Status Construction MoU and Construction Common Fund for the CBM experiment

11th CBM Resource Review Board meeting

23rd February 2022

Report CBM and HADES Resource Coordinator

Jürgen Eschke

RRB process → Construction MoU

1st meeting of FAIR RRBs
04 – 05 July 2013

11th RRB

Content presentation

- Status Signing C-MoU
- Common Infrastructure - Construction timeline CBM Cave
- Establishment of Construction Common Fund (CF)
- Payment requests CF / Status payments
- Spending profile Common Infrastructure
- Procurements for Common Infrastructure
- Outlook CBM Maintenance & Operation MoU
- CBM Construction Team Accounts

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/GSI · Planckstraße 1 · 64291 Darmstadt · Deutschland

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

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

Wissenschaftlicher Geschäftsführer
Prof. Dr. Paolo Giubellino
Telefon +49 6159 71-2648
P.Giubellino@gsi.de

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

23.02.2022

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 instsitutions have signed the CBM Construction MoU already!

clarification with ministries in India and Russia on additional funding for FAIR construction pending
→ causes also delay in signing of CBM C-MoU

Status CBM Construction MoU signatures from CBM member institutions 23.02.2022

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	
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	

Institute	Country	Signed page received
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	Int. Organization	√
JINR-VBLHEP	Int. Organization	√
PNPI	Russia	
INR	Russia	
ITEP	Russia	
MEPhI	Russia	expected
NRC-KI	Russia	
SINP-MSU	Russia	√
KINR	Ukraine	√
UKyiv	Ukraine	expected
number of signatories:		28

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

CBM Building (L0608A)

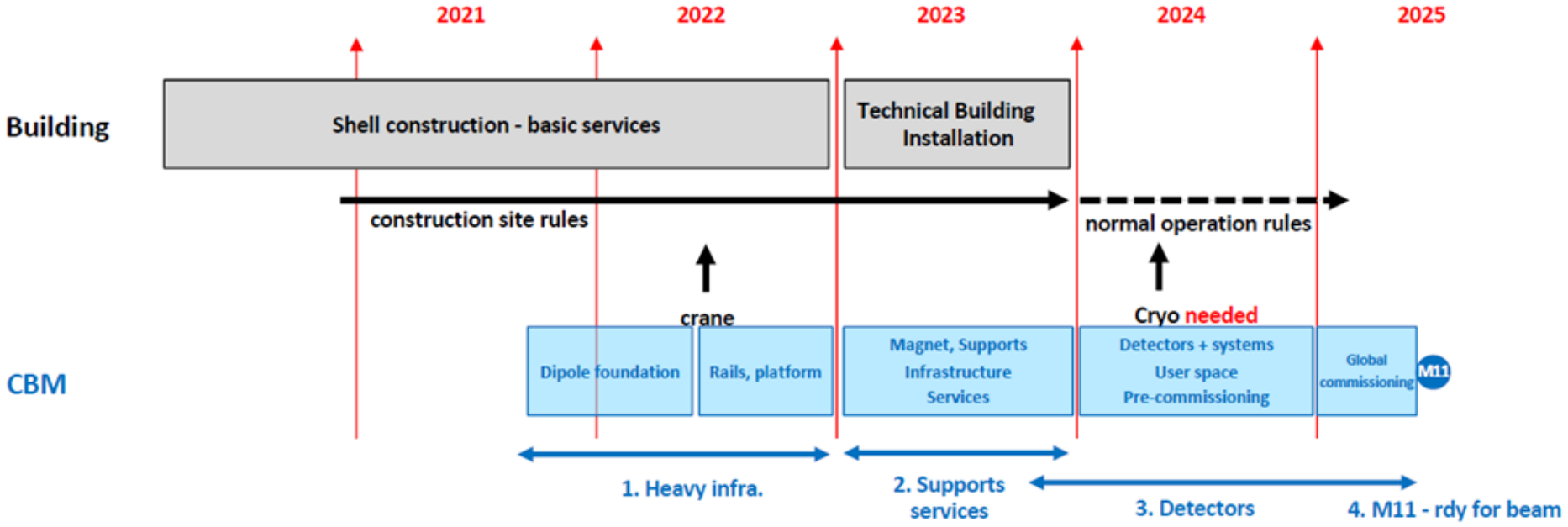
- Shell construction is progressing well
- Beam dump installed in April/May ‘21
- Roofing ongoing
- CBM Building ready for “Heavy Installation” in 2022

- TGA preparations in Mar-May ’22; iterative process in Jul-Aug ’22; plans release in Sep ‘22; execution start in Dec ‘22

September ‘21: https://youtu.be/Y82ZeLH1vZs

CBM installation – timeline after re-baselining of FAIR master schedule

CBM installation – baseline 2021



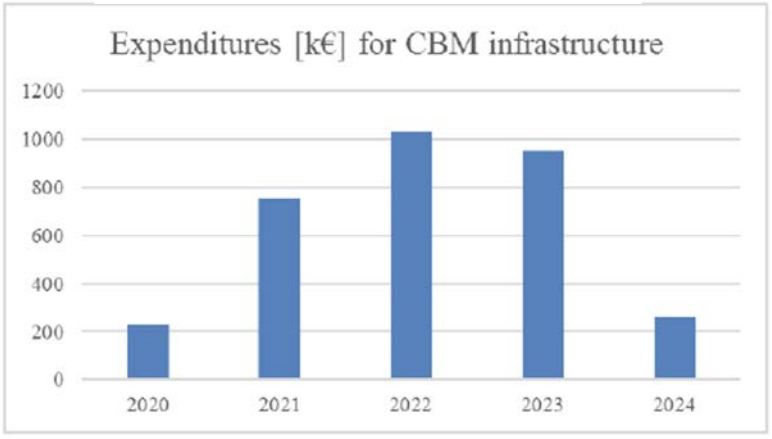
- Planning aims at Day-1 setup "Ready for beam" in mid 2025

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

Procedure for Common Fund

The CBM collaboration has decided to implement a Construction Common Fund. Each full member institute shall contribute according to the number of PhD holders working for CBM. The annual due amounts per institute have been defined such that the required expenditures for the common (cave) infrastructure are covered.

CBM Common Fund

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 €

→ 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**

Procedure for Common Fund
CBM Construction MoU

Article 6 Common Infrastructure and Construction Common Fund

6.1 The items belonging to the Common Infrastructure of CBM are defined in **Annex 8**, and shall be funded through the implementation of a Construction Common Fund as described in **Annex 8**.

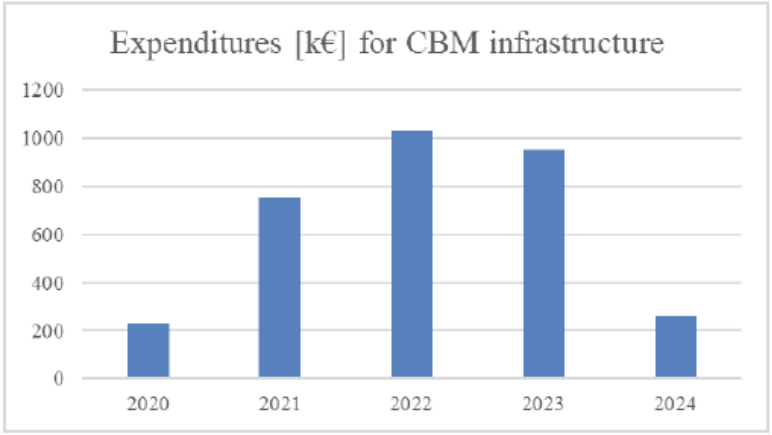
6.2 The purchasing process of the Common Infrastructure will be organized by the FAIR GmbH under the condition of support through cash supplements by all CBM Member Institutions into a dedicated Construction Common Fund. In-kind contributions are also possible. The Construction Common Fund will be managed and operated by the CBM Resource Coordinator in consultation with the CBM Management and the FAIR Management. All Construction Common Fund operations will be annually evaluated the Experiment Cost Scrutiny Group (ECSG) and monitored by the RRB.

6.3 The detailed procedure for collecting the cash supplements and the planned spending profile is given in Annex 8. The cash contributions depend on the number of PhD holders per member institute. The due amounts of the member institutes to the Common Fund were calculated, according to the number of PhD holders per member institute, which are presently* listed in the CBM Collaboration database *(status memberships and number of PhD holders of November 2019 is used for this calculation). The member institutes can also fulfil their obligations regarding the Common Fund by paying equal annual amounts in the years 2020 to 2024, or by an early down payment of the full amount per PhD holder.

6.4 Institutes, which join the CBM collaboration as Member Institutions during the construction period, have to pay the same amount to the Common Fund according to the number of PhD holders working for CBM, as if they were Member Institutions during the whole construction period.

6.5 The CBM Common Infrastructure items are purchased and owned by FAIR GmbH. The member institutes of the CBM Collaboration support the financing by paying cash supplements into the Common Fund as described above.

6.6 If a Member Institution is able and willing to procure one or several items of the Common Infrastructure, which correspond exactly to the technical specifications of Common Infrastructure items as listed in the Common Infrastructure cost breakdown, these contributions are accounted with the listed amounts instead of cash contributions to the CBM Common Fund. However, they cannot be accounted as an In-Kind contribution of a shareholder to FAIR GmbH.

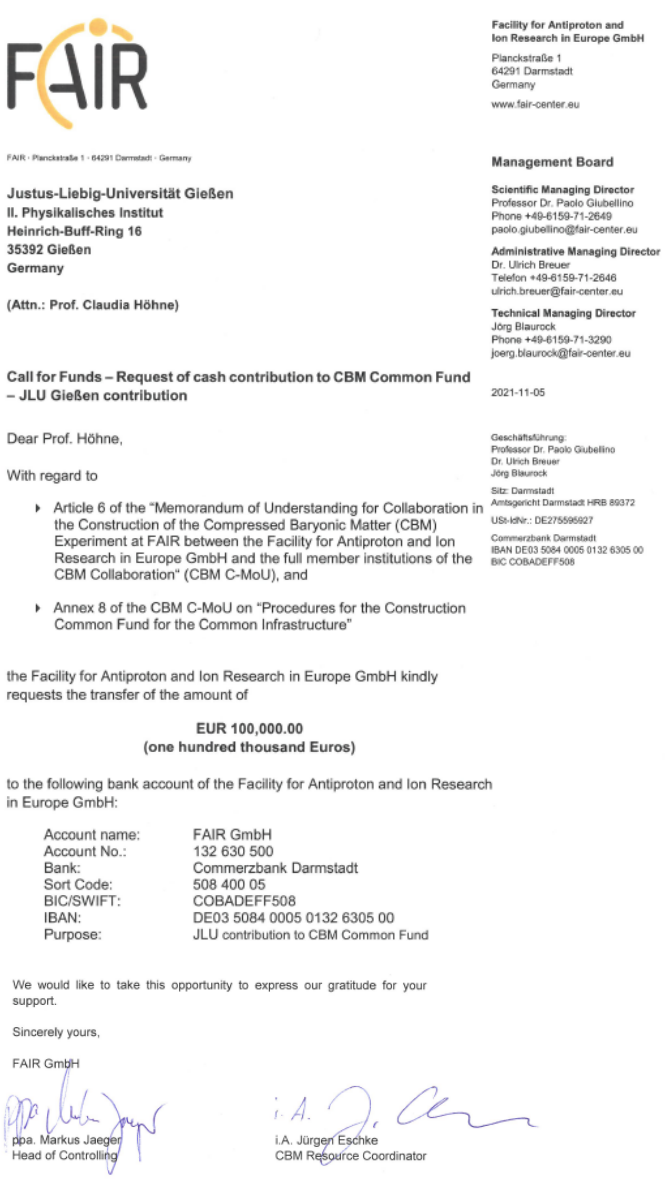


Letters requesting down payments into Common Fund are send

→ fexibility is forseen

Status payments into CBM Construction Common Fund

example payment request



FAIR

Facility for Antiproton and Ion Research in Europe GmbH
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Heinrich-Buff-Ring 16
35392 Gießen
Germany

(Attn.: Prof. Claudia Höhne)

2021-11-05

Call for Funds – Request of cash contribution to CBM Common Fund – JLU Gießen contribution

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

Sitz: Darmstadt
Amtsgericht Darmstadt HRB 89372
USt-IdNr.: DE275595927

Commerzbank Darmstadt
IBAN DE03 5084 0005 0132 6305 00
BIC COBADEFF508

Dear Prof. Höhne,

With regard to

- Article 6 of the "Memorandum of Understanding for Collaboration in the Construction of the Compressed Baryonic Matter (CBM) Experiment at FAIR between the Facility for Antiproton and Ion Research in Europe GmbH and the full member institutions of the CBM Collaboration" (CBM C-MoU), and
- Annex 8 of the CBM C-MoU on "Procedures for the Construction Common Fund for the Common Infrastructure"

the Facility for Antiproton and Ion Research in Europe GmbH kindly requests the transfer of the amount of

EUR 100,000.00
(one hundred thousand Euros)

to the following bank account of the Facility for Antiproton and Ion Research in Europe GmbH:

Account name:	FAIR GmbH
Account No.:	132 630 500
Bank:	Commerzbank Darmstadt
Sort Code:	508 400 05
BIC/SWIFT:	COBADEFF508
IBAN:	DE03 5084 0005 0132 6305 00
Purpose:	JLU contribution to CBM Common Fund

We would like to take this opportunity to express our gratitude for your support.

