Status Funding
CBM and HADES experiment

10th CBM Resource Review Board meeting

9th February 2021

Report

CBM and HADES Resource Coordinator

Jürgen Eschke

Overview

- Bases for CBM C-MoU – CBM funding status after 9th RRB meeting
- 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)

CBM Country Funding

by Resource Coordinator, J. Eschke

11.03.2020

CBM day 1 setup detector / system	Costs	Comm fun	ry	France	Korea	Ukraine	to be assigned
MVD	1,35			0,46	0,11		0,24
STS	14,01					0,14	0,38
TRD	3,85		0,05				0,62
RICH	5,45						0,30
TOF	8,63						0,78
Online Systems (DAQ+FLES) day-1 setup	2,69						
Magnet	5,54						
MuCh	9,05						
PSD	1,39						
Infrastructure	3,23	3,2					
ECAL (not part of day 1 setup)							
Sum in 2019 M€	**55,19**	3,2	0,05	0,46	0,11	0,14	2,32
Sum in 2005 M€	37,44	2,1	0,04	0,31	0,07	0,09	1,57
escalation factor (1./1.474)							
This calculation uses an escalation factor of 1.474 between 2006 prices ar			secured / with Common Fund				93,0%
1,474							
CBM phase 1 setup							
CBM day 1 setup	55,19	3,2	0,05	0,46	0,11	0,14	2,32
full bandwidth (DAQ/FLES)	0,53						0,53
plus ECAL	4,14						
Sum in 2019 M€	**59,86**	3,2	0,05	0,46	0,11	0,14	2,85
Sum in 2005 M€	40,61	2,1	0,04	0,31	0,07	0,09	1,93
			secured / with Common Fund				85,8%

Facility for Antiproton and Ion Research

Updated documents by the CBM Collaboration

post-meeting information following the 9th meeting of the CBM/HADES RRB

Enclosed are the following documents provided by the collaborations as a post-meeting update to the information given for 9th meeting of the CBM/HADES Resources Review Board (RRB) of the Facility for Antiproton and Ion Research (FAIR). Only documents with updated information following the feedback of funding agencies are attached in this circulation:

3. Experiment funding: Funding situation by experiment / major component for CBM
4. Country funding: Funding situation by country for CBM

Separately, a document optimised for printing in A3 format is attached:

6. Full current Cost Matrix, indicating the requirements for Day-One, for CBM

All other documents as circulated in November 2019 remain valid.

17 April 2020

Experiment funding
(in 2005 and 2021 prices [M€])

CBM day 1 setup

10th RRB

09.02.2021

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

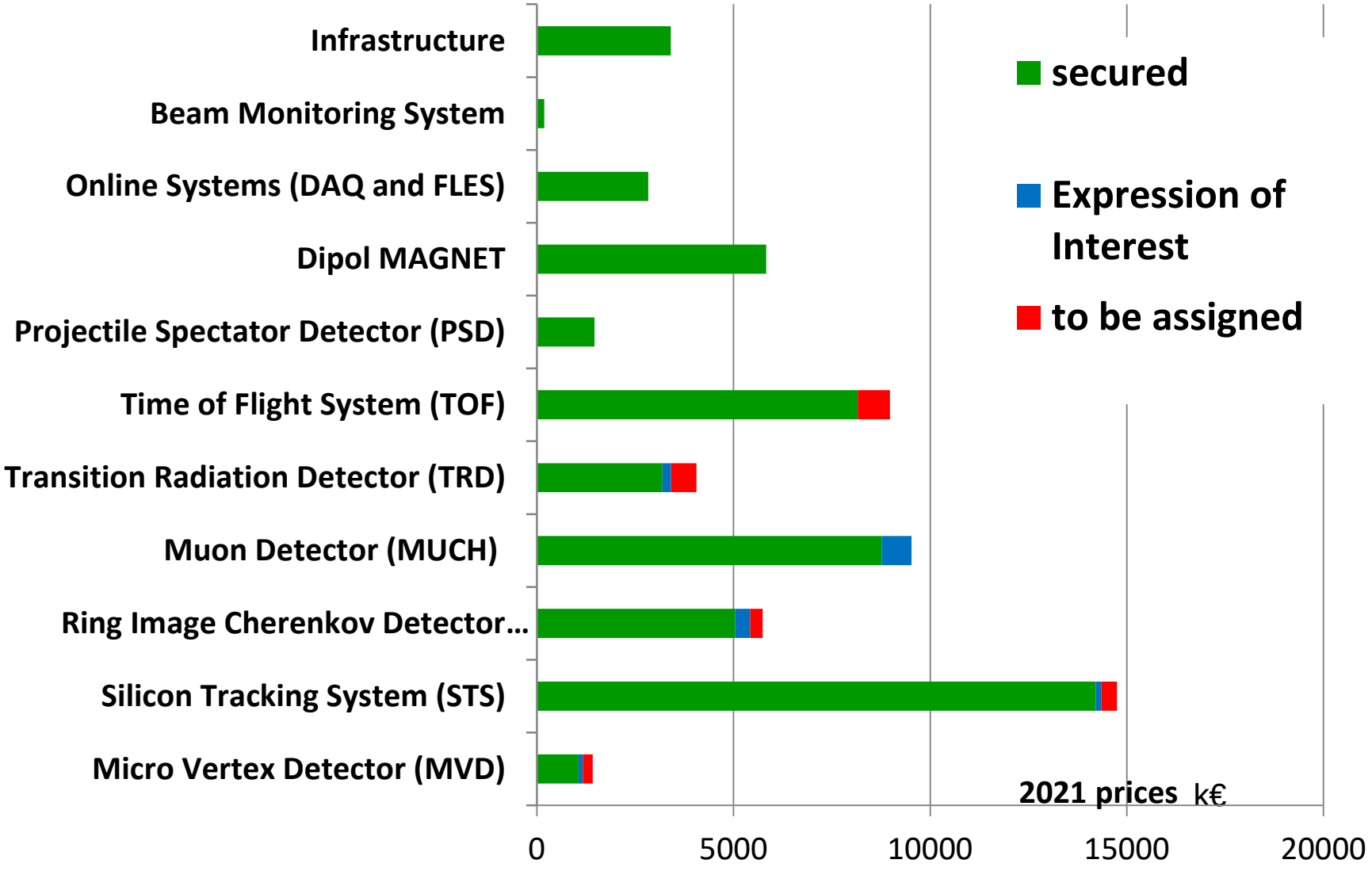
Status CBM experiment funding (CBM start version@SIS100)

