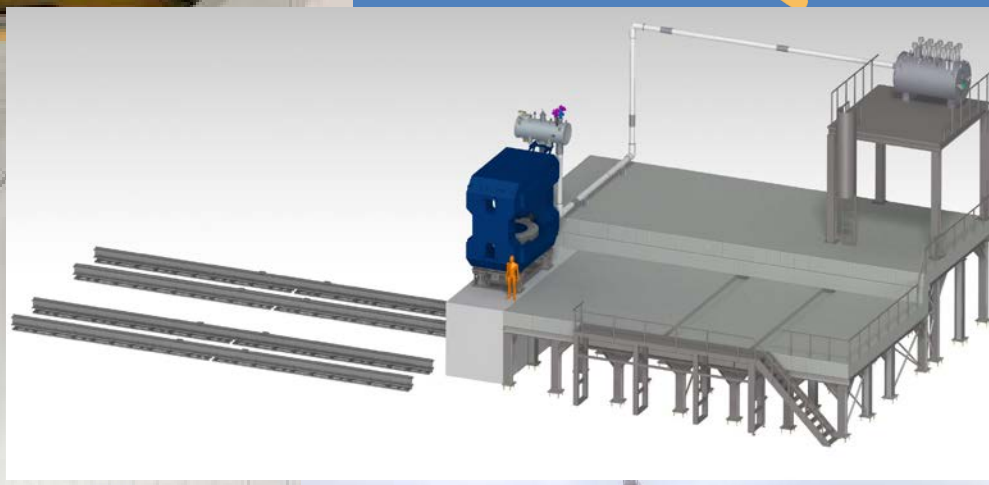
Amendment Construction MoU and update Construction Common Fund for the CBM experiment

13th CBM Resource Review Board meeting

16th May 2024

Report CBM Resource Coordinator

Jürgen Eschke



RRB process → Construction MoU → M&O MoU

1st meeting of FAIR RRBs
04 – 05 July 2013

Content presentation

- Status Signing C-MoU
- updated Construction timeline CBM
- Construction Common Fund / Status payments
- new Spending profile Common Infrastructure/Procurements for Common Infrastructure
- CBM proposal for Amendment to C-MoU on Common Fund
- ECE/ECSG evaluation of Amendment
- Outlook CBM Maintenance & Operation MoU

Status CBM Construction MoU

- The CBM C-MoU was evaluated by the ECSG/ECE (18.3.20)
  → recommendation to RRB to agree on start of signing
- Final submission to Funding Agencies in RRBs in April 2020
- Final ok for signing of Funding Agencies in 24 June 2020
- Signing of C-MoU by FAIR, GSI and CBM spokesperson in August 2020
- Start of distribution to Ministries and Funding Agencies and to the CBM full member institutions in October 2020


CBM Collaboration Memorandum of Understanding 15.04.2020

The Facility for Antiproton and Ion Research in Europe GmbH (Darmstadt, Germany),

GSI Helmholtzzentrum für Schwerionenforschung GmbH (Darmstadt, Germany)

and

the CBM Collaboration

declare that they agree on the present Memorandum of Understanding for the CBM Experiment.

Done in Darmstadt

For FAIR GmbH

Done in Darmstadt 29.7.2020

For the CBM Collaboration

For GSI GmbH


FAIR

GSI

FAIR - Facility for Antiproton and Ion Research in Europe GmbH
GSI Helmholtzzentrum für Schwerionenforschung GmbH
Planckstraße 1
64291 Darmstadt

Hern
RD Eckart Lilienthal
Referat 711
Bundesministerium für Bildung und Forschung
Heinemannstraße 2
53175 Bonn

Wissenschaftlicher Geschäftsführer
Prof. Dr. Paolo Giubellino
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19. October 2020

Signing of the CBM Construction Memorandum of Understanding

Dear Mr. Lilienthal,

For the monitoring of the financing of the construction of the experiments at the Facility for Antiproton and Ion Research (FAIR), the FAIR management has established together with the funding agencies in the involved countries the *Resource Review Board* (RRB) process. Since 2013 the RRBs take place for each of the four FAIR collaborations (APPA, CBM, NUSTAR and PANDA) in a joint meeting at least once per year.

Following a similar process successfully used at CERN, the funding agencies in the FAIR RRBs have agreed that the collaborations produce Construction Memoranda of Understanding (C-MoUs) for the FAIR experiments, which define the commitments of the participating institutions towards the realization of the experiments.

In the last two years, the content and wording of the CBM C-MoU, prepared by the CBM collaboration, was discussed and iterated with the funding agencies in the RRB and a consensus has been reached on its content, and thus the document can now be submitted for signing to every individual funding agency and each participating institution.

I kindly ask you to sign the C-MoU for BMBF and return one signature page to me.

Sincerely Yours

Paolo Giubellino

Geschäftsführung:
Professor Dr. Paolo Giubellino
Dr. Ulrich Breuer
Jörg Blaurock

FAIR:
Sitz: Darmstadt
Amtsgericht Darmstadt HRB 89372
USt-IdNr.: DE 275 995 927
Commerzbank Darmstadt
IBAN DE03 5084 0005 0132 6306 00
BIC COBADEFF508

GSI:
Vorsitzender des Aufsichtsrates:
Ministerialdirigent Dr. Volkmar Dietz
Sitz: Darmstadt
Amtsgericht Darmstadt HRB 1528
USt-IdNr.: DE 111 671 917
Landesbank Hessen/Thüringen
IBAN DE56 5005 0000 5001 8650 04
BIC HELADEFF

Status CBM Construction MoU signatures from Funding Agencies and CBM member institutions

16.05.2024

Country	Funding agency	Signature received
China	Central China Normal University (CCNU)	√
China	Tsinghua University (THU)	√
China	University of Science & Technology (USTC)	√
Czech Republic	Ministry of Education, Youth and Sports (MSMT)	√
Germany	Bundesministerium für Bildung und Forschung (BMBF)	√
Germany	GSI Helmholtzzentrum GmbH	√
Hungary	WIGNER RCP	√
India	Department of Science & Technology (DST)	
Korea	Pusan National University	√
Poland	Ministry of Higher Education in Poland	expected
Romania	Atomic Physics Institute (AFI) for Ministry of Research, Innovation and Digitalization	√
Russian Federation	ROSATOM	
Russian Federation	National Research Centre Kurchatov Institute	
International Organisation	Joint Institute for Nuclear Research (JINR)	√
Ukraine	NASU / State Agency of Ukraine	expected

The majority of the funding agencies and of the CBM member institutions have signed the CBM Construction MoU already!

clarification with ministry in India → causes delay in signing of CBM C-MoU

no signing of CBM C-MoU, since membership of Russian Institutions (plus JINR) is terminated

Status CBM Construction MoU signatures from CBM member institutions 16.05.2024

Institute	Country	Signed page received
Tsinghua (THU)	China	√
USTC	China	√
CCNU	China	√
Uchongqing	China	expected
CTGU	China	√
CTU	Czech Republic	√
NPI-CAS	Czech Republic	√
ZIB	Germany	√
FAIR	Germany	√
GSI	Germany	√
IKP-TUD	Germany	√
~~HZDR~~	~~Germany~~	~~expected~~
FIAS	Germany	√
IKF-UFra	Germany	√
IRI-UFra	Germany	√
UGiessen	Germany	√
PI-UHd	Germany	√
KIT	Germany	expected
ZITI-UHd	Germany	√
UMuenster	Germany	√
UTuebingen	Germany	√
UWuppertal	Germany	√
ELTE	Hungary	√
WignerRCP	Hungary	√
AMU	India	
IOPB	India	
NISER	India	
UPanjab	India	
UGauhati	India	√
IIT-I	India	
UJammu	India	
IIT-KGP	India	
Bose	India	
UCalcutta	India	
VECC	India	
UKashmir	India	
UBanaras	India	

expected

PNU	Korea	√
AGH	Poland	expected after ministry has signed
UJagiellonian	Poland	expected after ministry has signed
TUWarsaw Institure of Electro.	Poland	expected after ministry has signed
TUWarsaw Faculty of Physics	Poland	expected after ministry has signed
UWarsaw	Poland	expected after ministry has signed
IFIN-HH	Romania	√
UBucharest	Romania	√
~~JINR-LIT~~	~~Russia~~	~~√~~
~~JINR-VBLHEP~~	~~Russia~~	~~√~~
~~PNPI~~	~~Russia~~	~~not expected anymore~~
~~INR~~	~~Russia~~	~~not expected anymore~~
~~ITEP~~	~~Russia~~	~~not expected anymore~~
~~MEPhI~~	~~Russia~~	~~not expected anymore~~
~~NRC-KI~~	~~Russia~~	~~not expected anymore~~
~~SINP-MSU~~	~~Russia~~	~~√~~
KINR	Ukraine	√
UKyiv	Ukraine	expected
number of signatories:		29