Sincerely yours,

FAIR GmbH

ppa. Markus Jaeger
Head of Controlling

i.A. Jürgen Eschke
CBM Resource Coordinator

status 23.02.2022

Institute	Country	Common Fund due amount Total [€]	down payments until end 2021	
CTU	Czech Republic	14.049	42.146	
NPI-CAS	Czech Republic	28.097		
ZIB	Germany	42.146	0	
FAIR	Germany	42.146		
GSI	Germany	505.753	505.753	
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	100.000	(transfer in Q1/22)
ELTE	Hungary	14.049		
WignerRCP	Hungary	14.049	14.049	
IFIN-HH	Romania	56.195	17.061	
UBucharest	Romania	112.390	22.500	
JINR-LIT	Int. Organization	84.292	39.000	
JINR-VBLHEP	Int. Organization	98.341		
Total:			1.123.509	

Status payments into CBM Construction Common Fund

Institute	Country	Total [€]	Total Germany [€]	Total German Universities VF [€]	Total GSI, FAIR, HZDR [€]
		14048,70			
		EURO per PhD/Prof			
ZIB	Germany	42.146			
FAIR	Germany	42.146			
GSI	Germany	505.753			
IKP-TUD	Germany	14.049			
HZDR	Germany	56.195			
FIAS	Germany	70.243			
IKF-UFra	Germany	126.438			
IRI-UFra	Germany	14.049			
UGiessen	Germany	70.243			
PI-UHd	Germany	28.097			
KIT	Germany	42.146			
ZITI-UHd	Germany	14.049			
UMuenster	Germany	42.146			
UTuebingen	Germany	28.097			
UWuppertal	Germany	42.146	1.137.944	533.850	604.094

down payments
Germany CBM Common Fund:

Universities:

U Heidelberg	91.000 €
GU Frankfurt	100.000 €
U Münster	92.000 €
JLU Gießen	100.000 €
total:	**383.000 €**

U Wuppertal (in Q1/22) 100.000 €

GSI: 505.753 €

Czech Republic and Hungary

Institute	Country	Common Fund due amount Total [€]	down payments until end 2021
CTU	Czech Republic	14.049	42.146
NPI-CAS	Czech Republic	28.097	

Institute	Country	Common Fund due amount Total [€]	down payments until end 2021
WignerRCP	Hungary	14.049	14.049

Romania:

Institute	Country	Common Fund due amount Total [€]	down payments until end 2021
IFIN-HH	Romania	56.195	17.061
UBucharest	Romania	112.390	22.500

JINR:

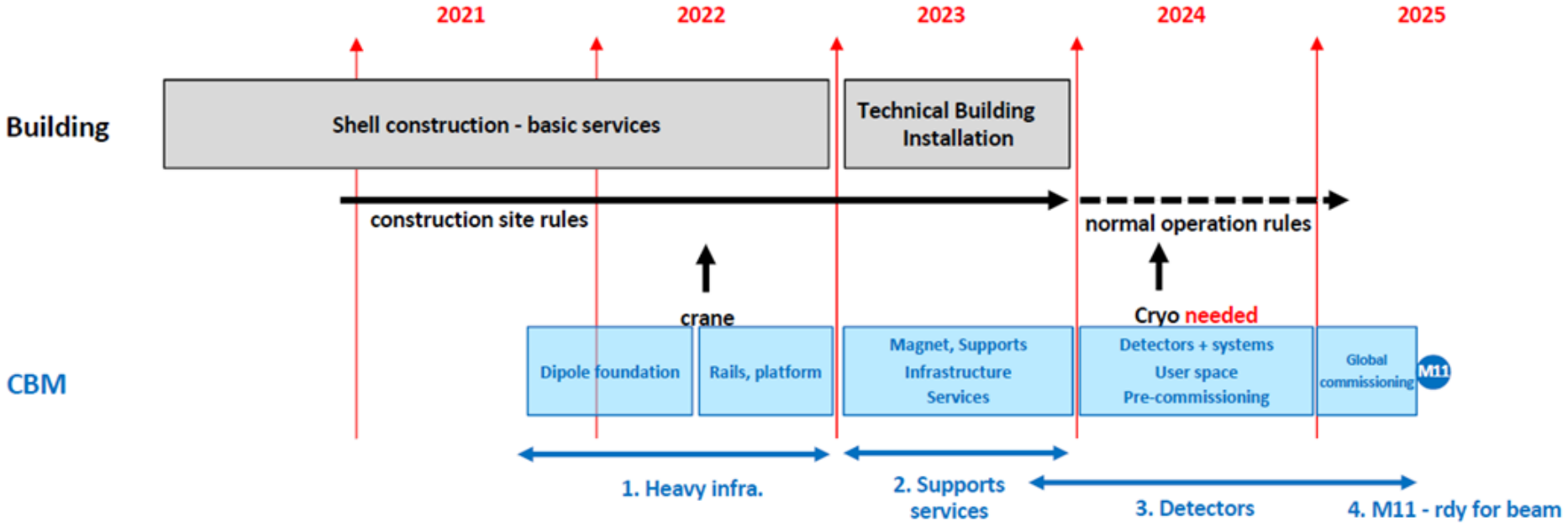
Institute	Country	Common Fund due amount Total [€]	down payments until end 2021
JINR-LIT	Int. Organization	84.292	39.000
JINR-VBLHEP	Int. Organization	98.341	

Status payments into CBM Construction Common Fund

Institute	Country	Common Fund due amount Total [€]	down payments until end 2021
Tsinghua (THU)	China	70.243	
USTC	China	28.097	
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	
ZIB	Germany	42.146	0
FAIR	Germany	42.146	
GSI	Germany	505.753	505.753
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	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
UBucharest	Romania	112.390	22.500
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:		**3.231.200**	**1.123.509**

CBM installation – timeline after re-baselining of FAIR master schedule

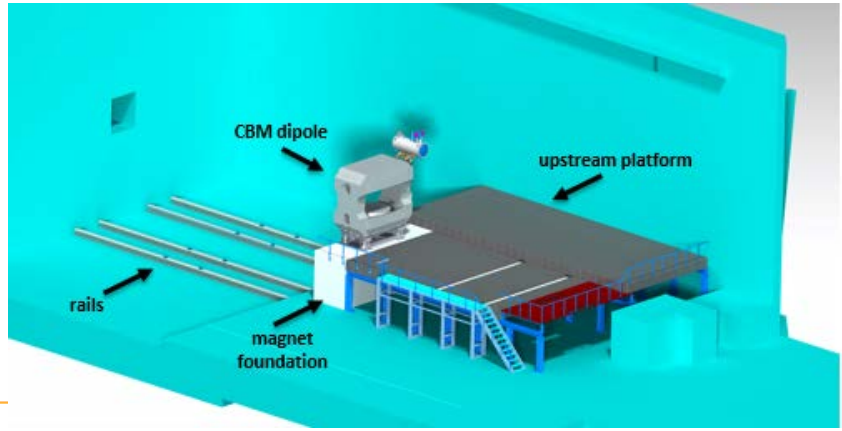
CBM installation – baseline 2021



- Planning aims at Day-1 setup "Ready for beam" in mid 2025

CBM cave

heavy construction, supports, magnet

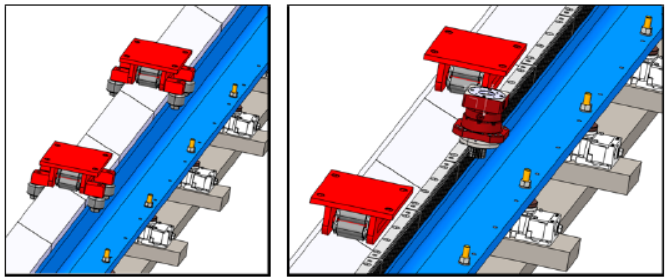


Major mechanical structures

Structural Steel Office (L+E Ingenieure)

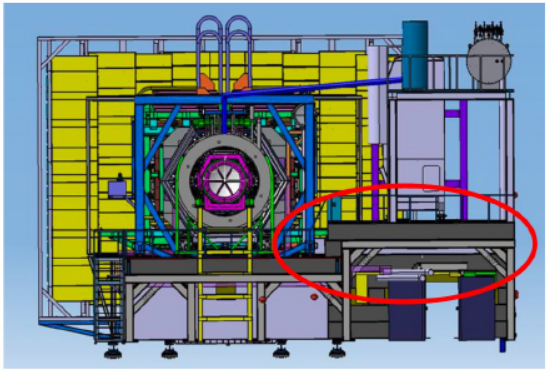
- Contracted for monitoring all major structures according to Hessian Building Regulations - HBO

Rail system



- tendering of the Rail System:
  - three initial contestants, only one offer received
  - the offer ×2 wrt. the amount envisaged in the Common Fund → tender cancelled
- New specification in preparation by CBM engineer
  - Valuable feedback from PANDA
  - Internal review with CBM downstream detectors (TRD, TOF, PSD) took place yesterday → documents finalization
- New tender to be re-issued

Upstream platform

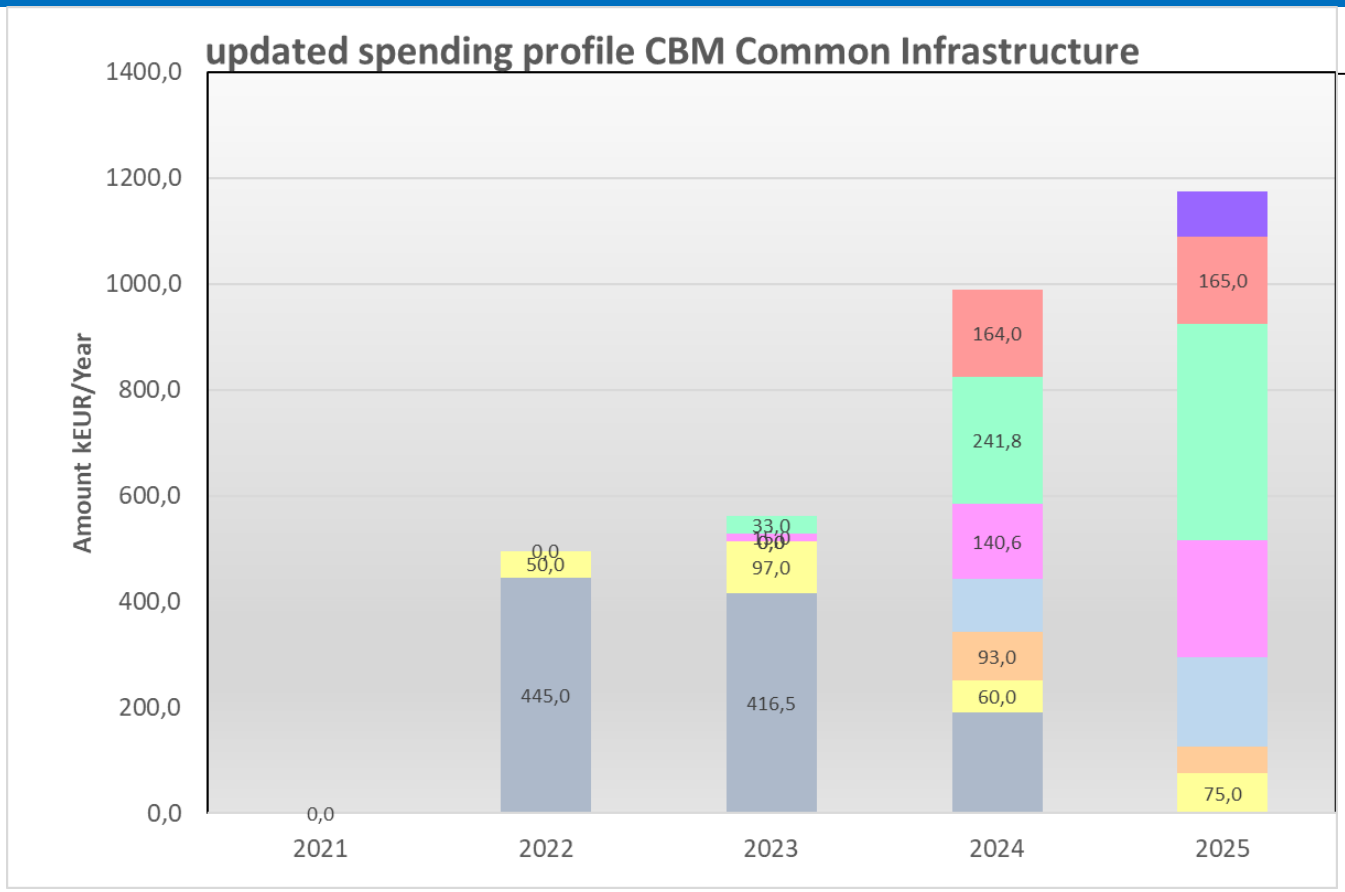


- Upstream platform design and construction by Czech partners
- CDR finalization, design adapted to the newest Cave/CBM/HADES layout; **FDR in 01.2022**
- Next: static calculations, CDR review (together with L+E Ingenieure)
- Determination of forces (earthquake scenario) acting on the magnet foundation → finalize CR