PSP Code	detector / system	Prices, K Euro (2005 price)				Prices, K Euro (2021 price)				
		total cost 2005 prices	Secured amount	EoI	To be assigned	total cost 2021 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	**1419**	1055	111	253	1
1.1.1.2	Silicon Tracking System (STS)	**9504**	9152	94	258	**14750**	14205	145	400	1
1.1.1.3.1	Ring Image Cherenkov Detector (RICH)	**3697**	3246	250	201	**5738**	5037	388	313	1
1.1.1.3.2	Muon Detector (MUCH)	**6138**	5648	490		**9526**	8765	760		1
1.1.1.4	Transition Radiation Detector (TRD)	**2615**	2054	143	418	**4059**	3188	222	649	1
1.1.1.5	Time of Flight System (TOF)	**5785**	5255	0	531	**8979**	8155	0	824	1
1.1.1.6.1	Electromagnetic Calorimeter (ECAL)	**2805**		2805		**4354**		4354		no
1.1.1.6.2	Projectile Spectator Detector (PSD)	**944**	944			**1465**	1465			1
1.1.1.7	Dipol MAGNET	**3758**	3758			**5832**	5832			1
1.1.1.8	Online Systems (DAQ and FLES)	**2188**	1825	0	363	**3396**	2832	0	563	(1)
1.1.1.9	Beam Monitoring System	**120**	120			**186**	186			1
1.1.1.10	Infrastructure	**2192**	2192			**3402**	3402			1
	Sum CBM Phase 1 setup	**40660**	**34874**	**3853**	**1934**	**63105**	**54124**	**5980**	**3001**	**85,8%**
Sum CBM day 1 setup (without ECAL and full bandwidth DAQ/FLES)		**37492**	**34874**	**1048**	**1571**	**58188**	**54124**	**1626**	**2438**	**93,0%**
										percentage secured
1,552	This calculation uses an escalation factor of 1.552 between 2005 prices and 2021 prices									

Funding CBM day-1 setup

(RRB10, 9 Feb. 2021)