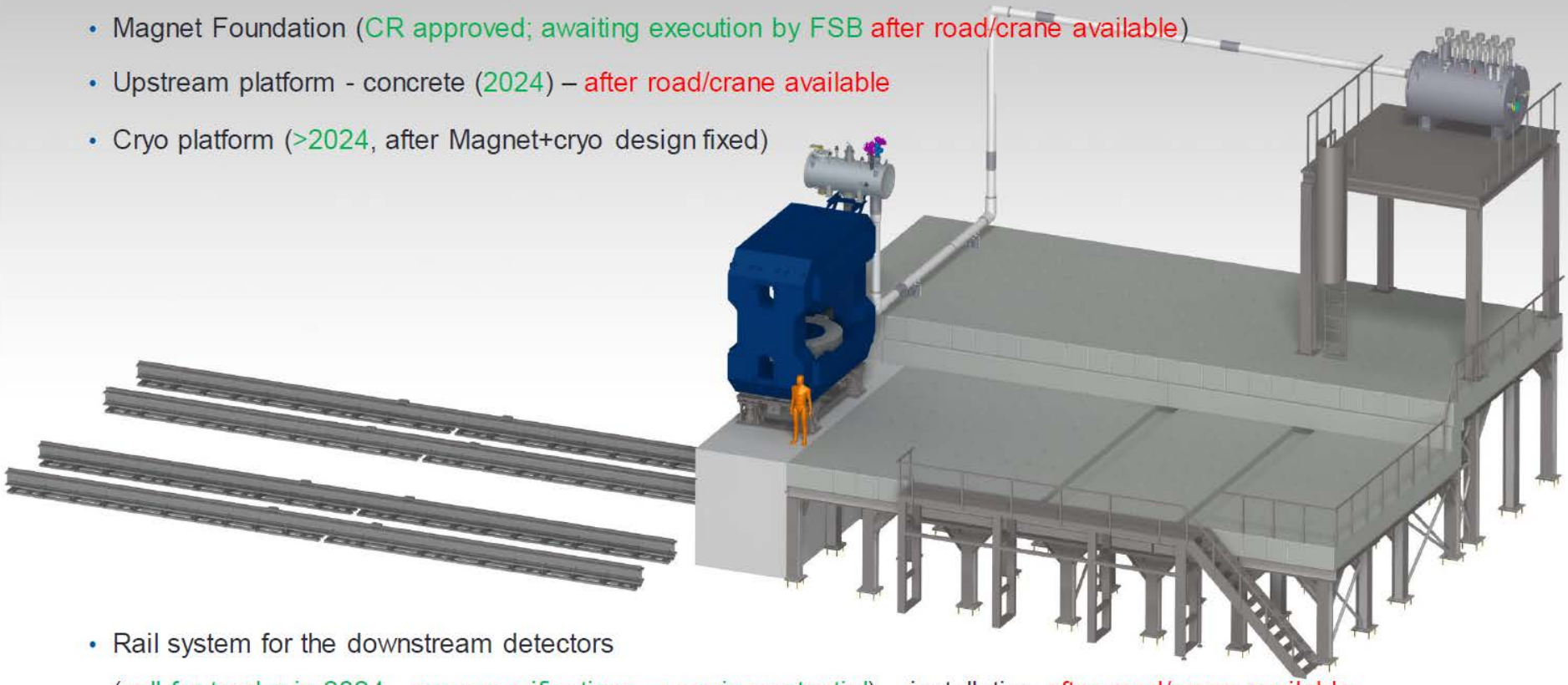
membership in CBM Collaboration terminated

Signatures of Indian and Polish CBM member institutes expected after clarification with ministries in India and Poland on additional funding for FAIR construction

CBM building & cave

Costs for common infrastructure procurements
Common infrastructure installations in CBM cave

- Magnet Foundation (CR approved; awaiting execution by FSB after road/crane available)
- Upstream platform - concrete (2024) – after road/crane available
- Cryo platform (>2024, after Magnet+cryo design fixed)



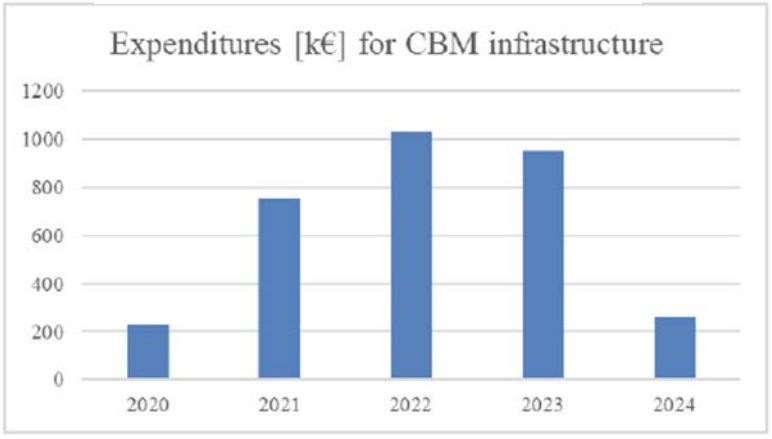
- Rail system for the downstream detectors
  (call for tender in 2024 – new specifications → saving potential) – installation after road/crane available

CBM Common (cave) infrastructure

Work Package	2020	2021	2022	2023	2024	2025	1.1.1.10.1 targ beam	1.1.1.10.2 rail	1.1.1.10.3 data fiber	1.1.1.10.4 racks	1.1.1.10.5 cryo	1.1.1.10.6 gas inf	1.1.1.10.7 gen inf	1.1.1.10.8 supports	1.1.1.10.9 pow std
Rail System	100,0	300,0	96,5					496,5							
upstream plattform	130,0	145,0	90,0											365,0	
RICH-MUCH foundation		90,0	90,0											180,0	
Cryo - BB balcony		3,0	7,0										10,0		
Survey													75,0		
Tools,													195,0		
Safety															
Contro															
Gas co															
Gas ala															
Gas lin															
Gas lines (E30-E10)		50,0	92,5												
Racks E40			100,0	195,1											
Racks E30		10,0	24,5												
Racks E10		15,0	30,6												
Preparation area (E40)			42,0												42,0
Cable tray															
Cooling w															69,2
Optical fit															
							70,0								
							70,0								
							79,0								
							30,0								
							80,0								
							329,0	496,5							111,2
Sum of work p															

The Experiment Cost Scrutiny Group (ECSG) has performed a Cost Assessment of the Common Infrastructure of the CBM Experiment.

expenditures as in C-MoU meanwhile updated



CBM Common Fund (C-MoU 2020)

Breakdown of the annual contributions to the CBM Common Fund for the member institutes of the CBM collaboration (CBM data base 13th November 2019 is bases for calculation of due amounts):

2020: 1000€ /PhD holder
2021: 3265€ /PhD holder
2022: 4469€ /PhD holder
2023: 4184€ /PhD holder
2024: 1130€ /PhD holder

in total per PhD holder: 14049 €

2810 €

per year on average

→ flexible payment possibilities included in final C-MoU text

Institute	Country	all CBM members	PhD-Students	PhDs + Profs	common fund 2020 [€]	common fund 2021 [€]	common fund 2022 [€]	common fund 2023 [€]	common fund 2024 [€]	Total [€]	Total per country [€]	Fraction per country [%]
					1000,00 EURO per PhD/Prof	3265,22 EURO per PhD/Prof	4468,70 EURO per PhD/Prof	4184,35 EURO per PhD/Prof	1130,43 EURO per PhD/Prof	14048,70 EURO per PhD/Prof		
Tsinghua (THU)	China	6	1	5	5.000	16.326	22.343	20.922	5.652	70.243		
USTC	China	10	5	2	2.000	6.530	8.937	8.369	2.261	28.097		
CCNU	China	11	3	8	8.000	26.122	35.750	33.475	9.043	112.390		
Uchongqing	China	3	0	2	2.000	6.530	8.937	8.369	2.261	28.097		
CTGU	China	4	1	3	3.000	9.796	13.406	12.553	3.391	42.146	280.974	8,70
CTU	Czech Republic	2	0	1	1.000	3.265	4.469	4.184	1.130	14.049		
NPI-CAS	Czech Republic	3	1	2	2.000	6.530	8.937	8.369	2.261	28.097	42.146	1,30
IPHC (associated member)	France				0	0	0	0	0	0	0	0,00
ZIB	Germany	4	0	3	3.000	9.796	13.406	12.553	3.391	42.146		
FAIR	Germany	3	0	3	3.000	9.796	13.406	12.553	3.391	42.146		
GSI	Germany	52	5	36	36.000	117.548	160.873	150.637	40.696	505.753		
IKP-TUD	Germany	3	2	1	1.000	3.265	4.469	4.184	1.130	14.049		
HZDR	Germany	5	0	4	4.000	13.061	17.875	16.737	4.522	56.195		
FIAS	Germany	10	5	5	5.000	16.326	22.343	20.922	5.652	70.243		
IKF-UFra	Germany	20	6	9	9.000	29.387	40.218	37.659	10.174	126.438		
IRI-UFra	Germany	4	2	1	1.000	3.265	4.469	4.184	1.130	14.049		
UGiessen	Germany	12	4	5	5.000	16.326	22.343	20.922	5.652	70.243		
PI-UHd	Germany	7	3	2	2.000	6.530	8.937	8.369	2.261	28.097		
KIT	Germany	8	1	3	3.000	9.796	13.406	12.553	3.391	42.146		
ZITI-UHd	Germany	1	0	1	1.000	3.265	4.469	4.184	1.130	14.049		
UMuenster	Germany	13	3	3	3.000	9.796	13.406	12.553	3.391	42.146		
UTuebingen	Germany	7	5	2	2.000	6.530	8.937	8.369	2.261	28.097		
UWuppertal	Germany	7	2	3	3.000	9.796	13.406	12.553	3.391	42.146	1.137.944	35,22
ELTE	Hungary	2	0	1	1.000	3.265	4.469	4.184	1.130	14.049		
WignerRCP	Hungary	2	1	1	1.000	3.265	4.469	4.184	1.130	14.049	28.097	0,87
AMU	India	4	1	3	3.000	9.796	13.406	12.553	3.391	42.146		
IOPB	India	3	0	2	2.000	6.530	8.937	8.369	2.261	28.097		
NISER	India	4	0	4	4.000	13.061	17.875	16.737	4.522	56.195		
UPanjab	India	2	0	2	2.000	6.530	8.937	8.369	2.261	28.097		
UGauhati	India	2	1	1	1.000	3.265	4.469	4.184	1.130	14.049		
IIT-I	India	3	1	2	2.000	6.530	8.937	8.369	2.261	28.097		
UJammu	India	4	0	2	2.000	6.530	8.937	8.369	2.261	28.097		
IIT-KGP	India	1	0	1	1.000	3.265	4.469	4.184	1.130	14.049		
Bose	India	10	3	6	6.000	19.591	26.812	25.106	6.783	84.292		
UCalcutta	India	3	0	3	3.000	9.796	13.406	12.553	3.391	42.146		
VECC	India	11	7	4	4.000	13.061	17.875	16.737	4.522	56.195		
UKashmir	India	6	0	3	3.000	9.796	13.406	12.553	3.391	42.146		
UBanaras	India	4	1	3	3.000	9.796	13.406	12.553	3.391	42.146	505.753	15,65
PNU	Korea	1	0	1	1.000	3.265	4.469	4.184	1.130	14.049	14.049	0,43
AGH	Poland	8	1	7	7.000	22.857	31.281	29.290	7.913	98.341		
UJagiellonian	Poland	6	0	5	5.000	16.326	22.343	20.922	5.652	70.243		
TUWarsaw	Poland	8	3	5	5.000	16.326	22.343	20.922	5.652	70.243		
UWarsaw	Poland	2	0	2	2.000	6.530	8.937	8.369	2.261	28.097	266.925	8,26
IFIN-HH	Romania	5	0	4	4.000	13.061	17.875	16.737	4.522	56.195		
UBucharest	Romania	9	1	8	8.000	26.122	35.750	33.475	9.043	112.390	168.584	5,22
JINR-LIT	Russia	7	1	6	6.000	19.591	26.812	25.106	6.783	84.292		
JINR-VBLHEP	Russia	17	1	7	7.000	22.857	31.281	29.290	7.913	98.341		
PNPI	Russia	15	0	11	11.000	35.917	49.156	46.028	12.435	154.536		
INR	Russia	10	3	3	3.000	9.796	13.406	12.553	3.391	42.146		
ITEP	Russia	18	2	9	9.000	29.387	40.218	37.659	10.174	126.438		
MEPhI	Russia	11	2	8	8.000	26.122	35.750	33.475	9.043	112.390		
NRC-KI	Russia	5	0	3	3.000	9.796	13.406	12.553	3.391	42.146		
SINP-MSU	Russia	6	2	3	3.000	9.796	13.406	12.553	3.391	42.146		
IHEP	Russia	7	0	1	1.000	3.265	4.469	4.184	1.130	14.049	716.483	22,17
KINR	Ukraine	6	2	1	1.000	3.265	4.469	4.184	1.130	14.049		
UKyiv	Ukraine	4	0	4	4.000	13.061	17.875	16.737	4.522	56.195	70.243	2,17
Total:		**401**	**82**	**230**	**230.000**	**751.000**	**1.027.800**	**962.400**	**260.000**	**3.231.200**	**3.231.200**	**100,00**

