584 kCHF**

Comments:

- **M&O A:** Late payments of contributions in previous year see significant improvements in 2022/2023, thanks to the FA for paying overdue contributions.
- **M&O B:** Budget was **1,418 kCHF**, spending was within 10%. All subsystems are maintaining their cash reserves at less than 30% of their annual budget.

Request 2024 M&O:

M&O (kCHF)	2023	2024	2025	2026	2027
M&O A Total w/o power	4,935	5,064	5,064	5,064	5,064
M&O A Grand Total	7,437	7,764	7,764	5,508	5,508
M&O B Grand Total	1,385	1,456	1,474	1,470	1,409
Technical Manpower (FTE)	213	226	226	236	236

Comments:

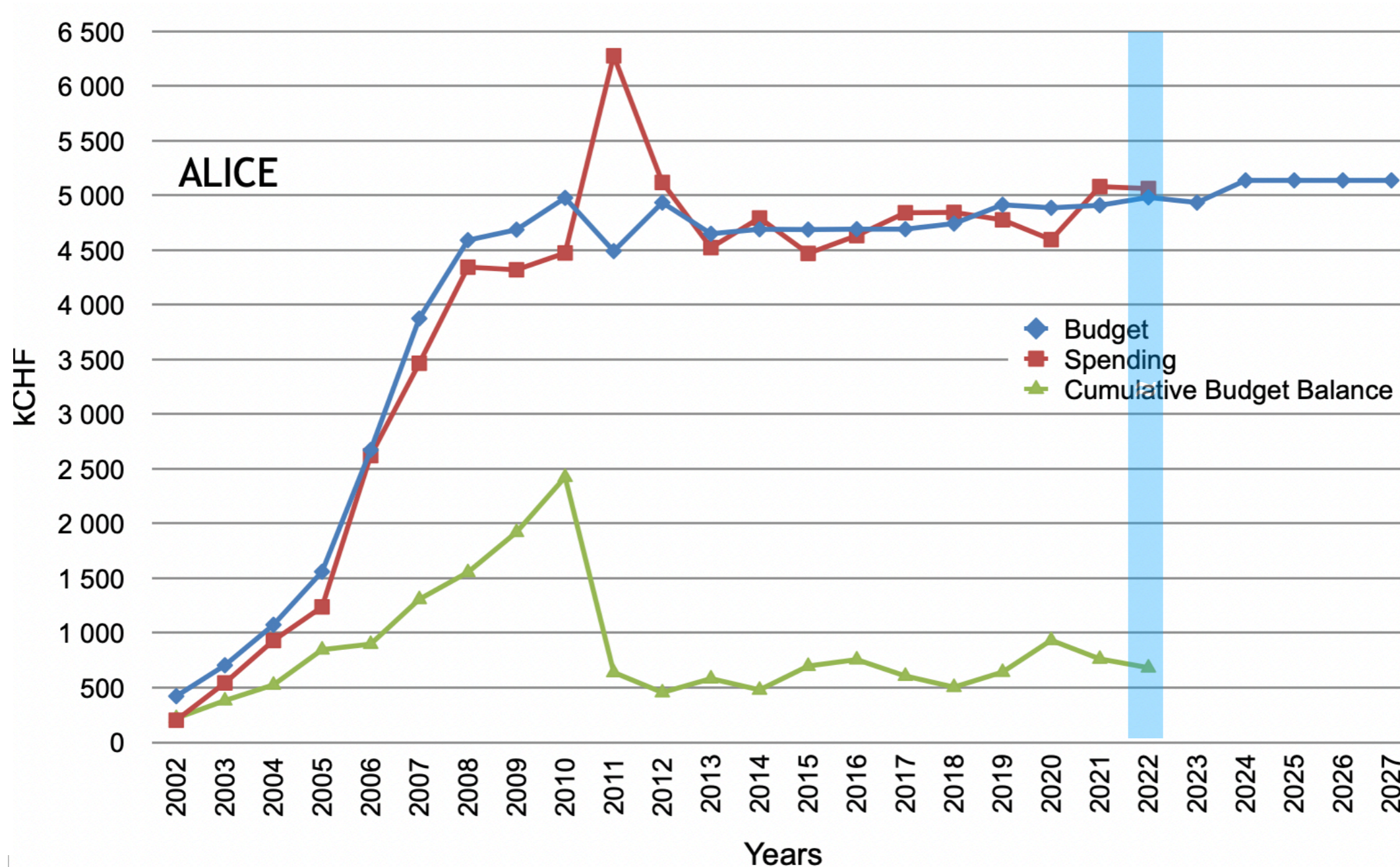
- **M&O A:** Budget request is **5,064 kCHF**, a small increase to the 2022 projection for 2024. Transition is still happening to the new M&O A level taking into account new and upgraded detectors.
- **M&O B:** Budget request is **1,456 kCHF**. This request takes into account changes in major subsystems due to the upgrade of detectors in LS2. The M&O B budget is stable since 2021.