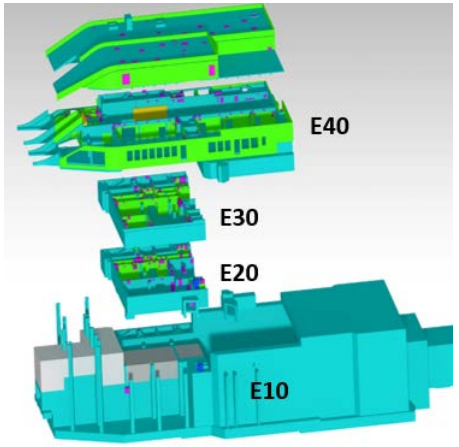
updated spending profile for CBM Common (cave) Infrastructure

Work Package	Price	2021	2022	2023	2024	2025		
Rail System - Rails	296,5		250,0	46,5			Mechanical structures	1051,5
Rail System - Subframes	200,0		50,0	50,0	100,0			
Upstream Platform - Concrete	270,0		100,0	170,0				
Upstream platform - Cryo platform	105,0		45,0	60,0				
RICH-MUCH foundation	180,0			90,0	90,0			
Survey tools	75,0			50,0	25,0			
Tools, scaffolding, hoisting gear	195,0		50,0	35,0	35,0	75,0		
Safety gear	12,0			12,0				
Control room	86,0				36,0	50,0	E40 equipment	143,0
Preparation area (E40)	42,0				42,0			
Gas container (E40)	15,0				15,0			
Gas alarm system (E30/E40)	*40,0*				20,0	20,0	Gas infrastructure	270,4
Gas lines (E40-E30)	87,9				30,0	57,9		
Gas lines (E30-E10)	142,5				50,0	92,5		
Racks E40	295,1				100,0	195,1	Racks	375,2
Racks E30	34,5				10,0	24,5		
Racks E10	45,6			15,0	30,6			
Cable trays	*28,0*			8,0	20,0		Data transfer infrastructure	685,1
Cooling water distribution	69,2			25,0	44,2			
Optical fibers (E10-E40)	422,6				122,6	300,0		
Optical fibers (E40-IT)	120,3				40,0	80,3		
Control system back end	*45,0*				15,0	30,0		
Target Box+Holder	70,0				35,0	35,0	Beam transfer infrastructure	329,0
Beam pipes	*70,0*				35,0	35,0		
Vacuum pumps	79,0				39,0	40,0		
Beam diagnosis box	*30,0*				15,0	15,0		
Beam abort system	*80,0*				40,0	40,0		
CBM beam dump (rest)	*35,0*					35,0	Beam dumps	85,0
HADES beam dump	*50,0*					50,0		
Sum	**3221,2**	**0,0**	**495,0**	**561,5**	**989,4**	**1175,3**		

updated spending profile for CBM Common (cave) Infrastructure



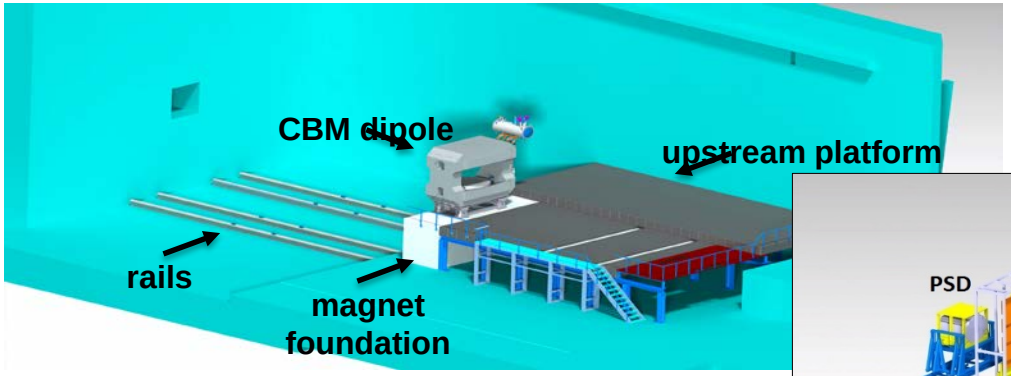
		2021	2022	2023	2024	2025
Mechanical structures	1051,5	0,0	445,0	416,5	190,0	0,0
E10 equipment etc.	282,0	0,0	50,0	97,0	60,0	75,0
E40 equipment	143,0	0,0	0,0	0,0	93,0	50,0
Gas infrastructure	270,4	0,0	0,0	0,0	100,0	170,4
Racks	375,2	0,0	0,0	15,0	140,6	219,6
Data transfer infrastructure	685,1	0,0	0,0	33,0	241,8	410,3
Beam transfer infrastructure	329,0	0,0	0,0	0,0	164,0	165,0
Beam dumps	85,0	0,0	0,0	0,0	0,0	85,0
	3221,2	**0,0**	**495,0**	**561,5**	**989,4**	**1175,3**

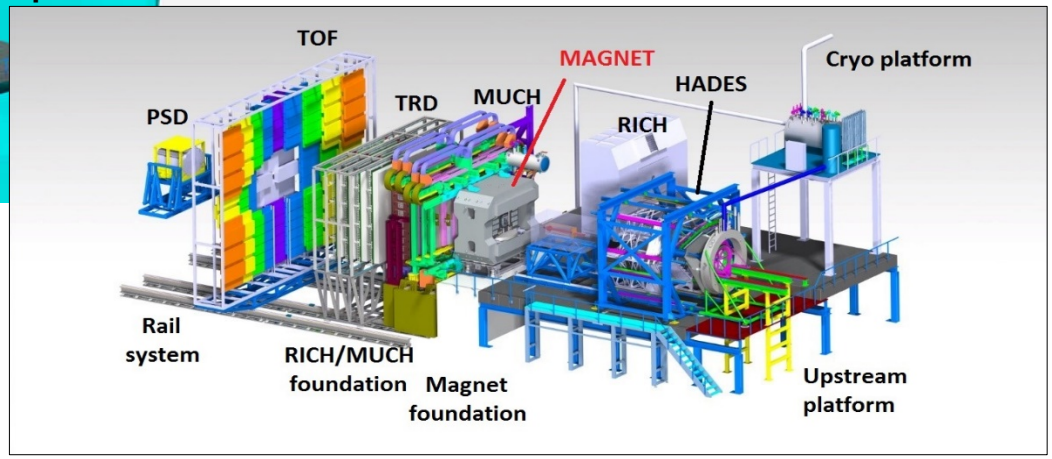


CBM Common Fund procurements for Common Infrastructure

procurements for common infrastructure started in 2021:

- call for tender for CBM cave rails system (~270k€ in obligo) started – need for new tender
- call for tender for structural steel certification (~100k€ in obligo) done
  → company contracted for work (costs not included in C-MoU)





planned procurements in 2022:

- new call for tender for rails system with new technical specifications
- call for tender for upstream platform -- concrete
- call for tender for upstream platform – cryo platform
- several smaller procurements towards the end of 2022

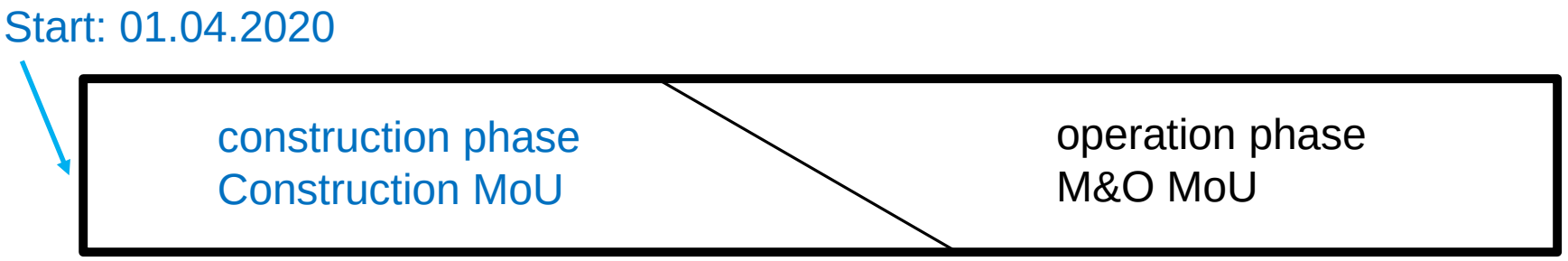
Status CBM Construction MoU

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 2025. The actual termination date will be set by the CBM RRB no later than 31 December 2024. 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 2023. 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.

- Operation phase will be regulated by a separate M&O MoU



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 started to discuss the M&O MoU and will present a first draft at the next CBM RRB meeting

Status CBM Common Fund
and
CBM Construction Team Accounts

CBM Common Fund

CBM Common Fund established according to legal/financial regulations agreed in the CBM Construction MoU

- Payments “cash supplements” of CBM member institutions to FAIR GmbH
- Procurement of CBM (cave) infrastructure items by FAIR GmbH
- Items are owned by FAIR GmbH

CBM Construction Team Accounts

CBM Construction Team Accounts are set up with the same principle
(see detailed write up)

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

Until end of 2021 several hundred thousand EUR have been transferred to FAIR GmbH and are available for procurements

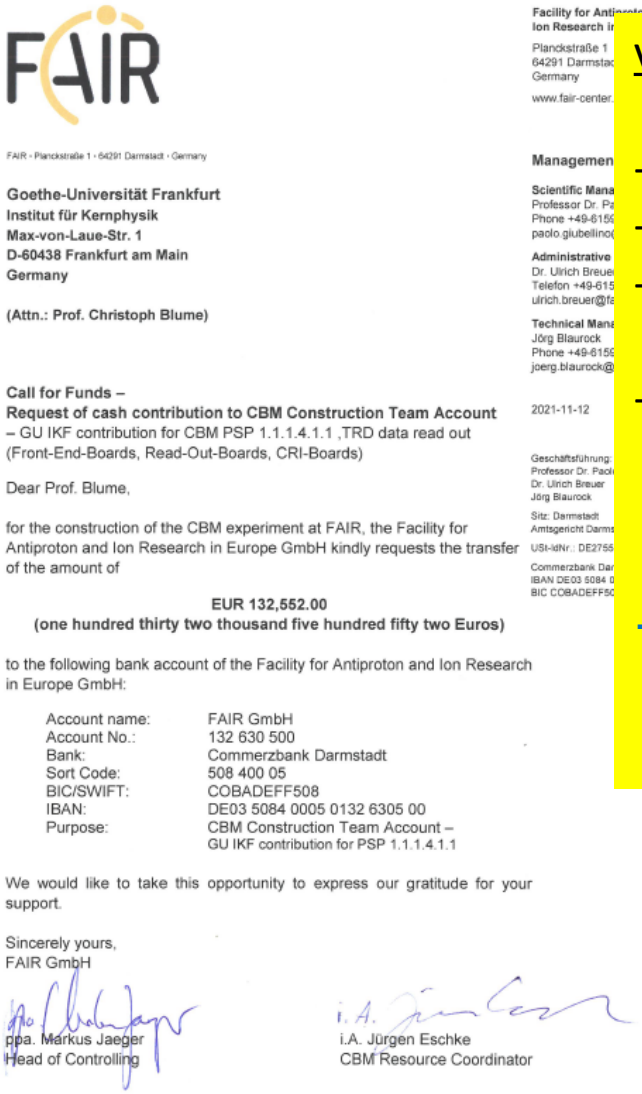
CBM Mitgliedsinstitut und Arbeitsgruppe	Auftrag bei FAIR GmbH - Einzahlungen werden dort verbucht	Beschaffung auf PSP Element	Einzahlung in 2021
Goethe Universität Frankfurt, IKF, AG C. Blume	471021	1.1.1.4.1.1	132.552,00 €
Goethe Universität Frankfurt, IKF, AG J. Stroth	471022	1.1.1.1.1.1	104.000,00 €
Goethe Universität Frankfurt, IRI, AG U. Kebschull	471023	1.1.1.4.3.1	47.500,00 €
Justus-Liebig-Universität Gießen, II. Physikalisches Institut, AG C. Höhne	471024	1.1.1.3.1.4.1	73.000,55 €
Institute for Particle and Nuclear Physics **Wigner** RCP, Budapest G. Wolf	471026	1.1.1.	10.000,00 €
CBM Construction Team Account (übergeordneter Sammel-Auftrag)	471020	1.1.1.	0,00 €