Status payments into CBM Construction Common Fund

Due ammount 2810€ per year per PhD-Holder

Institute	Country	Common Fund due amount Total [€]	down payments until end 2021	down payments in 2022	down payments in 2023
		2810,00 EURO per PhD/Prof/year			
Tsinghua (THU)	China	70.243			
USTC	China	28.097	payment request in preparation		
CCNU	China	112.390			
Uchongqing	China	28.097			
CTGU	China	42.146			
CTU	Czech Republic	14.049	42.146		
NPI-CAS	Czech Republic	28.097			
IPHC (associated member)	France	0			
ZIB	Germany	42.146	0	43.000	
FAIR	Germany	42.146			
GSI	Germany	505.753	505.753		252.900
GSI (Group Ritman)	Germany				40.000
IKP-TUD	Germany	14.049	0		
HZDR	Germany	56.195			
FIAS	Germany	70.243	0		
IKF-UFra	Germany	126.438	100.000		
IRI-UFra	Germany	14.049	0		
UGiessen	Germany	70.243	100.000		
PI-UHd	Germany	28.097	91.000		
KIT	Germany	42.146	0		
ZITI-UHd	Germany	14.049	0		
UMuenster	Germany	42.146	92.000		
UTuebingen	Germany	28.097	0		
UWuppertal	Germany	42.146	0	100.000	
ELTE	Hungary	14.049			
WignerRCP	Hungary	14.049	14.049		
AMU	India	42.146			
IOPB	India	28.097			
NISER	India	56.195			
UPanjab	India	28.097			
UGauhati	India	14.049			
IIT-I	India	28.097			
UJammu	India	28.097			
IIT-KGP	India	14.049			
Bose	India	84.292			
UCalcutta	India	42.146			
VECC	India	56.195			
UKashmir	India	42.146			
UBanaras	India	42.146			

PNU	Korea	14.049			
AGH	Poland	98.341			
UJagiellonian	Poland	70.243			
TUWarsaw	Poland	70.243			
UWarsaw	Poland	28.097			
IFIN-HH	Romania	56.195	17.061	17.875	16.737
UBucharest	Romania	112.390	22.500	17.400	16.000
JINR-LIT	Int. Organization	84.292	39.000		
JINR-VBLHEP	Int. Organization	98.341			
PNPI	Russia	154.536			
INR	Russia	42.146			
ITEP	Russia	126.438			
MEPhI	Russia	112.390			
NRC-KI	Russia	42.146			
SINP-MSU	Russia	42.146			
IHEP	Russia	14.049			
KINR	Ukraine	14.049			
UKyiv	Ukraine	56.195			
Total / year:			1.023.509	178.275	325.637
Total: Fond 471019					1.527.421

membership in CBM Collaboration terminated

Total amount collected so far:

1,527 Million Euro

Amendment to CBM C-MoU required

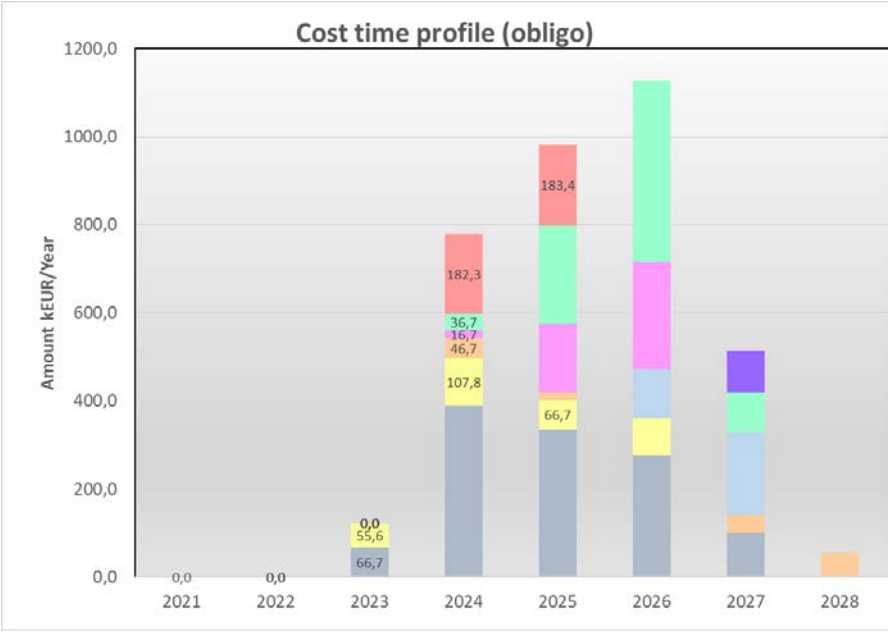
There are three reasons, why an amendment to the CBM Construction MoU is necessary. All of them are a consequence of Russia‘s war against Ukraine.

1. The termination of the CBM collaboration contracts with Russian In-kind providers (cancellation of Russian In-kind contributions to CBM experiment) by the FAIR council, requires a substantial update of the CBM cost and funding matrix, which defines who takes over the responsibility and funding of these items.

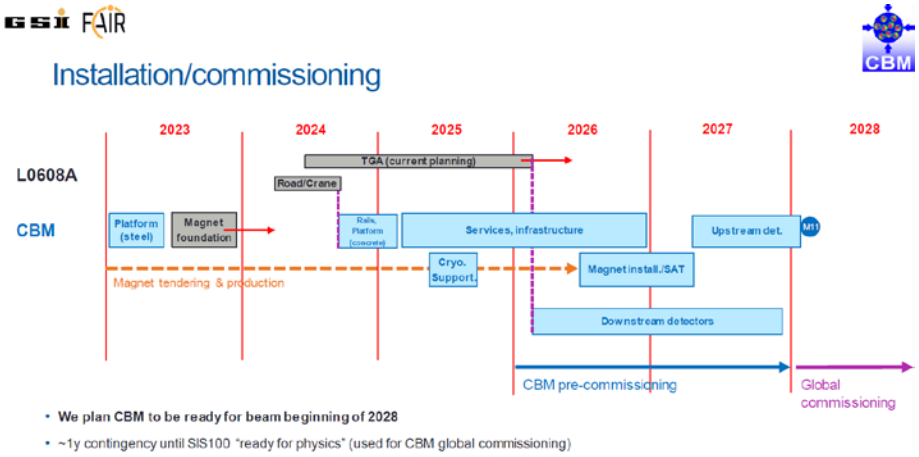
2. The re-procurement of missing (Russian) In-Kind contributions causes a delay of the construction timeline of the FAIR project and of the CBM experiment.
→ duration of the C MoU has to be extended

3. A compensation for the missing financial contributions from Russian institutes to CBM Common Fund has to be regulated. The additional costs for the procurement of the CBM infrastructure caused by inflation have to be compensated as well.

updated spending profile for CBM Common (cave) Infrastructure

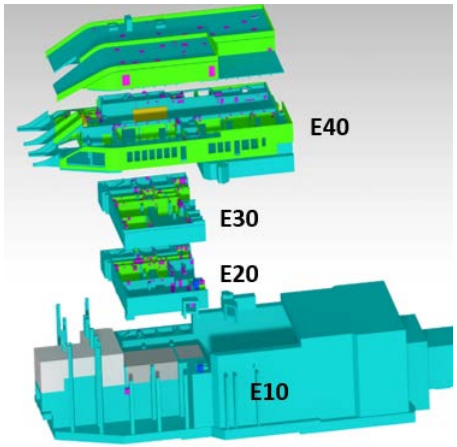


CBM installation – timeline re-baselining (2023)