Special 2023 review: Review of the purchase of EPN servers - more in the individual experiments session



ALICE M&O A evolution

Graph does not include open commitments



The SG recommends approval of the ALICE M&O A and M&O B closing reports for 2022, and the budget requests for 2024



ATLAS M&O - Overview

Closing report 2022 M&O:

M&O A:

- Budget w/o power: **13,982 kCHF**
- Actual costs w/o power: **14,734 kCHF**
- End of year open commitments: **655 kCHF**
- NMS power costs: **735 kCHF**

Comments:

- **M&O A** : 2022 sees an overspending of 752 kCHF e.g. due to replacement of the HLT servers and is compensated by a transfer from the TDAQ online account.
- **M&O B** : The budget is **5,258 kCHF**, spending is within 10%. Globally, the M&O B carry-over is 41% of the annual budget, above the target limit of 30%. ATLAS is returning the excess carry-over to the Funding Agencies during 2023-26.

Request 2024 M&O:

M&O (kCHF)	2023	2024	2025	2026	2027
M&O A Total w/o power	13,230	13,108	13,012	13,337	13,661
M&O A Grand Total	15,430	15,308	15,212	15,537	15,873
M&O B Grand Total	5,970	6,092	6,188	5,863	5,539
Technical Manpower (FTE)	239	266	279	291	182
Core Computing (FTE)	162	162	162	162	162