→ first procurement for JLU Giessen (73k€) for CBM PSP 1.1.1.3.1.4.1 RICH (High Voltage) in preparation

CBM Construction Team Accounts

Status: established, similar model as for Common Fund

example payment request



FAIR · Planckstraße 1 · 64291 Darmstadt · Germany

Goethe-Universität Frankfurt
Institut für Kernphysik
Max-von-Laue-Str. 1
D-60438 Frankfurt am Main
Germany

(Attn.: Prof. Christoph Blume)

Call for Funds –
Request of cash contribution to CBM Construction Team Account
– GU IKF contribution for CBM PSP 1.1.1.4.1.1 ,TRD data read out
(Front-End-Boards, Read-Out-Boards, CRI-Boards)

Dear Prof. Blume,

for the construction of the CBM experiment at FAIR, the Facility for Antiproton and Ion Research in Europe GmbH kindly requests the transfer of the amount of

EUR 132,552.00
(one hundred thirty two thousand five hundred fifty two Euros)

to the following bank account of the Facility for Antiproton and Ion Research in Europe GmbH:

Account name:	FAIR GmbH
Account No.:	132 630 500
Bank:	Commerzbank Darmstadt
Sort Code:	508 400 05
BIC/SWIFT:	COBADEFF508
IBAN:	DE03 5084 0005 0132 6305 00
Purpose:	CBM Construction Team Account – GU IKF contribution for PSP 1.1.1.4.1.1

We would like to take this opportunity to express our gratitude for your support.

Sincerely yours,
FAIR GmbH

ppa. Markus Jaeger
Head of Controlling

i.A. Jürgen Eschke
CBM Resource Coordinator

01.11.2021

Construction Team Accounts for the member institutes of the FAIR experiment collaborations

Scope: During the construction phase of FAIR the **member institutes** of the experiment collaborations of the four research pillars of the FAIR project (APPA, CBM, NUSTAR and PANDA) will send teams of scientists, engineers and technicians to FAIR to install their detector systems (In-Kind contributions to the FAIR experiments) in the corresponding experimental areas of the FAIR facility.

In order to be capable to perform these installation tasks, the **visiting teams** of the member institutes of the FAIR experiment collaborations need to be able to withdraw items from the GSI stores, or to purchase equipment via the GSI/FAIR procurement department.

visting team of member institute of collaboration:

- registration at welcome office
- appointment of team leader
- appointment of team account responsible person

- establishment of administrative procedure for non employees of GSI/FAIR to perform administrative actions like procurements (EBISS account)

→ in preparation

supports the financing by paying cash supplements into the **Construction Team Account of the corresponding FAIR collaboration** as described above.

8. Withdrawals from the GSI stores by the visiting team of a member institute are also possible and follow the same procedure.

9. The items purchased via the described procedure are part of the corresponding FAIR experiment and owned by FAIR GmbH. A temporary removal from the FAIR site is possible only in exceptional cases and with permission of FAIR GmbH.

1

Status CBM Construction MoU

Next steps:

- C-MoU: seeking for additional signatories
- payment requests 2022
- further procurement for the Common Infrastructure

Status Funding
CBM and HADES experiment

11th CBM Resource Review Board meeting

Report CBM and HADES Resource Coordinator, Jürgen Eschke

Content:

- Status funding of the CBM day 1 setup
  and of the CBM start version (phase 1 - MSV)
- Status Contracts for FAIR shareholder contributions
- Status Funding of HADES@SIS18 (FAIR Phase 0)
  and of HADES@SIS100 (FAIR Phase 1)
- HADES MoUs

Experiment funding
(in 2005 and 2022 prices [k€])

CBM day 1 setup

11th RRB

23.02.2022

and CBM phase 1 setup (CBM start version@SIS100)

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

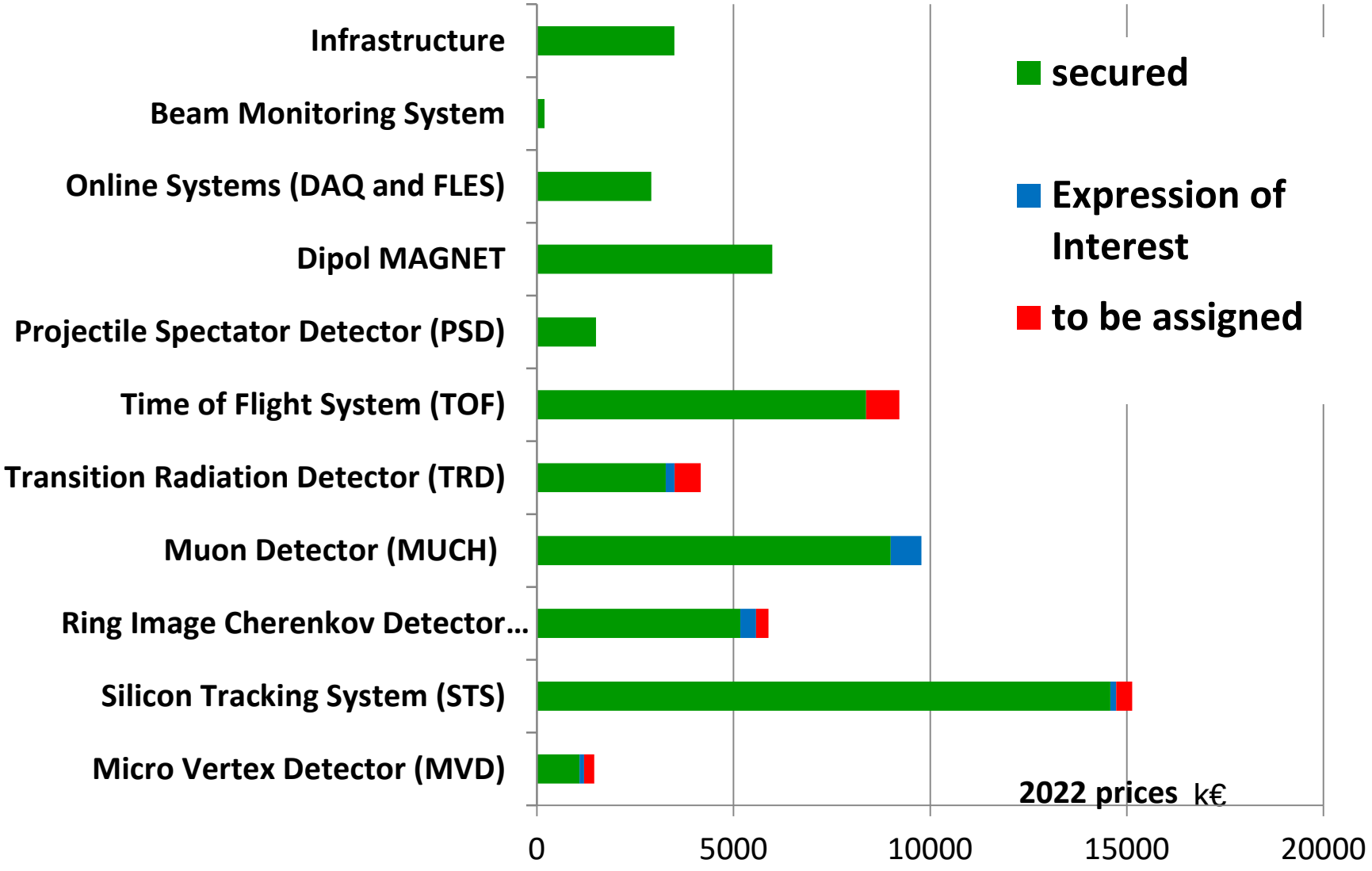
PSP Code	detector / system	Prices, K Euro (2005 price)				Prices, K Euro (2022 price)				
		total cost 2005 prices	Secured amount	EoI	To be assigned	total cost 2022 prices	Secured amount	EoI	To be assigned	components belongs to CBM day 1 setup
1.1.1.1	Micro Vertex Detector (MVD)	**914**	680	71	163	**1456**	1083	114	259	1
1.1.1.2	Silicon Tracking System (STS)	**9504**	9152	94	258	**15140**	14580	149	411	1
1.1.1.3.1	Ring Image Cherenkov Detector (RICH)	**3697**	3246	250	201	**5890**	5170	398	321	1
1.1.1.3.2	Muon Detector (MUCH)	**6138**	5648	490		**9777**	8997	781		1
1.1.1.4	Transition Radiation Detector (TRD)	**2615**	2054	143	418	**4166**	3273	228	666	1
1.1.1.5	Time of Flight System (TOF)	**5785**	5255	0	531	**9216**	8371	0	845	1
1.1.1.6.1	Electromagnetic Calorimeter (ECAL)	**2805**		2805		**4469**		4469		no
1.1.1.6.2	Projectile Spectator Detector (PSD)	**944**	944			**1504**	1504			1
1.1.1.7	Dipol MAGNET	**3758**	3758			**5986**	5986			1
1.1.1.8	Online Systems (DAQ and FLES)	**2188**	1825	0	363	**3485**	2907	0	578	(1)
1.1.1.9	Beam Monitoring System	**120**	120			**191**	191			1
1.1.1.10	Infrastructure	**2192**	2192			**3492**	3492			1
	Sum CBM Phase 1 setup	**40660**	**34874**	**3853**	**1934**	**64772**	**55554**	**6138**	**3080**	**85,8%**
Sum CBM day 1 setup (without ECAL and full bandwidth DAQ/FLES)		**37492**	**34874**	**1048**	**1571**	**59725**	**55554**	**1669**	**2502**	**93,0%**
										percentage secured
1,593	This calculation uses an escalation factor of 1.593 between 2005 prices and 2022 prices									

Funding and costs unchanged compared to RRB10 !

Funding CBM day-1 setup

(RRB11, 23 Feb. 2022)

93% secured funding



Country funding (in 2022 prices [M€]) CBM day 1 setup 11th RRB 09.02.2021

and CBM phase 1 setup (CBM start version)

CBM day 1 setup detector / system	Costs	Common fund	Germany		Russia	India	Poland	Romania	China	Czech Republic	Hungary	France	Korea	Ukraine	to be assigned
			GSI and FAIR project funds	University funding (VF)											
MVD	1,46			0,58								0,50	0,11		0,26
STS	15,14		7,38	0,97	3,37		2,87							0,15	0,41
TRD	4,17			1,25				1,97			0,23 + 0,06				0,67
RICH	5,89		**1,97**	1,28	0,40 + 1,91										0,32
TOF	9,22		1,18	0,70	0,75			1,19	4,55						0,85
Beam Monitoring System	0,19			0,11						0,08					
Online Systems (DAQ+FLES) day-1 setup	2,91		**1,40**	1,18			0,32								
Magnet	5,99				5,99										
MuCh	9,78				0,78 + 2,90	6,09									
PSD	1,50				1,24					0,26					
Infrastructure	3,49	**3,49**													
ECAL (not part of day 1 setup)															
Sum in 2022 M€	**59,72**	**3,49**	**11,93**	**6,09**	**1,18 + 16,15**	**6,09**	**3,19**	**3,16**	**4,55**	**0,34**	**0,23 + 0,06**	**0,50**	**0,11**	**0,15**	**2,50**
Sum in 2005 M€	37,49	2,19	7,49	3,82	0,74 + 10,14	3,83	2,00	1,98	2,86	0,21	0,14 + 0,04	0,31	0,07	0,09	1,57
escalation factor (1./1.593)															

This calculation uses an escalation factor of 1.593 between 2005 prices and 2022 prices

1,593

amounts in green are considered as secured / **93,0 % secured**

amounts in blue - Expression of Interest (EoI)

amounts in red - to be assigned

CBM phase 1 setup															
CBM day 1 setup	59,72	3,49	11,93	6,09	1,18 + 16,15	6,09	3,19	3,16	4,55	0,34	0,23 + 0,06	0,50	0,11	0,15	2,50
full bandwidth (DAQ/FLES)	0,58														0,58
plus ECAL	4,47				4,47										
Sum in 2022 M€	**64,77**	**3,49**	**11,93**	**6,09**	**5,65 16,15**	**6,09**	**3,19**	**3,16**	**4,55**	**0,34**	**0,23 0,06**	**0,50**	**0,11**	**0,15**	**3,08**
Sum in 2005 M€	40,66	2,19	7,49	3,82	3,55 + 10,14	3,83	2,00	1,98	2,86	0,21	0,14 + 0,04	0,31	0,07	0,09	1,93