*(C-MoU: 3,23 M€ (2019 prices) - escalated amount (2024 prices) 3,68 MEURO

		2021	2022	2023	2024	2025	2026	2027	2028
Mechanical structures	1168,6	0,0	0,0	66,7	389,0	335,1	277,8	100,0	0,0
E10 equipment etc.	313,4	0,0	0,0	55,6	107,8	66,7	83,4	0,0	0,0
E40 equipment	158,9	0,0	0,0	0,0	46,7	16,7	0,0	40,0	55,6
Gas infrastructure	300,5	0,0	0,0	0,0	0,0	0,0	111,1	189,4	0,0
Racks	417,0	0,0	0,0	0,0	16,7	156,3	244,1	0,0	0,0
Data transfer infrastructure	761,4	0,0	0,0	0,0	36,7	224,3	411,2	89,2	0,0
Beam transfer infrastructure	365,6	0,0	0,0	0,0	182,3	183,4	0,0	0,0	0,0
Beam dumps	94,5	0,0	0,0	0,0	0,0	0,0	0,0	94,5	0,0
	3580,0	0,0	0,0	122,3	779,1	982,4	1127,6	513,1	55,6
	2023 prices								



updated spending profile for CBM Common (cave) Infrastructure

*(C-MoU: 3,23 M€ (2019 prices) - escalated amount (2024 prices) 3,68 MEURO

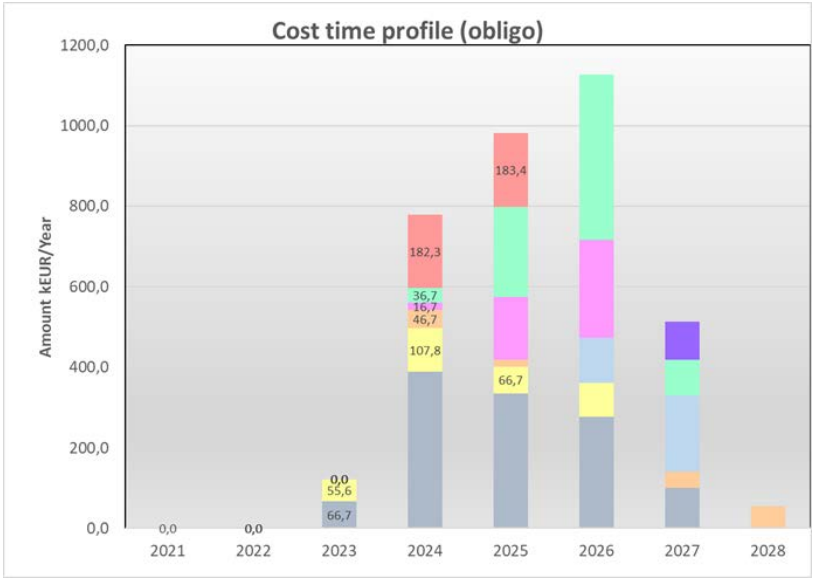
Work Package	*[k€] Price	2021	2022	2023	2024	2025	2026	2027	2028		
Rail System - Rails	329,5			55,6	222,3	51,7					
Rail System - Subframes	222,3				55,6	55,6	111,1				
Upstream Platform - Concrete	300,1			11,1	111,1	177,8				Mechanical struct	68,6
Upstream platform - Cryo platform	116,7					50,0	66,7				
RICH-MUCH foundation	200,0					0,0	100,0	100,0			
Survey tools	83,4				55,6	27,8					
Tools, scaffolding, hoisting gear	216,7			55,6	38,9						
Safety gear	13,3										
Control room	95,6										
Preparation area (E40)	46,7									E40 equipment	158,9
Gas container (E40)											
Gas alarm sy							22,2	22,2			
						0,0	33,3	64,3		Gas infrastructure	300,5
						0,0	55,6	102,8			
						111,1	216,8				
	38,3					11,1	27,2			Racks	417,0
	50,7				16,7	34,0					
C trays	*31,1*				8,9	22,2					
Cooling water distribution	76,9				27,8	49,1				Data transfer infrastructure	761,4
Optical fibers (E10-E40)	469,7					136,3	333,4				
Optical fibers (E40-IT)	133,7					0,0	44,5	89,2			
Control system back end	*50,0*					16,7	33,3				
Target Box+Holder	77,8				38,9	38,9					
Beam pipes	*77,8*				38,9	38,9				Beam transfer infrastructure	365,6
Vacuum pumps	87,8				43,3	44,5					
Beam diagnosis box	*33,3*				16,7	16,7					
Beam abort system	*88,9*				44,5	44,5					
CBM beam dump (rest)	*38,9*							38,9		Beam dumps	94,5
HADES beam dump	*55,6*							55,6			
Sum 2023 prices	**3580,0**	**0,0**	**0,0**	**122,3**	**779,1**	**982,4**	**1127,6**	**513,1**	**55,6**		

updated spending profile for CBM common infrastructure presented to ECE/ECSG in November 2023 and April 2024

escalated amount (2024 prices) 3,68 MEURO

Common Fund procurements

- CBM Common Fund (CF) was established for the financing of the CBM common infrastructure (evaluated by ECSG and ECE)



- **1.53 M€ collected to date** (Critical for success: sufficient budget for CF procurements)

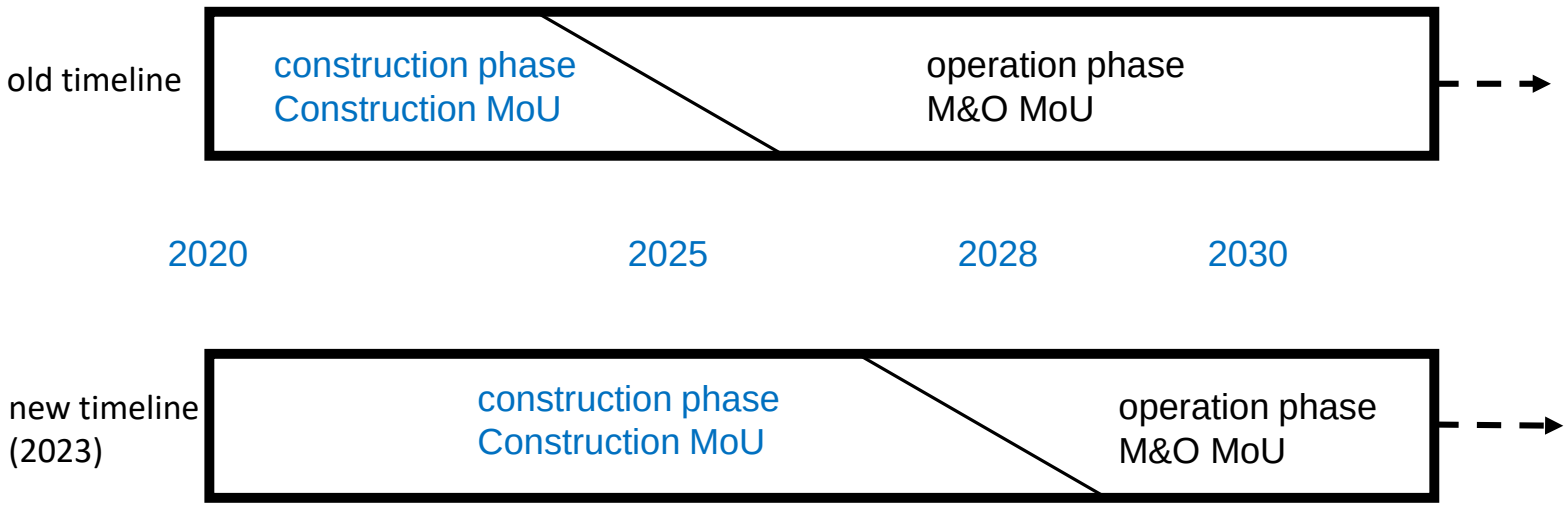
- ~22% Russian contribution to Common Fund (0,711 M€) to be accommodated by other institution
- Compensation for cost increase due to inflation (~0,349 M€)

→ 1,06 M€ in addition needed !

update CBM Common Fund (Amendment C-MoU)

Due to the termination of the membership of the institutions in Russia contributions to the Common Fund of 0,711 M€ (~22%) are not covered at present. The **CBM Collaboration Board has endorsed at its meeting in March 2023 the strategy to collect the annual due amounts per institute as defined in the CBM Construction MoU for 2 additional years**, since the construction period will be about 2 years longer, as anticipated in the signed C-MoU. This procedure would assure that the annual contributions per CBM member institute remain unchanged. Only the transition of the construction phase to the operation phase of the CBM experiment will be shifted by about 2 years.

The annual due amount per PhD holder to the Common Fund in the CBM construction phase will be 2810 EURO. The annual due amount per PhD holder in the operation phase of CBM has to be determined. The M&O costs will be subject of the CBM Maintenance and Operations (M&O) MoU. Moreover, 0,349M€ compensation for inflation have to be collected.



update Common Fund regulated in Amendment:
Annual due amount per PhD holder in construction phase of 2810 EURO also to be collected in 2025 and 2026!

update CBM Construction Common Fund (Amendment C-MoU)

due amounts per institute in the years 2025 and 2026 for closing of funding gap

Institute	City	Country	all	phd students	D+P (PhD holder)	D+P% (PhD holder %)	due amount per PhD holder (2810€) in 2025	due amount per PhD holder (2810€) in 2026	sum 2025 & 2026 [EURO]	per country [EURO]	
THU	Beijing	China	5	1	4	2,1%	11.240 €	11.240 €	22.480 €		
UChongqing	Chongqing	China	3	0	2	1,0%	5.620 €	5.620 €	11.240 €		
USTC	Hefei	China	6	2	2	1,0%	5.620 €	5.620 €	11.240 €		
CCNU	Wuhan	China	7	0	7	3,6%	19.670 €	19.670 €	39.340 €		
CTGU	Yichang	China	4	0	4	2,1%	11.240 €	11.240 €	22.480 €	106.780 €	
CTU	Prague	Czech	5	1	3	1,6%	8.430 €	8.430 €	16.860 €		
NPI-CAS	Řež	Czech	3	2	1	0,5%	2.810 €	2.810 €	5.620 €	22.480 €	
ZIB	Berlin	Germany	2	0	2	1,0%	5.620 €	5.620 €	11.240 €		
RUB	Bochum	Germany	8	1	7	3,6%	19.670 €	19.670 €	39.340 €		
FAIR	Darmstadt	Germany	10	0	9	4,7%	25.290 €	25.290 €	50.580 €		
GSI	Darmstadt	Germany	63	6	45	23,4%	126.450 €	126.450 €	252.900 €		
IKP-TUD	Darmstadt	Germany	4	3	1	0,5%	2.810 €	2.810 €	5.620 €		
HZDR	Dresden	Germany				0,0%	0 €	0 €	0 €		
FIAS	Frankfurt	Germany	13	6	6	3,1%	16.860 €	16.860 €	33.720 €		
IKF-UFra	Frankfurt	Germany	17	9	8	4,2%	22.480 €	22.480 €	44.960 €		
IRI-UFra	Frankfurt	Germany	4	3	1	0,5%	2.810 €	2.810 €	5.620 €		
UGiessen	Gießen	Germany	7	3	2	1,0%	5.620 €	5.620 €	11.240 €		
PI-UHd	Heidelberg	Germany	6	2	3	1,6%	8.430 €	8.430 €	16.860 €		
ZITI-UHd	Heidelberg	Germany	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
KIT	Karlsruhe	Germany	8	1	4	2,1%	11.240 €	11.240 €	22.480 €		
UMuenster	Münster	Germany	13	5	3	1,6%	8.430 €	8.430 €	16.860 €		
UTuebingen	Tübingen	Germany	3	2	1	0,5%	2.810 €	2.810 €	5.620 €		
UWuppertal	Wuppertal	Germany	10	4	4	2,1%	11.240 €	11.240 €	22.480 €	545.140 €	
ELTE	Budapest	Hungary	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
WignerRCP	Budapest	Hungary	1	0	1	0,5%	2.810 €	2.810 €	5.620 €	11.240 €	
AMU	Aligarh	India	5	2	3	1,6%	8.430 €	8.430 €	16.860 €		
IOPB	Bhubaneswar	India	3	0	2	1,0%	5.620 €	5.620 €	11.240 €		
NISER	Bhubaneswar	India	3	0	3	1,6%	8.430 €	8.430 €	16.860 €		
UPanjab	Chandigarh	India	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
UGauhati	Guwahati	India	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
IIT-I	Indore	India	3	0	3	1,6%	8.430 €	8.430 €	16.860 €		
UJammu	Jammu	India	4	0	2	1,0%	5.620 €	5.620 €	11.240 €		
IIT-KGP	Kharagpur	India	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
Bose	Kolkata	India	11	3	8	4,2%	22.480 €	22.480 €	44.960 €		
UCalcutta	Kolkata	India	3	0	3	1,6%	8.430 €	8.430 €	16.860 €		
VECC	Kolkata	India	11	5	6	3,1%	16.860 €	16.860 €	33.720 €		
UKashmir	Srinagar	India	4	0	2	1,0%	5.620 €	5.620 €	11.240 €		
BHU	Varanasi	India	3	1	2	1,0%	5.620 €	5.620 €	11.240 €	207.940 €	
PNU	Pusan	Korea	1	0	1	0,5%	2.810 €	2.810 €	5.620 €	5.620 €	
AGH	Kraków	Poland	5	0	5	2,6%	14.050 €	14.050 €	28.100 €		
UJagiellonian	Kraków	Poland	8	0	6	3,1%	16.860 €	16.860 €	33.720 €		
IF-WUT	Warsaw	Poland	3	0	3	1,6%	8.430 €	8.430 €	16.860 €		*joined after C-MoU: Amount for 2020-2024 is 42150€
ISE-WUT	Warsaw	Poland	7	2	3	1,6%	8.430 €	8.430 €	16.860 €		
UWarsaw	Warsaw	Poland	2	0	2	1,0%	5.620 €	5.620 €	11.240 €	106.780 €	
IFIN-HH	Bucharest	Romania	5	0	4	2,1%	11.240 €	11.240 €	22.480 €		
UBucharest	Bucharest	Romania	6	2	4	2,1%	11.240 €	11.240 €	22.480 €	44.960 €	
KINR	Kyiv	Ukraine	7	4	1	0,5%	2.810 €	2.810 €	5.620 €		
TSNU-Kyiv	Kyiv	Ukraine	4	0	4	2,1%	11.240 €	11.240 €	22.480 €	28.100 €	
sum (all)			**305**	**70**	**192**	**100,0%**	**539.520 €**	**539.520 €**	**1.079.040 €**	**1.079.040 €**	