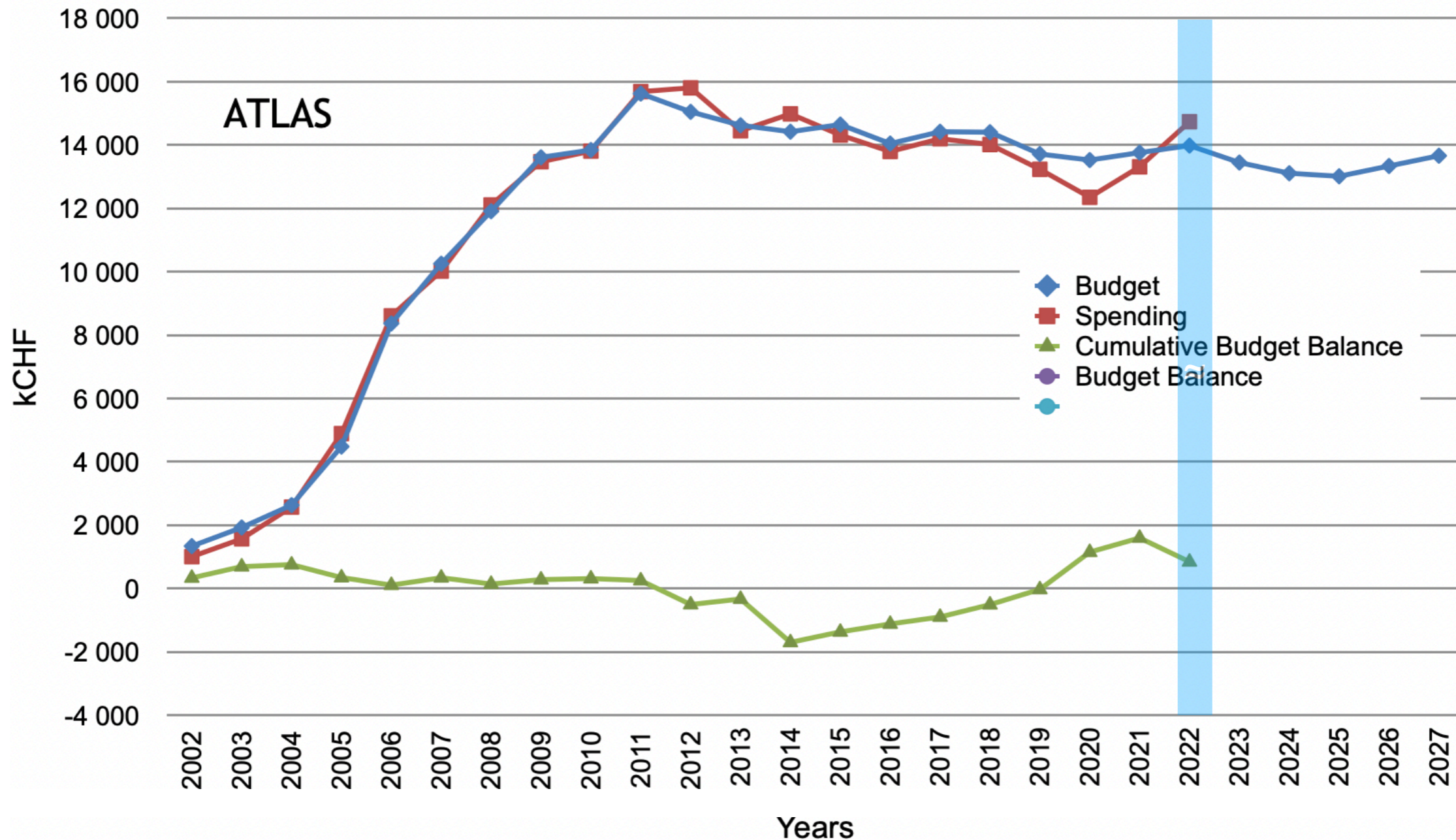
Comments:

- **M&O A** : The ATLAS M&O A budget request is **13,108 kCHF**, down by 122 kCHF compared to the budget approved for 2023, a small increase from the budget presented in 2022 for 2024.
- **M&O B** : The M&O B budget request for 2023 is **6,092 kCHF**, increased with 122 kCHF from last year, mainly due to the new ITK request. Less will be charged to the FA due to the return of surplus funds.



ATLAS M&O A evolution

Graph does not include open commitments



The SG recommends approval of the ATLAS M&O A and M&O B closing reports for 2022, and the budget requests for 2024



CMS M&O - overview and evolution

Closing report 2022 M&O:

M&O A :

- Budget w/o power: **13,366 kCHF**
- Actual costs w/o power: **13,544 kCHF**
- End of year open commitments: **1,011 kCHF**
- NMS power costs: **705 kCHF**

Comments:

- **M&O A** : Small overspending largely due to effects of the war in Ukraine, Stasi Lab and ECAL laser lab re-location.
- **M&O B** : Budget was **6,089 kCHF**, the expenditures was within 10%, with an underspending mainly for the HGAL due to delays in the HL-LHC upgrade and the need for personnel for the Tracker.