93% secured funding



Country funding (in 2021 prices [M€]) CBM day 1 setup 10th 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	1,42			0,57												0,49	0,11		0,25
STS	14,75		7,19	0,94			3,28		2,79									0,15	0,40
TRD	4,06			1,22						1,92			0,22	+	0,06				0,65
RICH	5,74		**1,92**	1,25	0,39	+	1,86												0,31
TOF	8,98		1,15	0,69			0,73			1,16	4,43								0,82
Beam Monitoring System	0,19			0,11								0,07							
Online Systems (DAQ+FLES) day-1 setup	2,83		**1,37**	1,15					0,31										
Magnet	5,83						5,83												
MuCh	9,53				0,76	+	2,83	5,94											
PSD	1,47						1,21					0,26							
Infrastructure	3,40	**3,40**																	
ECAL (not part of day 1 setup)																			
Sum in 2021 M€	**58,19**	**3,40**	**11,63**	**5,93**	**1,15**	**+**	**15,74**	**5,94**	**3,10**	**3,08**	**4,43**	**0,33**	**0,22**	**+**	**0,06**	**0,49**	**0,11**	**0,15**	**2,44**
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./1.552)																			
This calculation uses an escalation factor of 1.552 between 2005 prices and 2021 prices																			
1,552																			
CBM phase 1 setup																			
CBM day 1 setup	58,19	3,40	11,63	5,93	1,15	+	15,74	5,94	3,10	3,08	4,43	0,33	0,22	+	0,06	0,49	0,11	0,15	2,44
full bandwidth (DAQ/FLES)	0,56																		0,56
plus ECAL	4,35				4,35														
Sum in 2021 M€	**63,10**	**3,40**	**11,63**	**5,93**	**5,50**		**15,74**	**5,94**	**3,10**	**3,08**	**4,43**	**0,33**	**0,22**		**0,06**	**0,49**	**0,11**	**0,15**	**3,00**
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

amounts in green are considered as secured / 93,0 % secured
amounts in blue - Expression of Interest (EoI)
amounts in red - to be assigned

85,8 % secured

Country funding (in 2005 prices [M€]) CBM day 1 setup 10th 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	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**
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**

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**

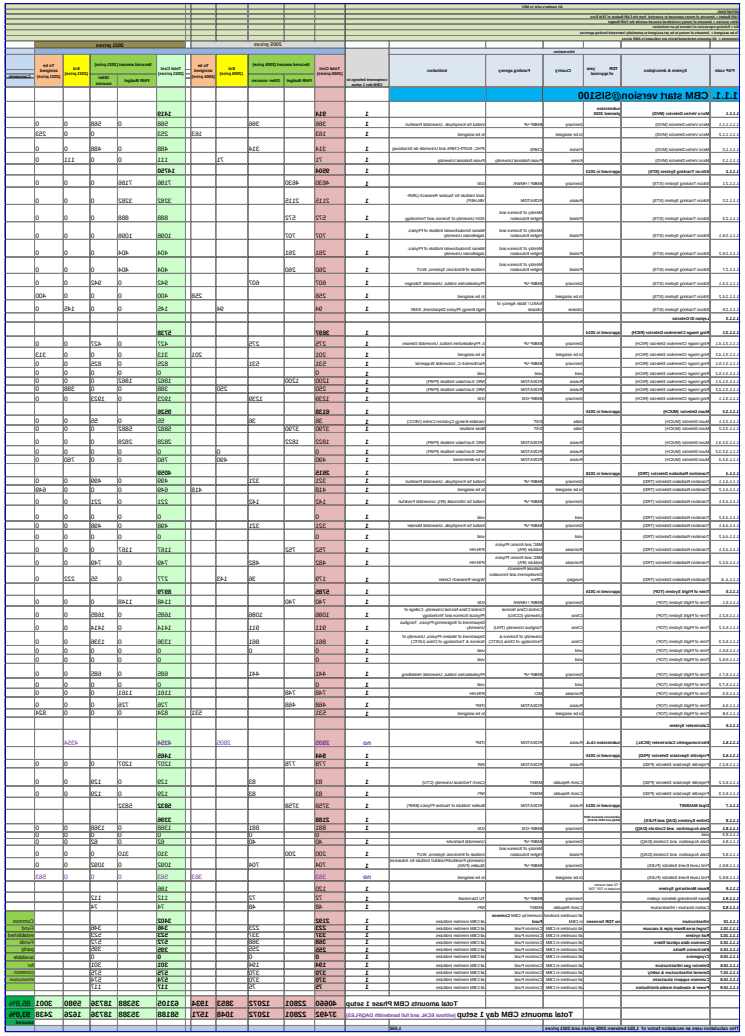
amounts in blue - Expression of Interest (EoI)

amounts in red - to be assigned

85,8 % secured

CBM Cost Matrix

and HADES Cost Matrix



please consult distributed cost matrix for all details!