Extention of duration of CBM C-MoU

The duration of the CBM Construction MoU has to be adapted to the new construction timeline of the FAIR project and of the CBM experiment.

Therefore, **Article 3** of the C-MoU is changed in the following way (changes are marked in red):

Article 3 Duration of this MoU and its Extension

3.1 This C-MoU is valid for the construction period of the CBM detector, from 1st April 2020 to a date not earlier than 31 December 2028. The actual termination date will be set by the CBM RRB no later than 31 December 2027. The construction phase ends after all construction workpackes are completed and the equipment is installed in the CBM cave.

3.2 The responsibilities for the maintenance and operation of the CBM detector is planned to be laid down in a separate *M&O-MoU* on maintenance and operation procedures, which will come into force in the operation phase of the CBM Experiment. The actual start date of the operation phase will be set by the CBM RRB no later than 31 December 2026. The M&O-MoU will be prepared by the CBM Collaboration together with FAIR GmbH, in consultation with the CBM RRB and will be signed by all the parties participating in the operation phase of CBM.

Content of Amendment to CBM Construction MoU

Additional contributions to CBM Common Fund

Article 6 Common Infrastructure and Construction Common Fund

There is the need to compensate for the missing financial contributions from Russian institutes to the CBM Common Fund (0,711 MEuro) and for the cost increase by inflation of 0,349 MEuro amounting to 1,06 MEuro. This requires additional contributions to the CBM Common Fund, which have to be collected to cover the expenses for the procurement of the CBM infrastructure items.

Therefore, to **Article 6** of the C-MoU the following paragraph (6.7) is added:

6.7 The CBM full member institutions have the obligation to pay the annual due amount for the Common Fund of 2810 EURO per PhD-holder per year also in the years 2025 and 2026 in order to compensate for the missing financial contributions from Russian institutes to the CBM Common Fund and for the cost increase of the CBM infrastructure items by inflation.
The table with the due amounts for the CBM full member institutions (as of 06.12.2023) in the years 2025 and 2026 is added to Annex 8 of the C-MoU.

Content of Amendment to CBM Construction MoU

Changes in the Annexes of the C-MoU

The CBM Collaboration Board has decided on April 4th, 2023 to terminate the membership of institutions in Russia (this includes JINR) in the CBM collaboration. The CBM Collaboration Data Base was updated accordingly. The list of member institutes and of the funding agencies is updated in this amendment. of the C-MoU with list of the member institutes of the CBM collaboration is updated s follows:

Akronym	City	Country	Status	Join Date	Full Name of Institute
AMU	Aligarh	India	FULL	26.09.2007	Department of Physics, Aligarh Muslim University
THU	Beijing	China	FULL	15.10.2008	Department of Engineering Physics, Tsinghua University
ZIB	Berlin	Germany	FULL	23.04.2015	Zuse Institute Berlin (ZIB)
IOPB	Bhubaneswar	India	FULL	21.09.2006	Institute of Physics
NISER	Bhubaneswar	India	FULL	22.03.2018	National Institute of Science Education and Research (NISER)
RUB	Bochum	Germany	FULL	27.09.2023	Institut für Experimentalphysik I, Ruhr-Universität Bochum
IFIN-HH	Bucharest	Romania	FULL	13.02.2004	Horia Hulubei National Institute of Physics and Nuclear Engineering (IFIN-HH)
UBucharest	Bucharest	Romania	FULL	27.02.2008	Atomic and Nuclear Physics Department, University of Bucharest
ELTE	Budapest	Hungary	FULL	13.02.2004	Eötvös Loránd University (ELTE)
WignerRCP	Budapest	Hungary	FULL	13.02.2004	Institute for Particle and Nuclear Physics, HUN-REN Wigner RCP
ECTP	Cairo	Egypt	ASSO	14.04.2016	Egyptian Center for Theoretical Physics at Nile University (ECTP)
UPanjab	Chandigarh	India	FULL	21.09.2006	Department of Physics, Panjab University
UChongqing	Chongqing	China	FULL	27.09.2017	Chongqing University
USilesia	Chorzów	Poland	ASSO	13.02.2004	Institute of Physics, University of Silesia
FAIR	Darmstadt	Germany	FULL	29.03.2012	Facility for Antiproton and Ion Research in Europe GmbH (FAIR)
GSI	Darmstadt	Germany	FULL	13.02.2004	GSI Helmholtzzentrum für Schwerionenforschung GmbH (GSI)
IKP-TUD	Darmstadt	Germany	FULL	27.09.2012	Institut für Kernphysik, Technische Universität Darmstadt
FIAS	Frankfurt	Germany	FULL	07.10.2009	Frankfurt Institute for Advanced Studies, Goethe-Universität Frankfurt (FIAS)
IKF-UFra	Frankfurt	Germany	FULL	13.02.2004	Institut für Kernphysik, Goethe-Universität Frankfurt
IRI-UFra	Frankfurt	Germany	FULL	07.10.2009	Institute for Computer Science, Goethe-Universität Frankfurt
UGiessen	Gießen	Germany	FULL	29.11.2010	Justus-Liebig-Universität Gießen
UGauhati	Guwahati	India	FULL	15.10.2008	Nuclear and Radiation Physics Research Laboratory, Department of Physics, Gauhati University
USTC	Hefei	China	FULL	17.12.2005	Department of Modern Physics, University of Science & Technology of China (USTC)
PI-UHd	Heidelberg	Germany	FULL	13.02.2004	Physikalisches Institut, Universität Heidelberg
ZITI-UHd	Heidelberg	Germany	FULL	13.02.2004	Institut für Technische Informatik, Universität Heidelberg
UHiroshima	Hiroshima	Japan	ASSO	27.09.2023	Physics Program, Graduate School of Advanced Science and Engineering, Hiroshima University
IIT-I	Indore	India	FULL	10.04.2014	Indian Institute of Technology Indore
UJammu	Jammu	India	FULL	26.09.2007	Department of Physics, University of Jammu
KIT	Karlsruhe	Germany	FULL	11.09.2014	Karlsruhe Institute of Technology (KIT)
IIT-KGP	Kharagpur	India	FULL	21.09.2006	Indian Institute of Technology Kharagpur
Bose	Kolkata	India	FULL	29.03.2012	Department of Physics, Bose Institute
UCalcutta	Kolkata	India	FULL	26.09.2007	Department of Physics and Department of Electronic Science, University of Calcutta
VECC	Kolkata	India	FULL	03.03.2006	Variable Energy Cyclotron Centre (VECC)
AGH	Kraków	Poland	FULL	26.09.2007	AGH University of Science and Technology (AGH)
UJagiellonian	Kraków	Poland	FULL	13.02.2004	Marian Smoluchowski Institute of Physics, Jagiellonian University
KINR	Kyiv	Ukraine	FULL	15.10.2008	High Energy Physics Department, Kiev Institute for Nuclear Research (KINR)
TSNU-Kyiv	Kyiv	Ukraine	FULL	13.02.2004	Department of Nuclear Physics, Taras Shevchenko National University of Kyiv
IMP	Lanzhou	China	ASSO	01.10.2019	Institute of Modern Physics, Chinese Academy of Sciences (IMP)
UMainz	Mainz	Germany	ASSO	30.09.2021	Institut für Physik, Johannes Gutenberg-Universität Mainz
UMuenster	Münster	Germany	FULL	13.02.2004	Institut für Kernphysik, Universität Münster
IIT-B	Mumbai	India	ASSO	14.04.2016	Indian Institute of Technology Bombay
TUM	Munich	Germany	ASSO	04.04.2019	TUM School of Natural Sciences, Department of Physics, Technical University of Munich (TUM)
CTU	Prague	Czech Republic	FULL	13.02.2004	Czech Technical University in Prague (CTU)
PNU	Pusan	Korea	FULL	13.02.2004	Pusan National University (PNU)
NPI-CAS	Řež	Czech Republic	FULL	13.02.2004	Nuclear Physics Institute of the Czech Academy of Sciences
NBU	Siliguri	India	ASSO	14.04.2016	Department of Physics, Faculty of Science, University of North Bengal
UKashmir	Srinagar	India	FULL	26.09.2007	Department of Physics, University of Kashmir
IPHC	Strasbourg	France	ASSO	13.02.2004	Institut Pluridisciplinaire Hubert Curien (IPHC), IN2P3-CNRS and Université de Strasbourg
KEK	Tsukuba	Japan	ASSO	04.04.2019	High Energy Accelerator Research Organization (KEK)
TCHoU	Tsukuba	Japan	ASSO	29.09.2021	Tomonaga Center for the History of the Universe, University of Tsukuba (TCHoU)
UTuebingen	Tübingen	Germany	FULL	07.04.2011	Physikalisches Institut, Eberhard Karls Universität Tübingen
BHU	Varanasi	India	FULL	21.09.2006	Department of Physics, Banaras Hindu University (BHU)
IF-WUT	Warsaw	Poland	FULL	30.04.2020	Faculty of Physics, Warsaw University of Technology
ISE-WUT	Warsaw	Poland	FULL	11.04.2013	Institute of Electronic Systems, Warsaw University of Technology
UWarsaw	Warsaw	Poland	FULL	13.02.2004	Faculty of Physics, University of Warsaw
CCNU	Wuhan	China	FULL	11.03.2005	College of Physical Science and Technology, Central China Normal University (CCNU)
UWuppertal	Wuppertal	Germany	FULL	07.10.2009	Fakultät für Mathematik und Naturwissenschaften, Bergische Universität Wuppertal
CTGU	Yichang	China	FULL	23.04.2015	College of Science, China Three Gorges University (CTGU)