85,8 % secured

Country funding (in 2005 prices [M€]) CBM day 1 setup 11th RRB 23.02.2022

and CBM phase 1 setup (CBM start version)

CBM day 1 setup detector / system	Costs	Common fund	Germany		Russia			India	Poland	Romania	China	Czech Republic	Hungary			France	Korea	Ukraine	to be assigned
			GSI and FAIR project funds	University funding (VF)															
MVD	0,91			0,37												0,31	0,07		0,16
STS	9,50		4,63	0,61			2,12		1,80									0,09	0,26
TRD	2,62			0,78						1,23			0,14	+	0,04				0,42
RICH	3,70		**1,24**	0,81	0,25	+	1,20												0,20
TOF	5,79		0,74	0,44			0,47			0,75	2,86								0,53
Beam Monitoring System	0,12			0,07								0,05							
Online Systems (DAQ+FLES) day-1 setup	1,83		**0,88**	0,74					0,20										
Magnet	3,76						3,76												
MuCh	6,14				0,49	+	1,82	3,83											
PSD	0,94						0,78					0,17							
Infrastructure	2,19	**2,19**																	
ECAL (not part of day 1 setup)																			
Sum in 2005 M€	**37,49**	**2,19**	**7,49**	**3,82**	**0,74**	+	**10,14**	**3,83**	**2,00**	**1,98**	**2,86**	**0,21**	**0,14**	+	**0,04**	**0,31**	**0,07**	**0,09**	**1,57**

This calculation uses an escalation factor of 1.552 between 2005 prices and 2021 prices

1

amounts in green are considered as secured / 93,0 % secured

amounts in blue - Expression of Interest (EoI)

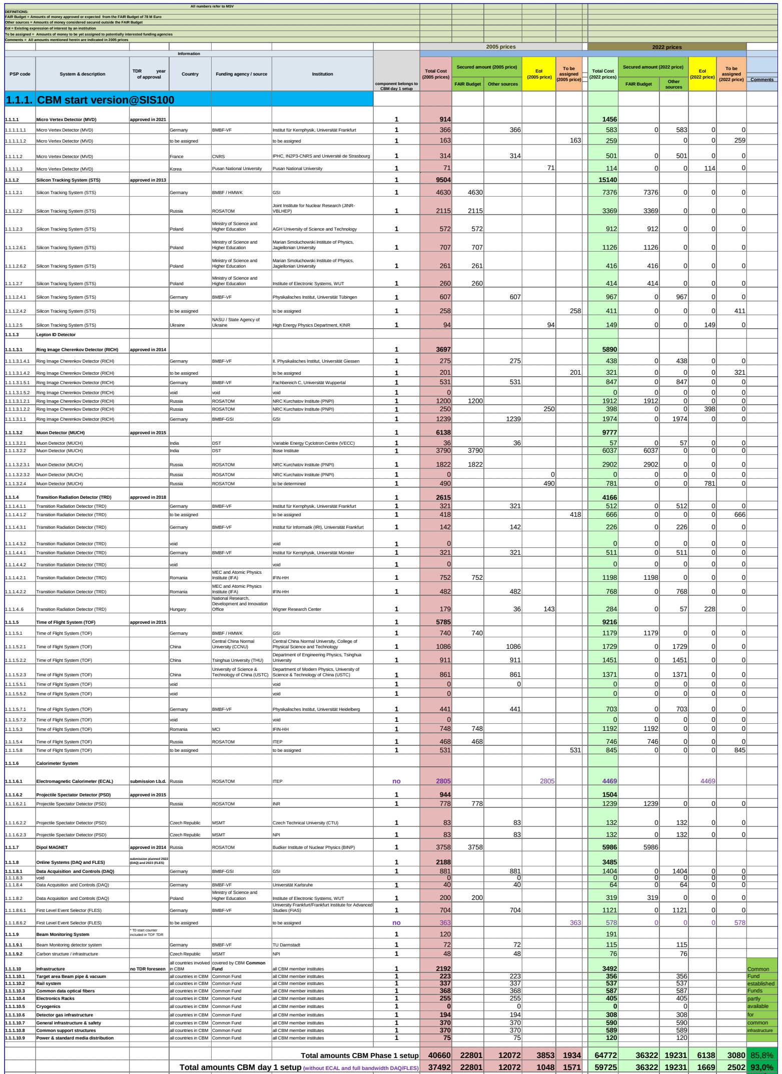
amounts in red - to be assigned

CBM phase 1 setup																			
CBM day 1 setup	37,49	2,19	7,49	3,82	0,74	+	10,14	3,83	2,00	1,98	2,86	0,21	0,14	+	0,04	0,31	0,07	0,09	1,57
full bandwidth (DAQ/FLES)	0,36																		0,36
plus ECAL	2,81				2,81														
Sum in 2005 M€	**40,66**	**2,19**	**7,49**	**3,82**	**3,55**	+	**10,14**	**3,83**	**2,00**	**1,98**	**2,86**	**0,21**	**0,14**	+	**0,04**	**0,31**	**0,07**	**0,09**	**1,93**

85,8 % secured

CBM Cost Matrix

and HADES Cost Matrix



PSP code	System & description	TDR year of approval	Country	Funding agency / source	Institution	component belongs to CBM day 1 setup	Total Cost (2005 prices)	FAIR Budget (2005)	Other sources (2005)	EoI (2005 price)	To be assigned (2005 price)	Total Cost (2022 prices)	FAIR Budget (2022)	Other sources (2022)	EoI (2022 price)	To be assigned (2022 price)	Comments
1.1.1.10	Infrastructure	no TDR foreseen	all countries involved in CBM	covered by CBM Common Fund	all CBM member institutes	1	2192					3492					Common
1.1.1.10.1	Target area Beam pipe & vacuum		all countries in CBM	Common Fund	all CBM member institutes	1	223		223			356		356			Fund
1.1.1.10.2	Rail system		all countries in CBM	Common Fund	all CBM member institutes	1	337		337			537		537			established
1.1.1.10.3	Common data optical fibers		all countries in CBM	Common Fund	all CBM member institutes	1	368		368			587		587			Funds
1.1.1.10.4	Electronics Racks		all countries in CBM	Common Fund	all CBM member institutes	1	255		255			405		405			partly
1.1.1.10.5	Cryogenics		all countries in CBM	Common Fund	all CBM member institutes	1	0		0			0		0			available
1.1.1.10.6	Detector gas infrastructure		all countries in CBM	Common Fund	all CBM member institutes	1	194		194			308		308			for
1.1.1.10.7	General infrastructure & safety		all countries in CBM	Common Fund	all CBM member institutes	1	370		370			590		590			common
1.1.1.10.8	Common support structures		all countries in CBM	Common Fund	all CBM member institutes	1	370		370			589		589			infrastructure
1.1.1.10.9	Power & standard media distribution		all countries in CBM	Common Fund	all CBM member institutes	1	75		75			120		120			
					Total amounts CBM Phase 1 setup		40660	22801	12072	3853	1934	64772	36322	19231	6138	3080	85,8%
	Total amounts CBM day 1 setup (without ECAL and full bandwidth DAQ/FLES)						37492	22801	12072	1048	1571	59725	36322	19231	1669	2502	93,0% secured

This calculation uses an escalation factor of 1,593 between 2005 prices and 2022 prices 1,593

please consult distributed cost matrix for all details!

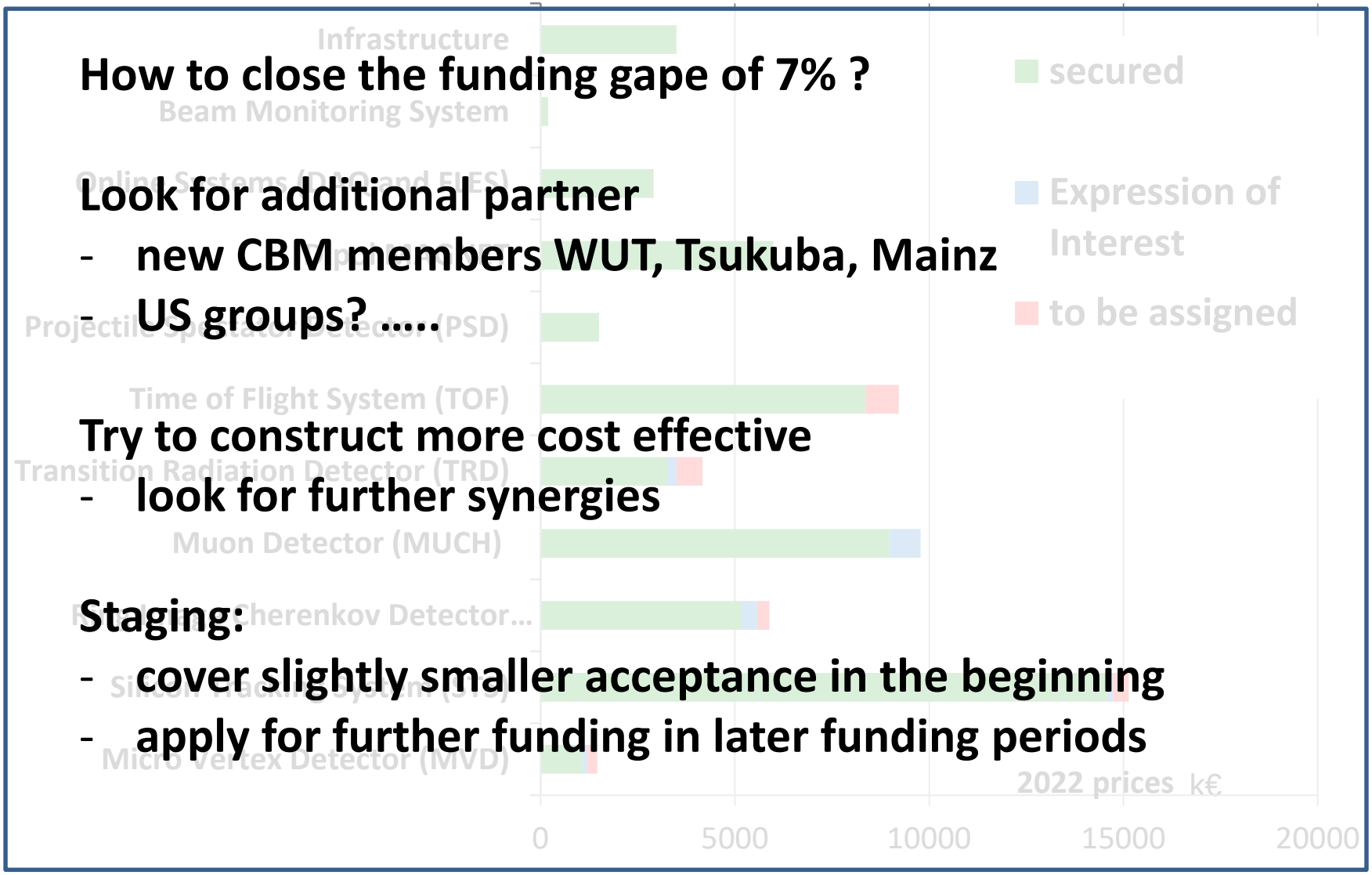
PSP code	System & description	TDR year of approval	Country	Funding agency	Institution	component belongs to FAIR Phase	Total Cost (2005 prices)	Secured amount (2005 price): FAIR Budget	Secured amount (2005 price): Other sources	EoI (2005 price)	To be assigned (2005 price)	Total Cost (2022 prices)	Secured amount (2022 price): FAIR Budget	Secured amount (2022 price): Other sources	EoI (2022 price)	To be assigned (2022 price)	Comments
1.1.2.	HADES@SIS100 (FAIR Phase 1) and HADES@SIS18 (FAIR Phase 0)																
1.1.2.1.	Mechanics and Installation					FAIR Phase 1	386					615					
1.1.2.1.1			Germany	BMBF-GSI	GSI	FAIR Phase 1	6			6		10			10		
1.1.2.1.2	Infrastructure		Czech Rep.	MSMT	NPI	FAIR Phase 1	280		280	0		445		445	0		
1.1.2.1.3	HADES exp. relocation into CBM cave		HADES Common Fund			FAIR Phase 1	100			100		159			159		
1.1.2.2	Cryo Infrastructure		Germany	BMBF-GSI	GSI	FAIR Phase 1	69			69		110			110		
1.1.2.3	HADES Calorimeter (ECAL)	approved in 2014					1250					1992					
1.1.2.3.1	ECAL main frame		Poland	Ministry of Science and Higher Education	Marian Smoluchowski Institute of Physics, Jagiellonian University	FAIR Phase 0	200	200				319	319		0		
1.1.2.3.2	ECAL Rail System		Germany	BMBF-GSI	GSI	FAIR Phase 0	25		25			40		40	0		
1.1.2.3.3	ECAL Infrastructure					FAIR Phase 0											
1.1.2.3.3.1			Czech Rep.	MSMT	NPI		293		293			467		467	0		
1.1.2.3.3.2	void																
1.1.2.3.3.3			Germany	BMBF-VF	TU Darmstadt		66		66			105		105	0		
1.1.2.3.3.4			Russia		MEPhI		21			21		34		0	34		
1.1.2.3.4	ECAL 3 inch PMTs					FAIR Phase 1											
1.1.2.3.4.1			Germany	BMBF-GSI	GSI		159		159			253		253	0		
1.1.2.3.4.2			Germany	TU Munich	TU Munich		21		21			34		34	0		
1.1.2.3.4.3			Germany	TU Darmstadt	TU Darmstadt		13		13			20		20	0		
1.1.2.3.4.4			Czech Rep.	MSMT	NPI		390		333	57		621		530	91		
1.1.2.3.4.5					to be assigned		62				62	99		0	0	99	
1.1.2.4	Readout Electronics Modification					FAIR Phase 1	168					268					
1.1.2.4.1	Readout Electronics Modification				to be assigned		168				168	268		0	0	268	
1.1.2.5	MDC						421					671					
1.1.2.5.1	MDC Plane II				to be assigned	FAIR Phase 1	207				207	330		0	0	330	
1.1.2.5.2	MDC FEE		Germany	BMBF-VF	Institut für Kernphysik, Universität Frankfurt	FAIR Phase 0	197		197			314		314	0		
1.1.2.5.4	MDC FEE		to be assigned		to be assigned		0					0		0	0		
1.1.2.5.3	MDC FEE		Germany	BMBF-GSI	GSI	FAIR Phase 0	17			17		27		0	27		
1.1.2.6	RICH Upgrade*					FAIR Phase 0	43					68					
1.1.2.6.1	void						0					0		0	0		
	RICH Photon Detector(*)		Germany	BMBF-GSI	see half of the costs of CBM PSP code: 1.1.1.3.1.1		0					0		0	0		
	RICH FEE TRB (*)		Germany	BMBF-VF	Uni. Wuppertal see CBM PSP code: 1.1.1.3.1.5		0					0		0	0		
	RICH FEE HV/LV (*)		Germany	BMBF-VF	Uni. Giessen see CBM PSP code: 1.1.1.3.1.4		0					0		0	0		
1.1.2.6.2	RICH mechanics		Germany	TU Munich	TU Munich		43		43			68		68	0		
	FAIR-Phase-0 activity @SIS18 included																
1.1.2.7	Forward Detector					FAIR Phase 0	257					409					
1.1.2.7.1	Forward Detector - Straw -STS2		Poland	Ministry of Science	Jagiellonian University		107		107			171		171	0		
1.1.2.7.2	Forward Detector - dE/dx		Russia	Mephi	Mephi		24			24		38		0	38		
1.1.2.7.3	Forward Detector - RPC		Portugal	LIP Coimbra	LIP Coimbra		71		71			114		114	0		
1.1.2.7.4	Forward Detector - Straw -STS1/DAQ		Germany	BMBF-Jülich	FZJ Institut für Kernphysik		25		25			40		40	0		
	Forward Detector - Straw -STS1/DAQ		Germany	BMBF-Jülich	FZJ Institut für Kernphysk see PANDA PSP 1.4.1.4.1												
1.1.2.7.5	Forward Detector mechanics		France	IPNO Orsay	IPNO Orsay		29		29			46		46	0		
					SUM HADES (FAIR phase 0&1)		2594	200	1662	295	437	4132	319	2647	470	697	71,8%
					SUM HADES@SIS18 (FAIR phase 0)		1118	200	856	63	0	1782	319	1363	100	0	94,4% secured