Request 2024 M&O :

M&O (kCHF)	2023	2024	2025	2026	2027
M&O A Total w/o power	13,653	13,554	13,311	13,191	13,030
M&O A Grand Total	15,353	15,254	15,011	14,891	14,730
M&O B Grand Total	6,578	7,005	7,484	7,820	7,738
Technical Manpower (FTE)	0	0	0	0	0
Core Computing (FTE)	8	8	8	8	8

Comments:

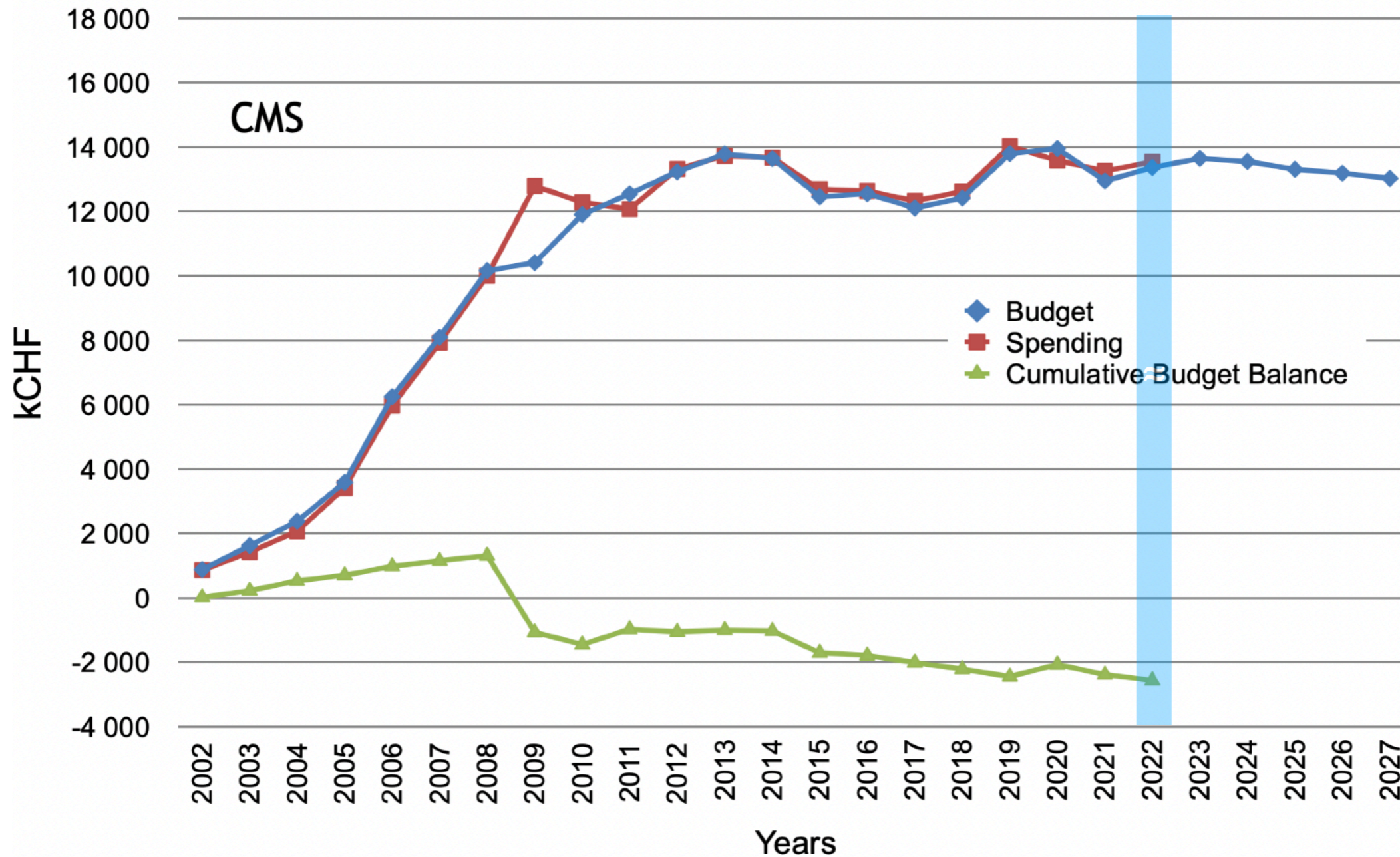
- **M&O A** : Budget request of **13,554 kCHF** is 99 kCHF lower than the M&O A for 2023 and decreases in following years, but the request for 2024 has increased from what was presented in 2022 for 2024.
- **M&O B** : Budget request is **7,005 kCHF** has increased by 427 kCHF compared to the request for 2023, part of a steady increase of the M&O B requests until 2026 that can be attributed to the Phase-2 Upgrade Projects and future decommissioning.