The Member Institutions of the CBM Collaboration are indicated with "FULL" in this list, whereas Associated Members Institutions are marked with "ASSO".

Annex 2 of the C-MoU with list of the Funding Agencies involved in the funding of the CBM experiment is updated as follows:

Country	Funding agency
China	Central China Normal University (CCNU)
China	Tsinghua University (THU)
China	University of Science & Technology (USTC)
Czech Republic	Ministry of Education, Youth and Sports (MSMT)
Germany	Bundesministerium für Bildung und Forschung (BMBF)
Germany	GSI Helmholtzzentrum GmbH
Hungary	HUN-REN WIGNER Research Center for Physics
India	Department of Science & Technology (DST)
Korea	Pusan National University
Poland	Ministry of Science and Higher Education
Romania	Atomic Physics Institute (AFI) for Ministry of Research, Innovation and Digitalization (MCID)
Ukraine	NASU / State Agency of Ukraine

The latest and valid version of the list of the Funding Agencies is archived at https://edms.cern.ch/document/xxxxxxxx .

Updated Annex 3 (Organization rules of the CBM Collaboration):

The **Organization rules of the CBM Collaboration** and Management structure of the CBM Collaboration are given in **Annex 3** of the CBM C-MoU. The CBM collaboration has updated its "CBM Organization Rules" since 2020 several times.

The latest and valid version of the "CBM Organization Rules" (Annex 3) is part of this amendment to the CBM C-MoU and archived at https://edms.cern.ch/document/3071438/LAST_RELEASED .

Content of Amendment to CBM Construction MoU

Changes in the Annexes of the C-MoU

Updated Annex 4: Summary Tables on Construction Cost and Funding

In Annex 4b of the C-MoU the Summary Tables on Construction Cost and Funding with the Values of Commitments by Funding Agency to the CBM Detectors/Subsystems as presented at the 9th Resource Review Board (RRB) in November 2019 and updated according to comments after the RRB9 from Funding Agencies and of the ECSG are given.

Annex 4b to the C-MoU with the contributions of the institutes and countries to the construction costs of the CBM experiment is updated with the following funding tables as presented in the 12th RRB meeting on 06.06.2023:

Country funding (in MEuro and 2023 prices):

CBM day 1 setup detector / system	Costs	Common fund	Germany: GSI and FAIR project funds	Germany: University funding (VF)	FAIR (re-procurment) *BIC for STS with JINR (will be terminated)	India	Poland	Romania	China	Czech Republic	Hungary	France	Korea	Ukraine	to be assigned
MVD	1,49			0,60								0,51	0,12		0,27
STS	15,54		7,57	0,99	* 3,46		2,94							0,15	0,42
TRD	4,28			1,28				2,02			0,23 + 0,06				0,68
RICH	4,96		2,03	1,32	1,28 +										0,33
TOF	9,46		1,21	0,72	0,00			1,22	4,67						1,63
Beam Monitoring System	0,39			0,12						0,08					0,20
Online Systems (DAQ+PLES) day-1 setup	2,98		1,44	1,22			0,33								
Magnet	6,14				+ 6,14										
MuCh	8,82				2,57 +	6,26									
Forward Detector (former PSD)	1,15				0,72 +					0,27 + 0,16					
Infrastructure	3,58	2,87													0,72
ECAL (not part of day 1 setup)															
Sum in 2023 M€	58,81	2,87	12,25	6,25	4,57 + 9,60	6,26	3,27	3,24	4,67	0,35 + 0,16	0,23 + 0,06	0,51	0,12	0,15	4,25
Sum in 2005 M€	35,97	1,75	7,49	3,82	2,79 + 5,87	3,83	2,00	1,98	2,86	0,21 + 0,10	0,14 + 0,04	0,31	0,07	0,09	2,60
escalation factor (1,/1,635)															

This calculation uses an escalation factor of 1,635 between 2005 prices and 2023 prices

amounts in green are considered as secured / 83,9 % secured

amounts in blue - Expression of Interest (EoI)

amounts in red - to be assigned

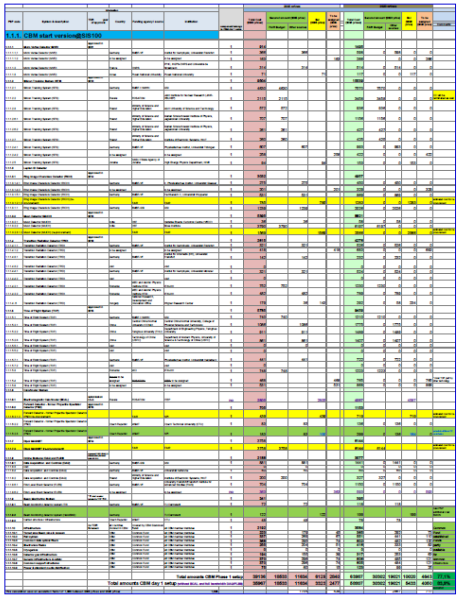
CBM phase 1 setup															
CBM day 1 setup	58,81	2,87	12,25	6,25	4,57 + 9,60	6,26	3,27	3,24	4,67	0,35 + 0,16					
full bandwidth (DAQ/FLES)	0,59														
plus ECAL	4,59				4,59										
Sum in 2023 M€	63,99	2,87	12,25	6,25	9,15 + 9,60	6,26	3,27	3,24	4,67	0,35 + 0,16					
Sum in 2005 M€	39,14	1,75	7,49	3,82	5,60 + 5,87	3,83	2,00	1,98	2,86	0,21 + 0,10					

Status CBM experiment funding (CBM day 1 & start version@SIS100)

PSP Code	detector / system	Prices, K Euro (2005 price): total cost 2005 prices	Secured amount	EoI	To be assigned	Prices, K Euro (2023 price): total cost 2023 prices	Secured amount	EoI	To be assigned	
1.1.1.1	Micro Vertex Detector (MVD)	914	680	71	163	1495	1112	117	266	
1.1.1.2	Silicon Tracking System (STS)	9504	9152	94	258	15539	14964	153	422	
1.1.1.3.1	Ring Image Cherenkov Detector (RICH)	3032	2046	785	201	4957	3345	1283	329	
1.1.1.3.2	Muon Detector (MUCH)	5395	3826	1569		8821	6255	2566		
1.1.1.4	Transition Radiation Detector (TRD)	2615	2054	143	418	4276	3359	234	683	
1.1.1.5	Time of Flight System (TOF)	5785	4787	0	999	9459	7826	0	1633	
1.1.1.6.1	Electromagnetic Calorimeter (ECAL)	2805		2805		4587		4587		
1.1.1.6.2	Projectile Spectator Detector (PSD), now Forward Detector	705	166	539		1153	271	882		
1.1.1.7	Dipol MAGNET	3758	3758			6144	6144			
1.1.1.8	Online Systems (DAQ and FLES)	2188	1825	0	363	3577	2984	0	593	
1.1.1.9	Beam Monitoring System	241	120	122		395	196	199		1
1.1.1.10	Infrastructure	2192	1754		438	3584	2867		717	1
	Sum CBM Phase 1 setup	39136	30167	6129	2840	63987	49323	10020	4643	77,1%
	Sum CBM day 1 setup (without ECAL and full bandwidth DAQ/FLES)	35967	30167	3323	2477	58807	49323	5433	4050	83,9%
										percentage secured

1,635 This calculation uses an escalation factor of 1,635 between 2005 prices and 2023 prices

The detailed CBM cost matrix is updated with the following cost matrix as distributed after the 12th CBM RRB.



Content of Amendment to CBM Construction MoU

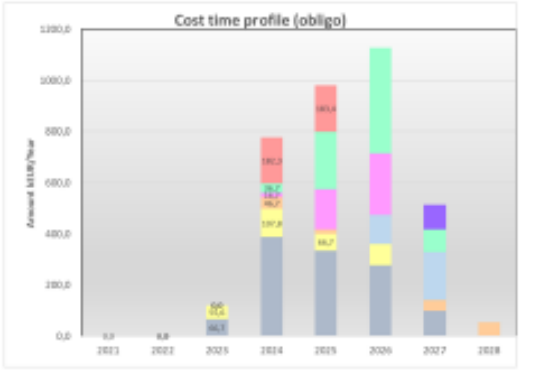
Changes in the Annexes of the C-MoU

Updated Annex 8 (Procedures for the Construction Common Fund for the Common Infrastructure):

The Procedures for the **Construction Common Fund** and the costs and spending profile of the **Common Infrastructure Costs** are defined in **Annex 8** of the CBM C-MoU.