PSP code	System & description	TDR approved	Country	Funding agency	Institution	component belongs to FAIR Phase	2005 prices: Total Cost (2005 prices)	Secured amount (2005 prices): FAIR Budget	Secured amount (2005 prices): Other sources	Est (2005 price)	To be assigned (2005 price)	2021 prices: Total Cost (2021 prices)	Secured amount (2021 prices): FAIR Budget	Secured amount (2021 prices): Other sources	Est (2021 price)	To be assigned (2021 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					599					
1.1.2.1.1	**Infrastructure**		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		434		434	0		
1.1.2.1.3	**HADES exp. relocation into CBM cave**		HADES Common Fund			FAIR Phase 1	100			100		155			155		
1.1.2.2	**Cryo Infrastructure**		Germany	BMBF-GSI	GSI	FAIR Phase 1	69			69		107			107		
1.1.2.3	**HADES Calorimeter (ECAL)**	approved in 2014					1250					1941					
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				310	310		0		
1.1.2.3.2	**ECAL Rail System**		Germany	BMBF-GSI	GSI	FAIR Phase 0	25		25			39		39	0		
1.1.2.3.3	**ECAL Infrastructure**					FAIR Phase 0											
1.1.2.3.3.1			Czech Rep.	MSMT	NPI		293		293			455		455	0		
1.1.2.3.3.2	**void**						0					0			0		
1.1.2.3.3.3			Germany	BMBF-VF	TU Darmstadt		66		66			102		102	0		
1.1.2.3.3.4			Russia		MEPhI		21			21		33		0	33		
1.1.2.3.4	**ECAL 3 inch PMTs**					FAIR Phase 1											
1.1.2.3.4.1			Germany	BMBF-GSI	GSI		159		159			247		247	0		
1.1.2.3.4.2			Germany	TU Munich	TU Munich		21		21			33		33	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		605		517	88		
1.1.2.3.4.5					to be assigned		62				62	96		0	0	96	
1.1.2.4	**Readout Electronics Modification**					FAIR Phase 1	168					261					
1.1.2.4.1	**Readout Electronics Modification**				to be assigned		168				168	261		0	0	261	
1.1.2.5	**MDC**						421					654					
1.1.2.5.1	**MDC Plane II**				to be assigned	FAIR Phase 1	207				207	321		0	0	321	
1.1.2.5.2	**MDC FEE**		Germany	BMBF-VF	Institut für Kernphysik, Universität Frankfurt	FAIR Phase 0	197		197			306		306	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					66					
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 HVSLV (*)		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			66		66	0		
	FAIR-Phase-0 activity @SIS18 included																
1.1.2.7	**Forward Detector**					FAIR Phase 0	257					398					
1.1.2.7.1	**Forward Detector - Straw -STS2**		Poland	Ministry of Science	Jagiellonian University		107		107			166		166	0		
1.1.2.7.2	**Forward Detector - dEdx**		Russia	Mephi	Mephi		24			24		37		0	37		
1.1.2.7.3	**Forward Detector - RPC**		Portugal	LIP Coimbra	LIP Coimbra		71		71			111		111	0		
1.1.2.7.4	**Forward Detector - Straw -STS1/DAQ**		Germany	BMBF-Jülich	FZJ Institut für Kernphysik		25		25			39		39	0		
	Forward Detector - Straw -STS1/DAQ		Germany	BMBF-Jülich	FZJ Institut für Kernphysik see PANDA PSP 1.1.1.4.1												
1.1.2.7.5	**Forward Detector mechanics**		France	IPNO Orsay	IPNO Orsay		29		29			45		45	0		
					SUM HADES (FAIR phase 0&1)		2594	200	1662	295	437	4025	310	2579	458	679	71.8%
					SUM HADES@SIS18 (FAIR phase 0)		1118	200	856	63	0	1736	310	1328	97	0	94.4%
This calculation uses an escalation factor of 1.552 between 2005 prices and 2021 prices																	secured

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 (draft agreed)

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 almost unchanged (increased by 48 T€ (2005 prices)) compared to the RRB9 estimate (37,44 M€ in 2005 prices), because of additional costs for the beam monitoring system, which was introduced as an independent subsystem of the CBM experiment.

Conclusion:

The CBM collaboration has implemented a Common Fund for covering the costs of the common infrastructure of 3,4 M€ (2021 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.