Special 2023 review: Review of the increased funding needed concerning DUF, UCF and M&O A - details in the individual experiments session



CMS M&O A evolution

Graph does not include open commitments



The SG recommends approval of the CMS M&O A and M&O B closing reports for 2022, and the budget requests for 2024



LHCb M&O - overview and evolution

Closing report 2022 M&O:

M&O A :

- Budget w/o power: **3,070 kCHF**
- Actual costs w/o power: **3,065 kCHF**
- End of year open commitments: **75 kCHF**
- NMS power costs: **64 kCHF**

Comments:

- **M&O A** : On target, open commitments has gone down compared to 2021. Largest overspending in general services due to an increase in SLA costs.
- **M&O B** : Budget reached **1,270 kCHF** - close to the new planned post phase-1 level, spending was within 10%.

Request 2024 M&O:

M&O (kCHF)	2023	2024	2025	2026	2027
M&O A Total w/o power	3,070	3,070	3,070	3,070	3,070
M&O A Grand Total	3,670	3,970	3,970	3,970	3,370
M&O B Grand Total	1,290	1,290	1,290	1,290	1,290

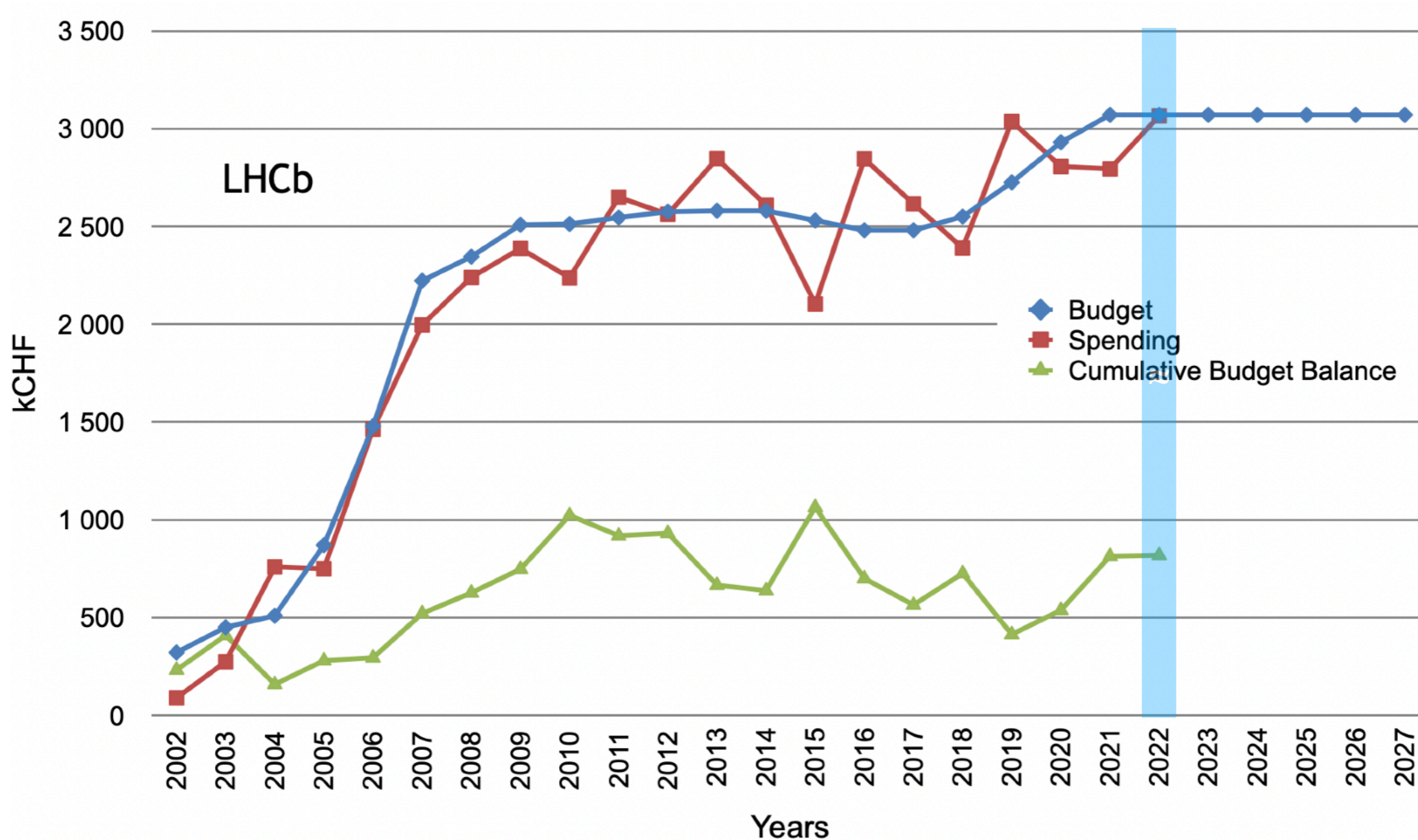
Comments.