This calculation uses an escalation factor of 1.593 between 2005 prices and 2022 prices

Funding CBM day-1 setup

(RRB11, 23 Feb. 2022)

93% secured funding



How to close the funding gape of 7% ?

Look for additional partner

- **new CBM members WUT, Tsukuba, Mainz**
- **US groups? …..**

Try to construct more cost effective

- **look for further synergies**

Staging:

- **cover slightly smaller acceptance in the beginning**
- **apply for further funding in later funding periods**

Status CBM collaboration contracts (Russia)

Project	Partner in Russia	Task	Costs (€ 2005)	Council Decision	Status contract
SC dipole magnet	BINP Novosibirsk	Design and Construction	3.758 Mio	9.07.2014	signed
STS	JINR Dubna	Construction of detector ladders for first 4 stations	2.115 Mio	10.12.2013	signed
PSD	INR Troitzk	Design and Construction	0.778 Mio	30.06.2015	signed
RICH	PNPI Gatchina	Construction of mechanical structures, gas system	1.2 Mio	9.11.2016	signed
MUCH	PNPI Gatchina	Construction of absorbers, mechanical structures, gas system	1.822 Mio	9.11.2016	signed
TOF	ITEP	Inner zone	0.468 Mio	9.11.2016	In preparation

Status CBM in-kind contracts (other shareholders)

Project	Partner Institution	Task	Costs k€ 2005	Council decision	Status In-Kind contract
STS	AGH, Crakow, Poland	Design and Construction of STS-XYTER chip	572	30.06.2015	Signed
STS	JU, Crakow	Sensors and QA	707	28.06.2016	Signed
STS	JU, Crakow	Front End Boards, test procedures for STS-XYTER chip and FEE	261	28.06.2016	Signed
STS	GSI, Germany	STS system	4630	28.06.2016	Signed
HADES	JU, Crakow, Poland	HADES ECAL Mechanical frame	200	30.06.2015	Signed (frame delivered and installed in HADES cave)
STS	WUT, Warsaw, Poland	Development of DAQ Data Processing Boards (DPBs)	260	30.06.2015	In preparation
TOF	IFIN-HH, Bukarest, Romania	RPC chambers	748	30.06.2015 28.06.2016	In preparation
TOF	GSI, Germany	FEE	740	28.06.2016	In preparation
TRD	IFIN-HH, Bukarest	TRD Chambers	752	29.4.2019	In preparation
MUCH	BOSE, Kolkata VECC +12 Indian Institutes	GEM chambers and FEE	3790	10.12.2015	Signed

Summary CBM Costs and Funding

The CBM collaboration has define the “day 1“ setup, which will be operational, when the SIS100 beam will be switched on.

The total cost of the CBM day 1 version (37,49 M€ in 2005 prices)

is unchanged compared to the RRB10.

The CBM collaboration has implemented a Common Fund for covering the costs of the common infrastructure of 3,49 M€ (2022 prices). The details for covering theses costs are regulated in the CBM Construction MoU, which is signed presently by the CBM member institutions and their funding agencies or ministries.

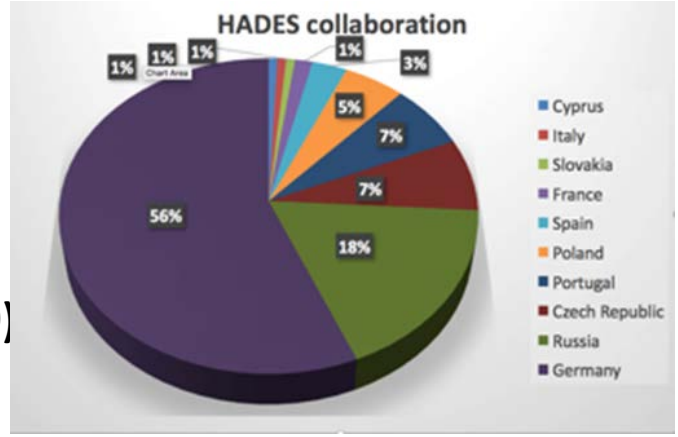
- **The CBM day 1 setup has 93% secured funding including Common Fund**
- The CBM start version (including ECAL and the full bandwidth of the DAQ/FLES) has 85,8% secured funding

HADES Timeline

Upgrade phase, preparation for SIS18 (FAIR phase 0))

2022:

- RICH UV photo-detector – ready
- Forward detector – ready
- ECAL 5 sectors - ready
- MDC readout upgrade – in progress



2022-2024… (experiment campaign at SIS18 - FAIR phase 0)

- we plan three long runs, e.g.:
  - π+$(CH_2)_n$/LH_2: baryon em transition form factors, baryonic resonances with strangeness
  - p+A/p+p: strangeness/vector mesons in medium
  - A+A: medium system at maximal energy

2025… on (HADES at SIS100)

- Transfer spectrometer to new experimental hall
- Cold matter physics (p+A)
- Exclusive measurements (p+p)
- A+A collisions

Scientists with PhD per country		
Country	**Scientists with PhD**	**All members**
Germany	**50**	**76**
Russia	**20**	**24**
Czech Republic	7	**10**
Portugal	6	**9**
Poland	4	**7**
Slovakia	4	**4**
Cyprus	3	**3**
Spain	3	**3**
France	2	**2**
Italy	1	1
	100	139

New HADES members

The HADES Phase-0 activity has attracted new members with own funding

- Polish initiative to increase participation in HADES (coordinated by Prof. Salabura)
  - Institute of Nuclear Physics, Polish Academy of Sciences, Cracow (5)
  - AGH University of Science and Technology, Cracow (6)
  - University of Warsaw - Institute of Experimental Physics (3)
  - Warsaw Techical University (8)

- FZJülich (Prof. Ritmans group) – now FAIR-RW (10)

- Swedish PANDA colleagues (through PANDA.HADES MoU, coord. Prof Schönning)
  - Department of Physics and Astronomy, Uppsala University (5)
  - University of Stockholm

- To come soon: cooperation with NUSTAR-R3B
  - TU Darmstadt
  - MIT

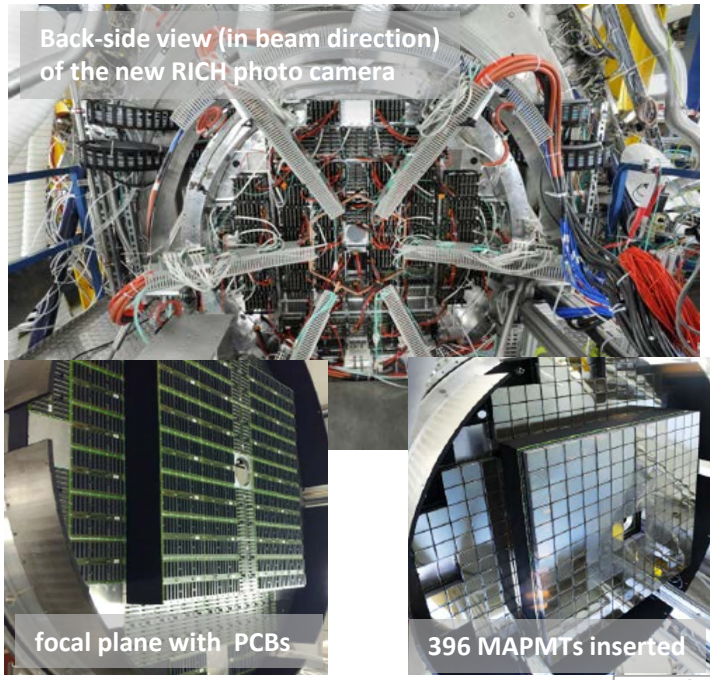
Excellent dilepton performance with new RICH photo camera

A success story:

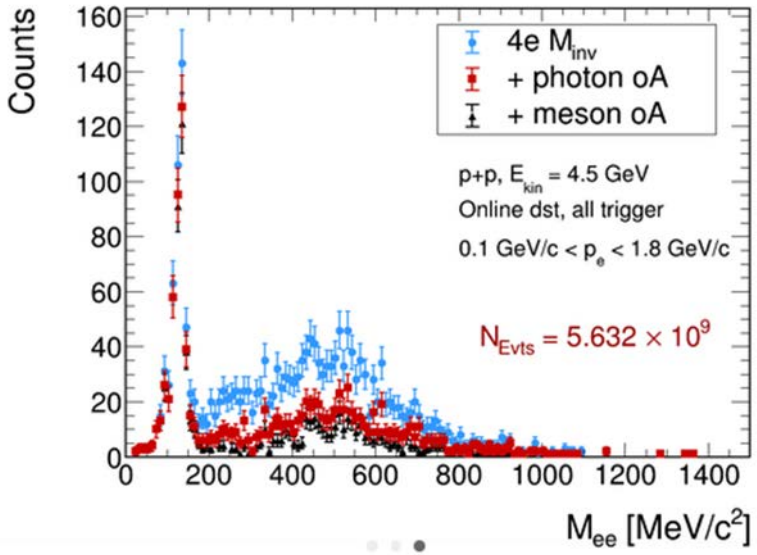
Usage of CBM funded detectors beforehand in HADES.