The cost and spending profile for the CBM Common (cave) Infrastructure procurements in Annex 8 of the CBM C-MoU is updated with the **new spending profile** as presented in 2023 to the RRB and to the ECE/ECSG. Since the completion of the CBM cave was delayed, planned procurements for the CBM infrastructure as originally defined in the C-MoU for 2020 and 2021 are shifted as given below:

updated (2023) spending profile for CBM



*(C-MoU: 3,23 M€ (2019 prices) - escalated amo

		2021	2022	2023	2024	20
Mechanical structures	1168,6	0,0	0,0	66,7	388,0	33
E10 equipment etc.	313,4	0,0	0,0	55,6	107,8	6
E40 equipment	158,9	0,0	0,0	0,0	46,7	1
Gas infrastructure	300,5	0,0	0,0	0,0	0,0	
Racks	417,0	0,0	0,0	0,0	16,7	15
Data transfer infrastructure	761,4	0,0	0,0	0,0	36,7	22
Beam transfer infrastructure	365,6	0,0	0,0	0,0	182,3	18
Beam dumps	94,5	0,0	0,0	0,0	0,0	
	3580,0	0,0	0,0	122,3	779,1	98

Work Package	Price	2021	2022	2023	2024	2025	2026	2027	2028		
Rail System - Rails	329,5			55,6	222,3	51,7					
Rail System - Subframes	222,3				55,6	55,6	111,1				
Upstream Platform - Concrete	300,1			11,1	111,1	177,8				Mechanical structures	1168,6
Upstream platform - Cryo platform	116,7					50,0	66,7				
RICH-MUCH foundation	200,0					0,0	100,0	100,0			
Survey tools	83,4				55,6	27,8					
Tools, scaffolding, hoisting gear	216,7			55,6	38,9	38,9	83,4				
Safety gear	13,3				13,3	0,0					
Control room	95,6					0,0		40,0	55,6		
Preparation area (E40)	46,7				46,7	0,0				E40 equipment	158,9
Gas container (E40)	16,7					16,7					
Gas alarm system (E30/E40)	*44,5*					0,0	22,2	22,2			
Gas lines (E40-E30)	97,7					0,0	33,3	64,3		Gas infrastructure	300,5
Gas lines (E30-E10)	158,4					0,0	55,6	102,8			
Racks E40	328,0					111,1	216,8				
Racks E30	38,3					11,1	27,2			Racks	417,0
Racks E10	50,7				16,7	34,0					
Cable trays	*31,1*				8,9	22,2					
Cooling water distribution	76,9				27,8	49,1					
Optical fibers (E10-E40)	469,7					136,3	333,4			Data transfer infrastructure	761,4
Optical fibers (E40-IT)	133,7					0,0	44,5	89,2			
Control system back end	*50,0*					16,7	33,3				
Target Box+Holder	*77,8*				38,9	38,9					
Beam pipes	*77,8*				38,9	38,9					
Vacuum pumps	*87,8*				43,3	44,5				Beam transfer infrastructure	365,6
Beam diagnosis box	*33,3*				16,7	16,7					
Beam abort system	*88,9*				44,5	44,5					
CBM beam dump (rest)	*38,9*							38,9		Beam dumps	94,5
HADES beam dump	*55,6*							55,6			
Sum	3580,0	0,0	0,0	122,3	779,1	982,4	1127,6	513,1	55,6		

There is the need to compensate for the missing financial contributions from Russian institutes to the CBM Common Fund (0,711 MEuro) and for the cost increase by inflation of 0,349 MEuro amounting to 1,06 MEuro. This requires additional contributions to the CBM Common Fund, which have to be collected to cover the expenses for the procurement of the CBM infrastructure items. For the determination of the cost increase of the infrastructure costs, the official FAIR inflation escalation factor of 1,635 between 2005 and 2023 prices was used.

Content of Amendment to CBM Construction MoU

Changes in the Annexes of the C-MoU

To **Annex 8** of the C-MoU the following formulation regarding the CBM Common Fund is added: "It is agreed to collect the annual due amount for the Common Fund of 2810 EURO per PhD-holder also in the years 2025 and 2026 from the full member institutes of the CBM collaboration in order to cover the expenses for the CBM Common Infrastructure."

The CBM Collaboration Board has endorsed this procedure at its Collaboration Board Meeting on 27.09.2023.

The table below with the due amounts for the CBM full member institutions in the years 2025 and 2026 (as of 06.12.2023) is added to the Breakdown of the annual contributions to the CBM Construction Common Fund in the C-MoU for the years 2020-2024.

Institute	City	Country	all	phd students	D+P (PhD holder)	D+P% (PhD holder %)	due amount per PhD holder (2810€) in 2025	due amount per PhD holder (2810€) in 2026	sum 2025 & 2026 [EURO]	per country [EURO]	
THU	Beijing	China	5	1	4	2,1%	11.240 €	11.240 €	22.480 €		
UChongqing	Chongqing	China	3	0	2	1,0%	5.620 €	5.620 €	11.240 €		
USTC	Hefei	China	6	2	2	1,0%	5.620 €	5.620 €	11.240 €		
CCNU	Wuhan	China	7	0	7	3,6%	19.670 €	19.670 €	39.340 €		
CTGU	Yichang	China	4	0	4	2,1%	11.240 €	11.240 €	22.480 €	106.780 €	
CTU	Prague	Czech	5	1	3	1,6%	8.430 €	8.430 €	16.860 €		
NPI-CAS	Řež	Czech	3	2	1	0,5%	2.810 €	2.810 €	5.620 €	22.480 €	
ZIB	Berlin	Germany	2	0	2	1,0%	5.620 €	5.620 €	11.240 €		
RUB	Bochum	Germany	8	1	7	3,6%	19.670 €	19.670 €	39.340 €		
FAIR	Darmstadt	Germany	10	0	9	4,7%	25.290 €	25.290 €	50.580 €		
GSI	Darmstadt	Germany	63	6	45	23,4%	126.450 €	126.450 €	252.900 €		
IKP-TUD	Darmstadt	Germany	4	3	1	0,5%	2.810 €	2.810 €	5.620 €		
HZDR	Dresden	Germany				0,0%	0 €	0 €	0 €		
FIAS	Frankfurt	Germany	13	6	6	3,1%	16.860 €	16.860 €	33.720 €		
IKF-UFra	Frankfurt	Germany	17	9	8	4,2%	22.480 €	22.480 €	44.960 €		
IRI-UFra	Frankfurt	Germany	4	3	1	0,5%	2.810 €	2.810 €	5.620 €		
UGiessen	Gießen	Germany	7	3	2	1,0%	5.620 €	5.620 €	11.240 €		
PI-UHd	Heidelberg	Germany	6	2	3	1,6%	8.430 €	8.430 €	16.860 €		
ZITI-UHd	Heidelberg	Germany	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
KIT	Karlsruhe	Germany	8	1	4	2,1%	11.240 €	11.240 €	22.480 €		
UMuenster	Münster	Germany	13	5	3	1,6%	8.430 €	8.430 €	16.860 €		
UTuebingen	Tübingen	Germany	3	2	1	0,5%	2.810 €	2.810 €	5.620 €		
UWuppertal	Wuppertal	Germany	10	4	4	2,1%	11.240 €	11.240 €	22.480 €	545.140 €	
ELTE	Budapest	Hungary	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
WignerRCP	Budapest	Hungary	1	0	1	0,5%	2.810 €	2.810 €	5.620 €	11.240 €	
AMU	Aligarh	India	5	2	3	1,6%	8.430 €	8.430 €	16.860 €		
IOPB	Bhubaneswar	India	3	0	2	1,0%	5.620 €	5.620 €	11.240 €		
NISER	Bhubaneswar	India	3	0	3	1,6%	8.430 €	8.430 €	16.860 €		
UPanjab	Chandigarh	India	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
UGauhati	Guwahati	India	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
IIT-I	Indore	India	3	0	3	1,6%	8.430 €	8.430 €	16.860 €		
UJammu	Jammu	India	4	0	2	1,0%	5.620 €	5.620 €	11.240 €		
IIT-KGP	Kharagpur	India	1	0	1	0,5%	2.810 €	2.810 €	5.620 €		
Bose	Kolkata	India	11	3	8	4,2%	22.480 €	22.480 €	44.960 €		
UCalcutta	Kolkata	India	3	0	3	1,6%	8.430 €	8.430 €	16.860 €		
VECC	Kolkata	India	11	5	6	3,1%	16.860 €	16.860 €	33.720 €		
UKashmir	Srinagar	India	4	0	2	1,0%	5.620 €	5.620 €	11.240 €		
BHU	Varanasi	India	3	1	2	1,0%	5.620 €	5.620 €	11.240 €	207.940 €	
PNU	Pusan	Korea	1	0	1	0,5%	2.810 €	2.810 €	5.620 €	5.620 €	
AGH	Kraków	Poland	5	0	5	2,6%	14.050 €	14.050 €	28.100 €		
UJagiellonian	Kraków	Poland	8	0	6	3,1%	16.860 €	16.860 €	33.720 €		
IF-WUT	Warsaw	Poland	3	0	3	1,6%	8.430 €	8.430 €	16.860 €		*joined after C-MoU: Amount for 2020-2024 is 42150€
ISE-WUT	Warsaw	Poland	7	2	3	1,6%	8.430 €	8.430 €	16.860 €		
UWarsaw	Warsaw	Poland	2	0	2	1,0%	5.620 €	5.620 €	11.240 €	106.780 €	
IFIN-HH	Bucharest	Romania	5	0	4	2,1%	11.240 €	11.240 €	22.480 €		
UBucharest	Bucharest	Romania	6	2	4	2,1%	11.240 €	11.240 €	22.480 €	44.960 €	
KINR	Kyiv	Ukraine	7	4	1	0,5%	2.810 €	2.810 €	5.620 €		
TSNU-Kyiv	Kyiv	Ukraine	4	0	4	2,1%	11.240 €	11.240 €	22.480 €	28.100 €	
sum (all)			**305**	**70**	**192**	**100,0%**	**539.520 €**	**539.520 €**	**1.079.040 €**	**1.079.040 €**	

ECE/ECSG recommendations regarding Amendment to CBM C-Mou

ECE/ECSG November 2023:

Executive Summary on Addendum of the MoU construction

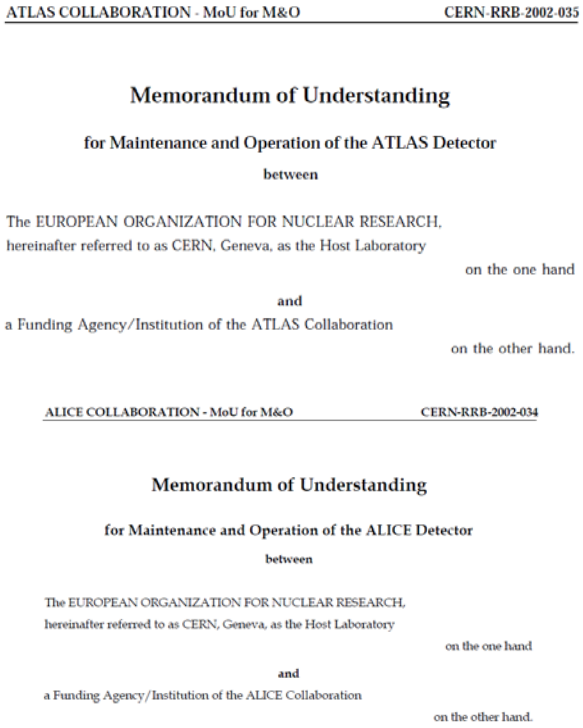
- A revised memorandum of understanding (MoU) for the CBM construction and common fund was introduced, necessitated by the cancellation of the Russian in-kind contribution matrix and to offset the shortfall from the financial contributions of Russian teams to the common construction fund. We advise that the current draft of the MoU Addendum be submitted to the Resource Review Board (RRB) for consideration.