- **M&O A** : Budget request of **3,070 kCHF** is unchanged from previous years. This number includes increased costs and power for operational years and the transition to the new sub-detectors
- **M&O B** : Budget request is **1,290 kCHF**, unchanged from the 2023 budget.



LHCb M&O A evolution

Graph does not include open commitments

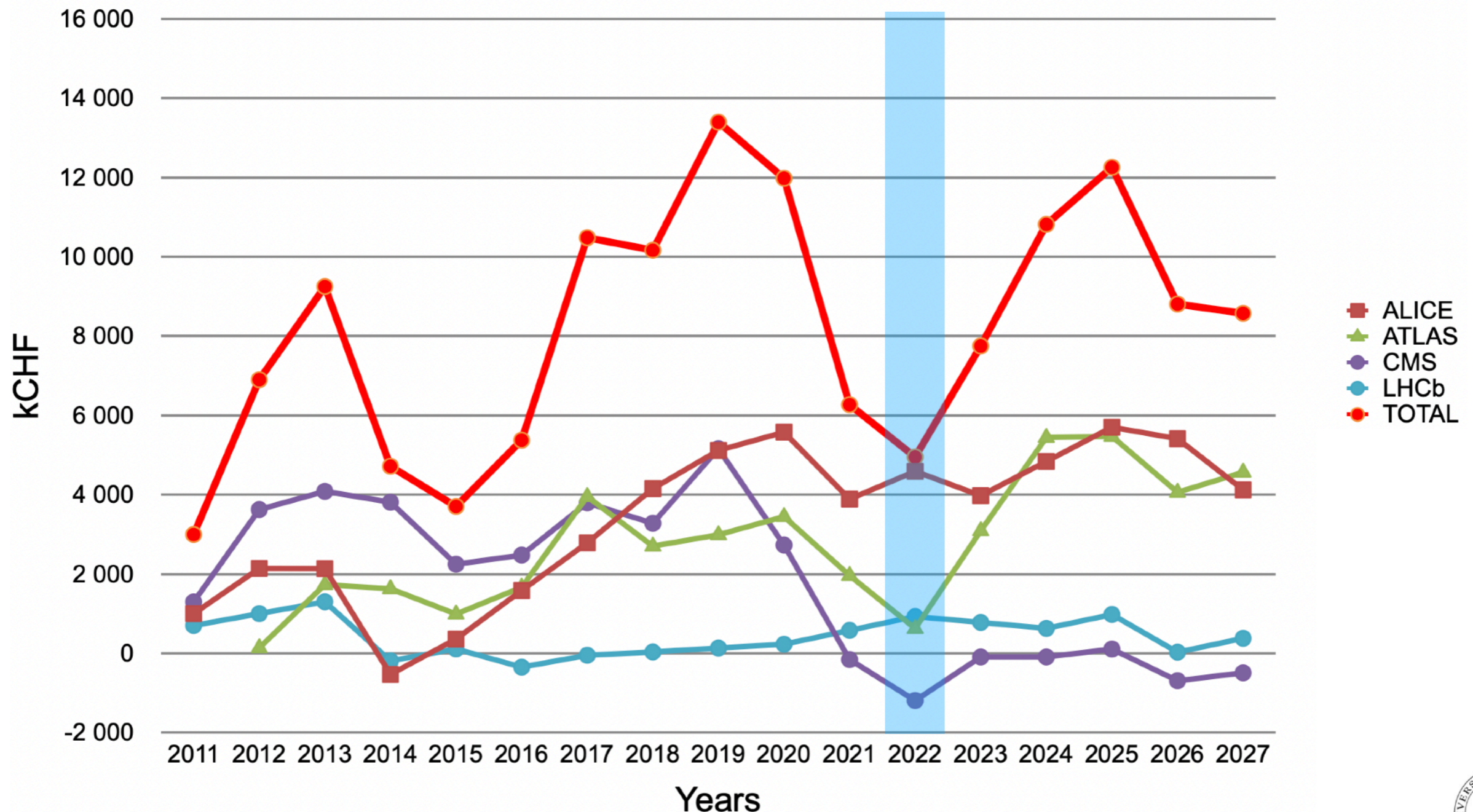


The SG recommends approval of the LHCb M&O A and M&O B closing reports for 2022, and the budget requests for 2024



2022 Scrutiny Cycle - Special Online Replacement Account

- In 2022 the experiments showed significant accumulation and were asked to revisit their plans
- Now all experiments (close to) negative balance earlier than previously predicted, CMS went negative in 2022 already and again in 2026, LHCb is expected to go negative 2023/2024, while ALICE and ATLAS in 2028.



2022 Scrutiny Cycle - Upgrade Common Fund

ALICE *Phase-1 Upgrade CF* budget 5,8 MCHF. By September 2023, 70 kCHF was outstanding. 5,9 MCHF has been spent including additional entry fees. The remaining 681 kCHF is proposed to be transferred to the next upgrade common fund (ALICE3).

ATLAS *Phase-1 Upgrade CF* has been completed after the end of LS2 and the installation of the NSW and is now used to collect entry fees. At the end of 2022, the balance of this account was 711 kCHF.