Sharing of MAPMTs after 2025 between CBM and HADES possible

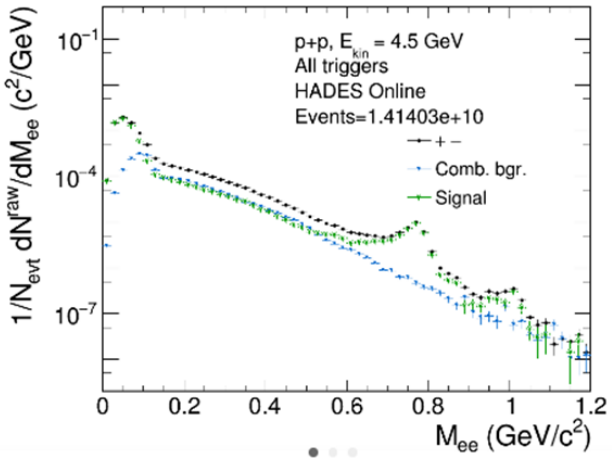
- ➢ Win-win situation – efficient use of funding.
  - CBM MAPMTs with TRB3 based readout.
  - Synergy project between HADES and CBM (**Univ's Wuppertal, Gießen, Frankfurt and GSI**).
  - Stable operation
  - High time precision allows near-background-free ring recognition.
- ➢ First measurement of dilepton yield beyond vector meson region (M_{ee} > 1 GeV/c^2) at SIS beam energies.

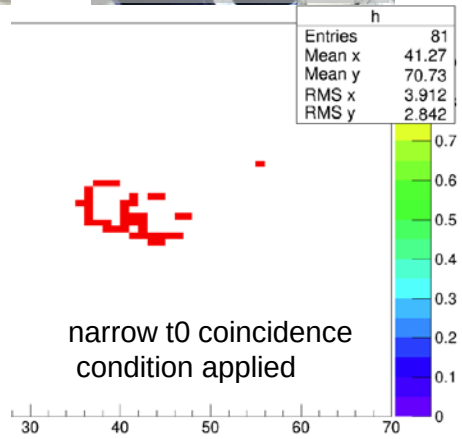


Online invariant mass $e^+e^-e^+e^-$

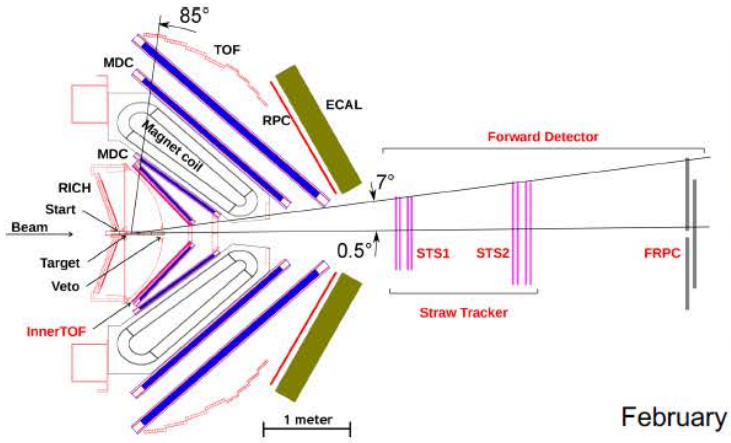


Online invariant mass e^+e^-



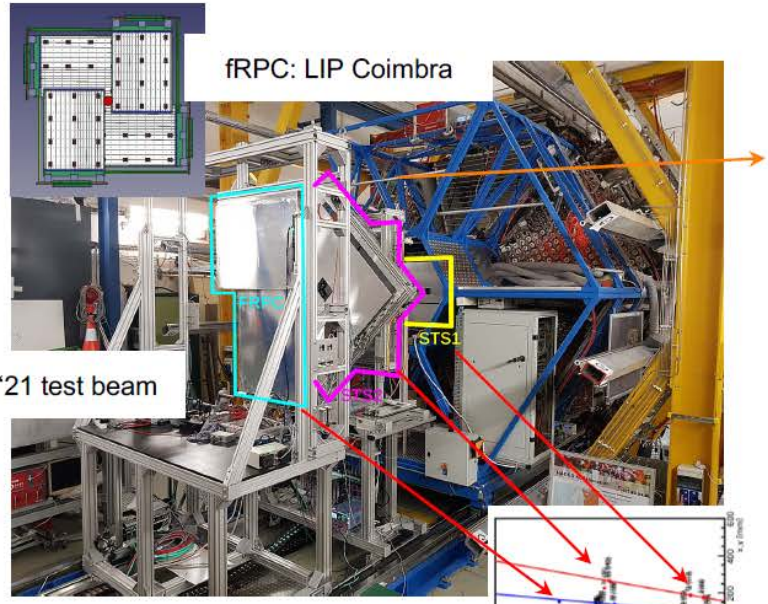


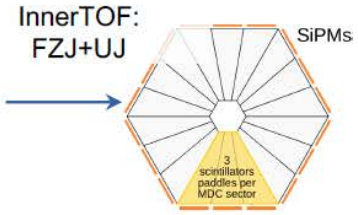
FAIR PHASE-0: HADES Forward Detector upgrade

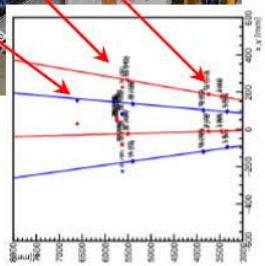


- Instruments the field-free forward hemisphere
- Straw Tube Stations (STS) compatible with Phase-1 PANDA STT and FT
- Boost physics capability for hyperon e/m transition FFs
- STS1 and STS2 installed and tested in HADES
- fRPC full installation in Nov '21 (half setup tested)
- InnerTOF project to improve triggering efficiency (Q4/2021)

Ready for beam in February 2022

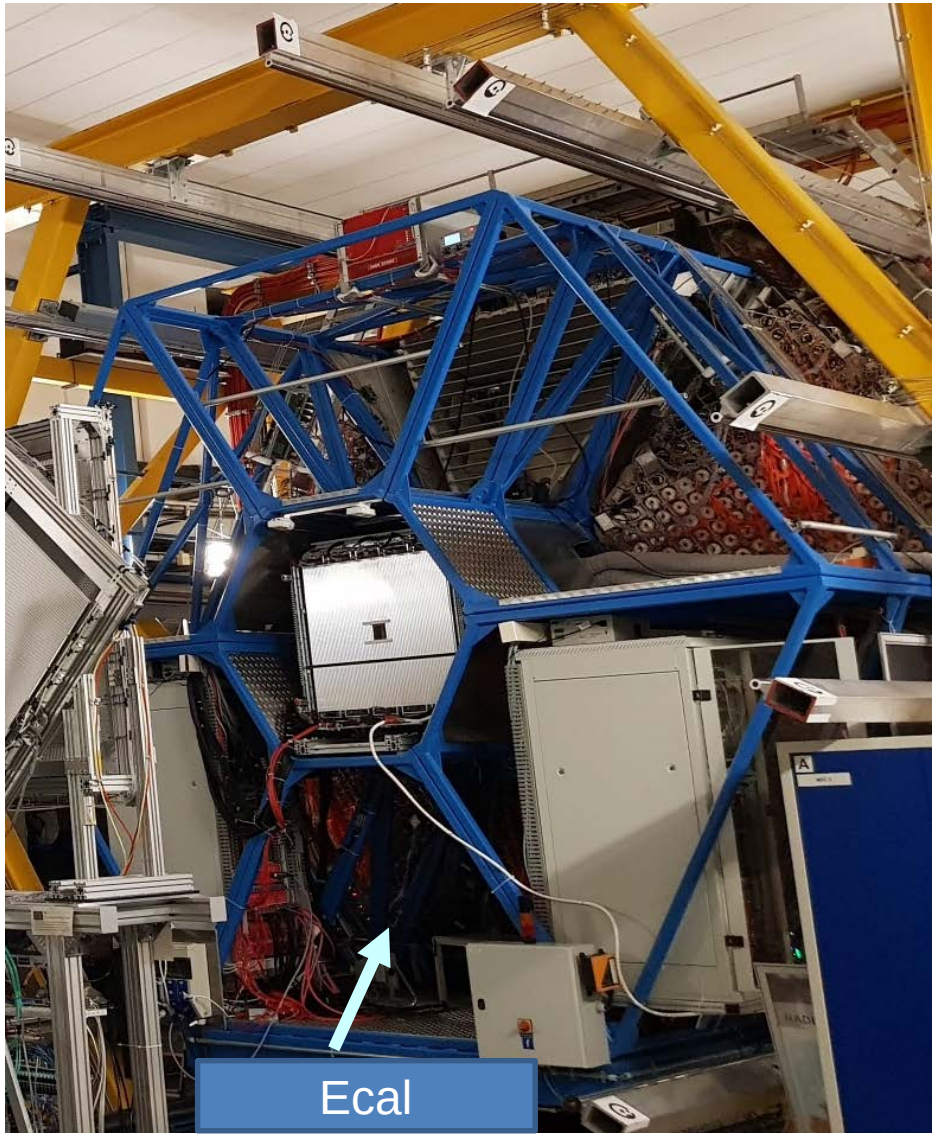




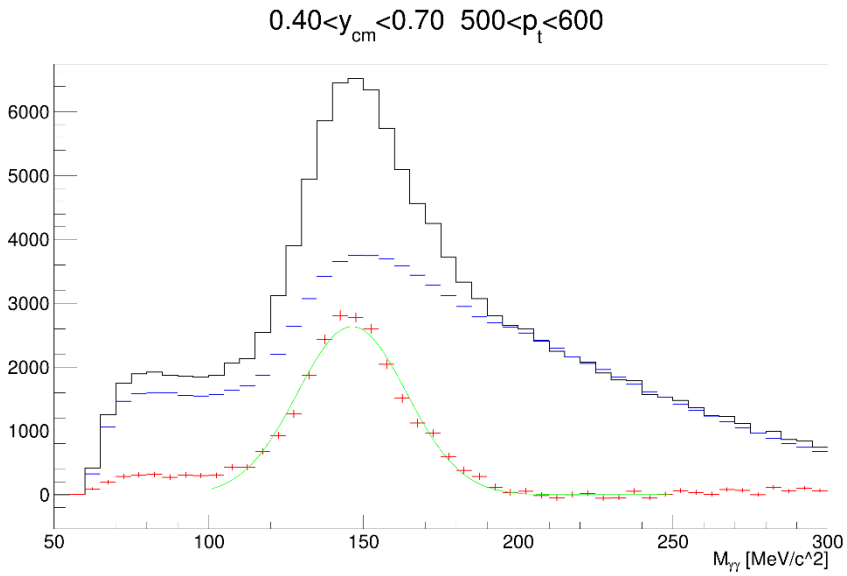


The forward detector project is driven by the PANDA-HADES collaboration: FZ Jülich (STS1), IPN Orsay (STS mechanics), UJ Kraków (STS2), Uni. of Uppsala (tracking software).

Five HADES ECAL secors ready in pp@4.5GeV experiment – online results



π^0 reconstruction in ECAL
Online results



HADES upgrade costs

	Status HADES experiment funding (FAIR phase 0 (@SIS18) & FAIR phase 1 (@SIS100)									
PSP Code	detector / system	Prices, K Euro								
		2005 prices				2022 prices				
		total cost 2005 prices	Secured amount	EoI	To be assigned	total cost 2022 prices	Secured amount	EoI	To be assigned	funded in FAIR Phase
1.1.2.1	Mechanics and Installation	**386**	280	106		**615**	445	169		Phase 1
1.1.2.2	Cryo Infrastructure	**69**		69		**110**		110		Phase 1
1.1.2.3.1-3	HADES Calorimeter	**605**	584	21		**964**	930	34		Phase 0
1.1.2.3.4	HADES Calorimeter (3" PMTs)	**645**	526	57	62	**1028**	838	91	99	Phase 1
1.1.2.4	Readout Electronics Modification	**168**			168	**268**			268	Phase 1
1.1.2.5.1	MDC Plane II	**207**			207	**330**			330	Phase 1
1.1.2.5.2-3	MDC FEE	**214**	197	17		**341**	314	27		Phase 0
1.1.2.6	RICH Upgrade	**43**	43			**68**	68			Phase 0
1.1.2.7	Forward Detector	**257**	232	24		**409**	370	38		Phase 0
	SUM HADES (FAIR phase 0&1)	**2594**	**1862**	**295**	**437**	**4132**	**2966**	**470**	**697**	**71,8%**
	SUM HADES@SIS18 (FAIR phase 0)	**1118**	**1056**	**63**	**0**	**1782**	**1682**	**100**	**0**	**94,4%**
										percentage secured
	This calculation uses an escalation factor of 1.593 between 2005 prices and 2022 prices.									