ECE/ECSG April 2024:

Executive Summary

- The collaboration presented an amendment to the construction Memorandum of Understanding (C-MOU) to address the shortfall of €0.7 million in contributions from Russian institutes, as well as an additional €0.3 million due to cost escalation from increased construction time and inflation. They propose extending the C-MOU payments for an additional two years, aligning with the postponed start of exploitation and the corresponding Maintenance & Operations Memorandum of Understanding (M&O MOU), thus covering the financial shortfall. The committees consider this an appropriate and equitable proposal and recommend its approval.

examples CERN: ATLAS and ALICE COLLABORATIONs - MoUs for M&O



ATLAS COLLABORATION - MoU for M&O CERN-RRB-2002-035

Memorandum of Understanding

for Maintenance and Operation of the ATLAS Detector

between

The EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH,
hereinafter referred to as CERN, Geneva, as the Host Laboratory

on the one hand

and

a Funding Agency/Institution of the ATLAS Collaboration

on the other hand.

ALICE COLLABORATION - MoU for M&O CERN-RRB-2002-034

Memorandum of Understanding

for Maintenance and Operation of the ALICE Detector

between

The EUROPEAN ORGANIZATION FOR NUCLEAR RESEARCH,
hereinafter referred to as CERN, Geneva, as the Host Laboratory

on the one hand

and

a Funding Agency/Institution of the ALICE Collaboration

on the other hand.

Article 6 : Responsibilities of the Institutes for the Maintenance and Operation of the ALICE Detector, and of CERN as Host Laboratory

6.1 Responsibility for the M&O of the ALICE detector rests jointly with the Collaboration as a whole and with CERN as Host Laboratory, within the General Conditions for Experiments Performed at CERN.

It is a fundamental principle that each Institute within the Collaboration shall participate in both maintenance and operation and contribute a fair and equitable share of **common costs.**

6.2 It is also a fundamental principle that an Institute, which has contributed a component of equipment, will also contribute to the necessary scientific and technical manpower support to operate that component and maintain it in good working order.

Article 7 : Maintenance and OperationCategories

7.1 The M&O expenses can be divided into the following three categories :

7.1.1 **Category A**. M&O expenses that are shared by the entire Collaboration (cf. Article 6.3.1 above). **Annex 9** lists the headings under which Category A costs are categorised.

7.1.2 **Category B**. M&O expenses that are borne by part of the Collaboration, i.e. by single Institutes or groups of Institutes, and their Funding Agencies (cf. Article 6.3.2 above). The headings in this category are defined with reference to the distribution of responsibilities amongst the various Institutes for the construction of the ATLAS Detector as given in Annex 8. **Annex 10** lists the headings under which Category B costs are categorised and the Institutes concerned.
It is agreed that an Institute having responsibility under a Category B heading will contribute to providing the necessary financial, scientific and technical support, as well as replacement or spare parts, for normal operation of that equipment and for the routine maintenance needed to keep it in good working order. If problems arise that require major modifications, responsibility will lie with the Collaboration as a whole. The Collaboration will propose on a case-by-case basis the events to which this provision will apply. The proposal will be submitted for approval to the next RRB meeting, which will also be asked to approve the provision of the necessary resources.

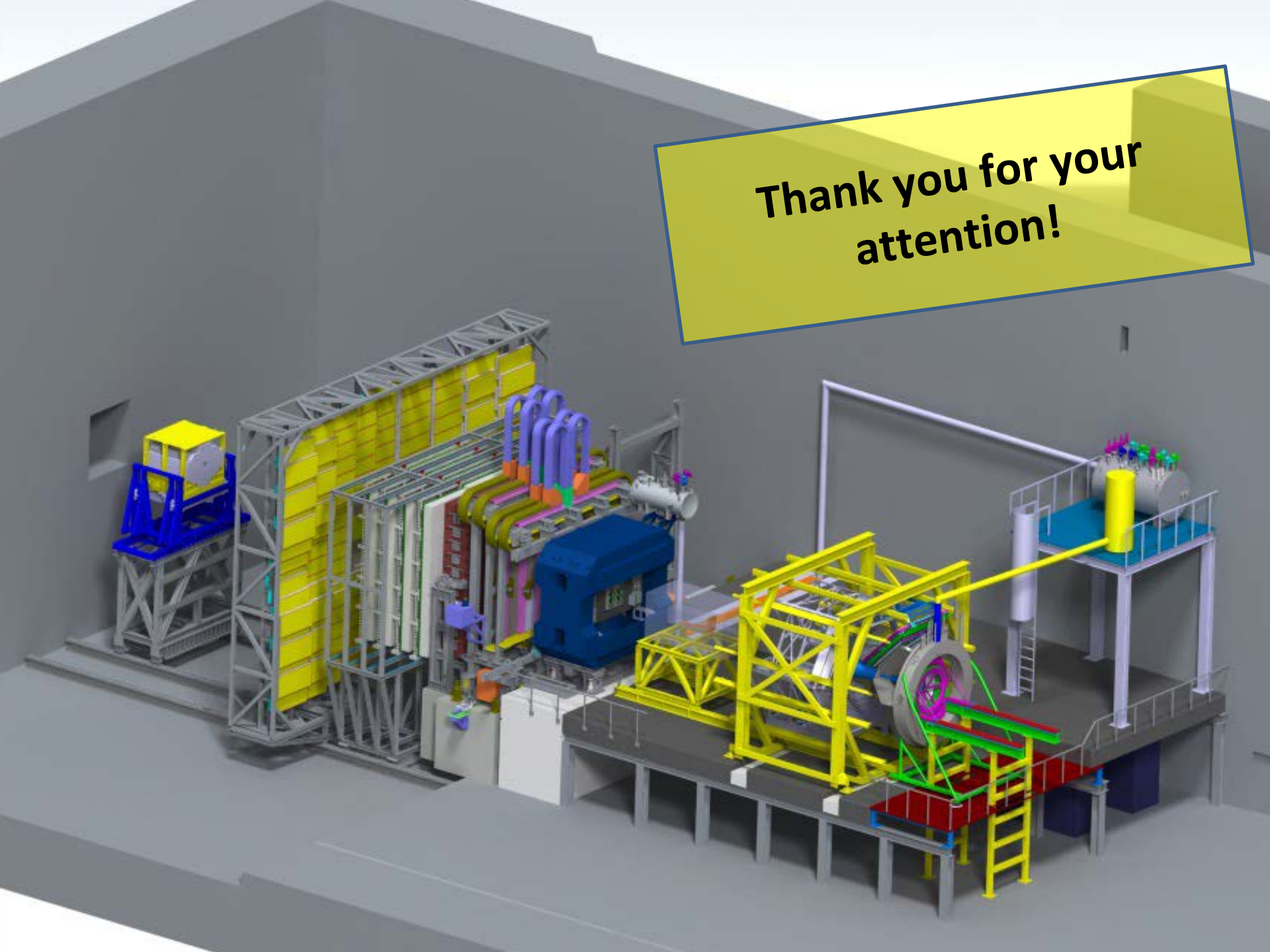
7.1.3 **Category C**. General maintenance and operation expenses that are provided to the Collaboration by CERN, acting in its role as Host Laboratory. Subject to the General Conditions for Experiments Performed at CERN (Annex 3), these are more precisely described in the list given in **Annex 11**.

CBM has started to discuss the M&O MoU
and will present a first draft
at one of next CBM RRB meetings

CBM RRB action item

draft resolution:

"The CBM RRB has no objections to proceed with the signing of the presented draft of the Amendment to the CBM Construction MoU by the funding agencies and the CBM member institutes."


Thank you for your attention!

CBM Construction Team Accounts

CBM Construction Team Accounts are set up at FAIR GmbH with the same principle as the CBM Common Fund

Purpose:

- CBM Construction Team Accounts are needed in the construction/installation phase.
- Visiting teams of the CBM member institutes need to be able to withdraw items from the GSI stores, or to purchase equipment via the GSI/FAIR procurement department.
- The purchased items become part of the CBM experiment (with PSP code) and are owned by FAIR GmbH

Status:

Until now CBM Construction Team Accounts for several CBM member institutes have been established at FAIR GmbH. The following CBM groups have opened CBM Construction Team Account and transferred

Several hundred thousand EUR to FAIR GmbH, which are available for procurements:

Goethe Universität Frankfurt, IKF, AG C. Blume
Goethe Universität Frankfurt, IKF, AG J. Stroth
Goethe Universität Frankfurt, IRI, AG U. Kebschull
Justus-Liebig-Universität Gießen, II. Physikalisches Institut, AG C. Höhne
Institute for Particle and Nuclear Physics **Wigner** RCP, Budapest G. Wolf
EKUT Universität Tübingen, Physikalisches Institut, AG H.R. Schmidt
Nuclear Physics Institute, Rez, Czech Republic
Universität Heidelberg, PI, AG N. Herrmann

→ procurement for GU Frankfurt on Mimosis Sensor for MVD and for Univ. Tübingen for the STS are done