Phase-2 Upgrade CF budget is of 24.4 MCHF to be collected over 9 years from 2018 to 2026 with a flat profile of 2.7 MCHF per year. As of the end of year 2022, contributions of 11,147 kCHF have been received and 976 kCHF spent (549 kCHF in 2022).

CMS *Phase-1 Upgrade CF* has been completed. CMS has received all contributions except one, the account will be closed when a solution is found for the last contribution.

Phase-2 Upgrade CF contributions is 25 MCHF, to be collected over 9 years from 2018 to 2026. At the end of 2022, 11,846 kCHF has been collected and spending is 7,383 kCHF. The request for additional funds (5 MCHF) have been reviewed during the 2023 SG cycle. In short the request seems well justified, however the SG strongly advice CMS to present this increase together with other upcoming increases in a comprehensive and complete funding plan.

LHCb *Phase-1 Upgrade CF* budget is of 15,710 kCHF, with approximately 91% available or fully committed. Outstanding contributions amounts to 1,018 kCHF. By the end of 2022 11 MCHF have been spent. The purchases related to the farm is moved and will now take place during 2023-2024 (just-in-time).



Acknowledgements

The Scrutiny Group thanks the Resource Coordinators and the collaborations as a whole for the excellent work, outstanding cooperation and the constructive spirit of the discussions of this years process.

We thank Patricia Mage-Granados and her team in EP-AGS-SCS for their excellent support.

And last but not least many thanks to the CERN management and the Funding Agencies