- The HADES upgrade for SIS18 (total costs in 2005 prices is 1,118 M€) has 94,4% secured funding (no change compared to RRB10).

- The costs of the HADES experiment at SIS100 (FAIR phase 1) amounts to 2,594 M€ (2005 prices). The full HADES upgrade costs including the moving to the CBM cave at SIS100 has 71,8% secured funding.

HADES upgrade for
FAIR Phase 0 (SIS18) & FAIR Phase 1 (SIS100)

HADES@SIS100 (FAIR Phase 1) and HADES@SIS18 (FAIR Phase 0)	Costs	Germany			Czech Republic		Poland		Portugal	France		Russia	HADES Common Fund	to be assigned
		GSI / FZJ / TUM		University funding (VF)			FAIR project funds							
Mechanics and Installation	615		10		445	0							159	
Cryo Infrastructure	110		110											
HADES Calorimeter	964	40		105	467	0	319					34		
HADES Calorimeter (3" PMTs)	1028	287		20	530	91								99
Readout Electronics Modification	268													268
MDC Plane II	330													330
MDC FEE	341		27	314										
RICH Upgrade	68	68												
Forward Detector	409	40						171	114	46	0	38		
	4132													
Sum in 2022 k€	**4132**	435	147	439	1442	91	319	171	114	46	0	72	159	697
Sum in 2005 k€	2594	273	92	276	906	57	200	107	71	29	0	45	100	437
escalation factor (1./1.593)														

This calculation uses an escalation factor of 1.593 between 2005 prices and 2022 prices

1,593

amounts in green are considered as secured

amounts in blue - Expression of Interest (EoI)

amounts in red - to be assigned

No change since 10th RRB

HADES MoUs

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

GSI Helmholtzzentrum für Schwerionenforschung GmbH (Darmstadt, Germany

and

the HADES collaboration

declare that they agree with **Addendum 1**
to the Memorandum of Understanding for the HADES experiment.

Done in Darmstadt

Done in Darmstadt

02.02.2022

For FAIR GmbH

For the HADES Collaboration

For GSI GmbH

Addendum 1 of the "Update HADES Memorandum Of Understanding for the execution of the HADES experiment during FAIR Phase-0"

FAIR GmbH and GSI Helmholtzzentrum GmbH jointly representing the Host Laboratories of the FAIR project certify by signing Addendum 1 to the present MoU for the HADES experiment the following:

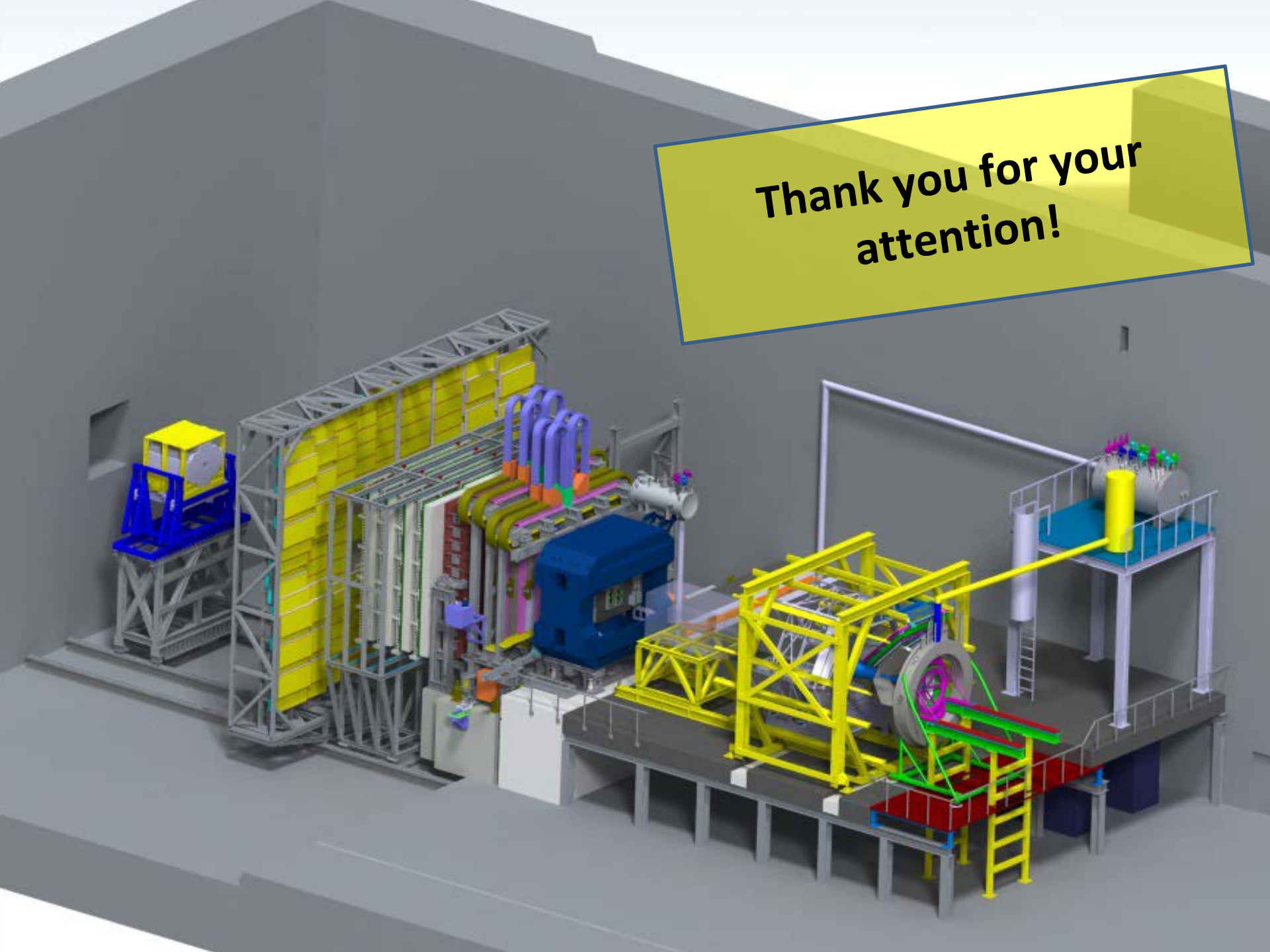
1. The upgraded HADES detector is a FAIR experiment at SIS18 and at SIS100.
2. The HADES collaboration operating the HADES experiment is part of the C.B.M. research pillar of the FAIR science programme.
3. The financial resources for the upgrade of the HADES experiment, including the contributions of the FAIR shareholders and from other countries, are monitored by the FAIR Resource Review Board.
4. FAIR GmbH and GSI are appreciating the efforts of the HADES collaboration to produce physics data from the data taking at SIS18 and later at SIS100.
5. **A separate Construction MoU like for other FAIR collaboration is not required, since the upgrade of the HADES experiment is almost completed.**
6. **For the operation phase of FAIR the present MoU will be superseded by a Maintenance & Operation MoU for the HADES experiment.**

MoU 1999	2009 2012	update MoU 2018	Addendum 1 2022	Addendum 2 extension until 2026	HADES M&O MoU 2026

Update of the

HADES Memorandum Of Understanding

for the execution of the HADES experiment during FAIR Phase-0

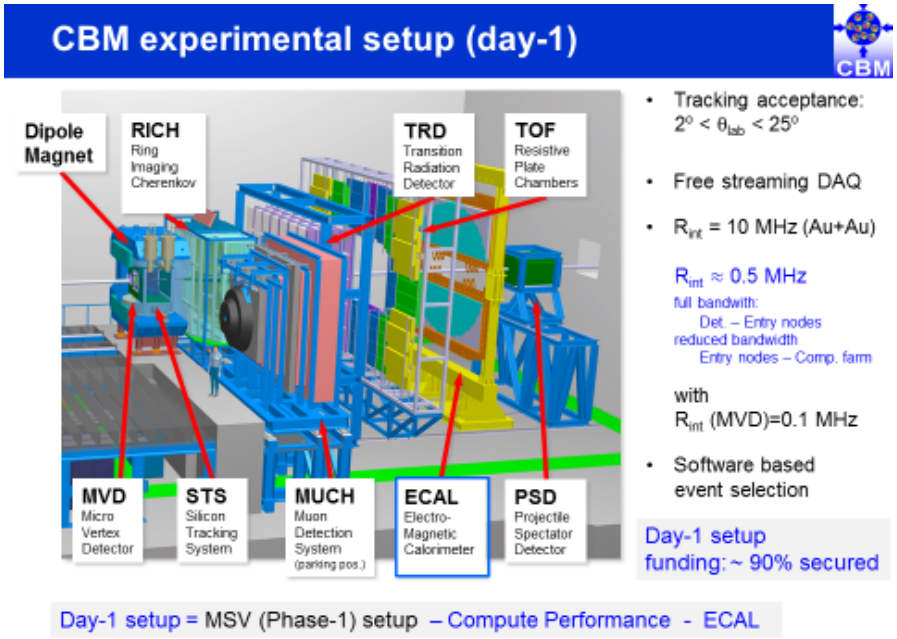

Thank you for your attention!

Backup slides

Status CBM/HADES Technical Design Reports January 2022

Nr.	CBM subsystem	Status
1	Superconducting dipole magnet	approved
2	Silicon Tracking System (STS)	approved
3	Ring Imaging Cherenkov Detector (RICH)	approved
4	Projectile Spectator Detector (PSD)	approved
5	Muon Chamber System (MUCH)	approved
6	Time of Flight (TOF) system	approved
7	Transition Radiation Detector (TRD)	approved
8	Micro-Vertex Detector (MVD)	approved
9a	Online Systems I: Data Acquisition (DAQ)	submission Q2 2022
9b	Online Systems II: Computing	submission Q2 2023
10	Electromagnetic Calorimeter (ECAL)	submission t.b.d.
11	**HADES** Electromagnetic Calorimeter	approved

Definition CBM DAY 1 and CBM start version (MSV)



full bandwidth
costs additional ~0,5 M€
(>1% of day 1 cost)

	CBM Day 1 setup	CBM start version (MSV)
Micro Vertex Detector (MVD)	yes	yes
Silicon Tracking System (STS)	yes	yes
Ring Image Cherenkov Detector (RICH)	yes	yes
Muon Detector (MUCH)	yes	yes
Transition Radiation Detector (TRD)	yes	yes
Time of Flight System (TOF)	yes	yes
Electromagnetic Calorimeter (ECAL)	no	yes
Projectile Spectator Detector (PSD)	yes	yes
Dipol MAGNET	yes	yes
Online Systems (DAQ and FLES)	yes	yes
- Front End	100%	100%
- Back End (bandwidth)	20%	100%
Infrastructure	yes	yes

CBM status: score card

	Component/ Sub-System	TDR	Cost [k€ 2005]	Funding	Construction	Construction completed	Test/ Commissioning
Day-1	Micro Vertex Detector (MVD)		914			04/2025	
	Silicon Tracking System (STS)		9504			10/2024	
	Ring Image Cherenkov Detector (RICH)		3697			12/2023	
	Muon Detector (MUCH)		6138			02/2024	
	Transition Radiation Detector (TRD)		2615			06/2024	
	Time of Flight System (TOF)		5785			08/2024	
	Projectile Spectator Detector (PSD)		944			05/2023	
	Dipol Magnet		3758			10/2022	
	Online Systems (DAQ and FLES)		1825			09/2024	
	Beam Monitoring System		120			09/2024	
	Infrastructure		2192			12/2023	
		95% value weighted	37492	93% secured	27.7% value weighted		5% value weighted
Phase-0 (SIS18) & Day-1 (SIS100)	HADES upgrade		2594			03/2023	
Change since RRB10		3%			9.0%		5%

Reporting Data Date: 14.02.2022

Memorandum of Understanding

for Collaboration in the Construction of the Compressed Baryonic Matter (CBM) Experiment at FAIR

between

the Facility for Antiproton and Ion Research in Europe GmbH, hereinafter referred to as FAIR GmbH,

and

the full member institutions of the CBM Collaboration (hereinafter referred to as *Member Institutions*)

together with the corresponding funding agencies

- Drafting of C-MoU in CBM collaboration since 2015
- Discussion of C-MoU contect (e.g. CF) with Funding Agencies in RRB since 2017