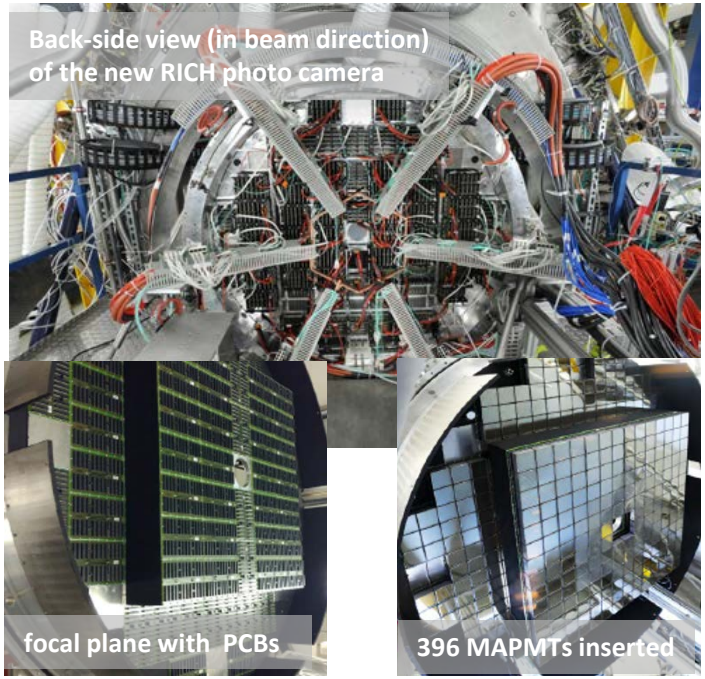
- **The CBM day 1 setup has 93% secured funding including Common Fund**
- The CBM start version (including ECAL and the full bandwidth of the DAQ/FLES) has 85,8% secured funding

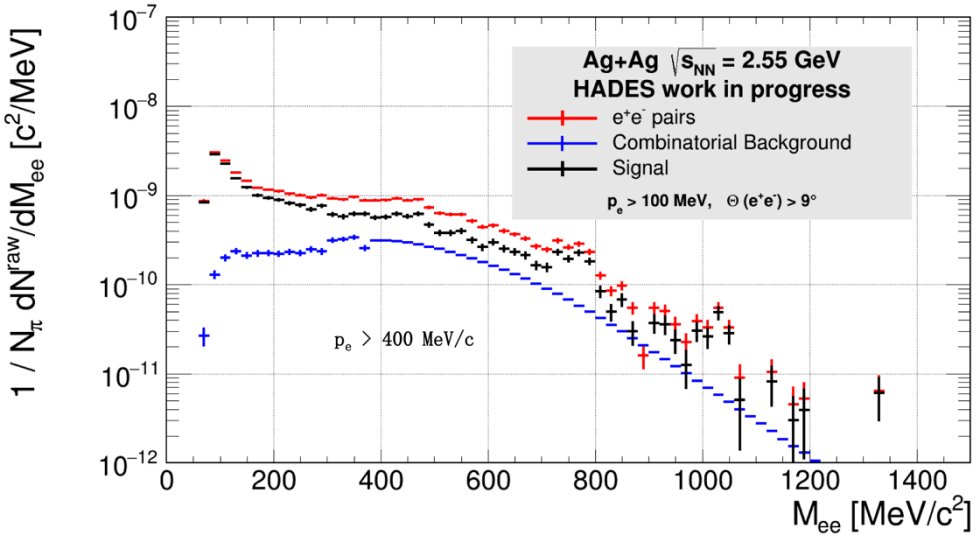
Excellent dilepton performance with new RICH photo camera

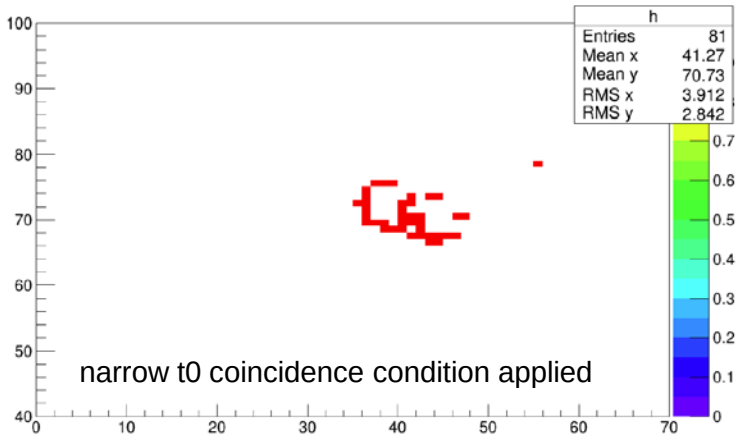
A success story:

Usage of CBM funded detectors beforehand in HADES.

- Win-win situation – efficient use of funding.
  - CBM MAPMTs with TRB3 based readout.
  - Synergy project between HADES and CBM (Univ's Münster, Gießen, Frankfurt and GSI).
  - Stable operation during four weeks of beamtime in 2019.
  - 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.







HADES timeline

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

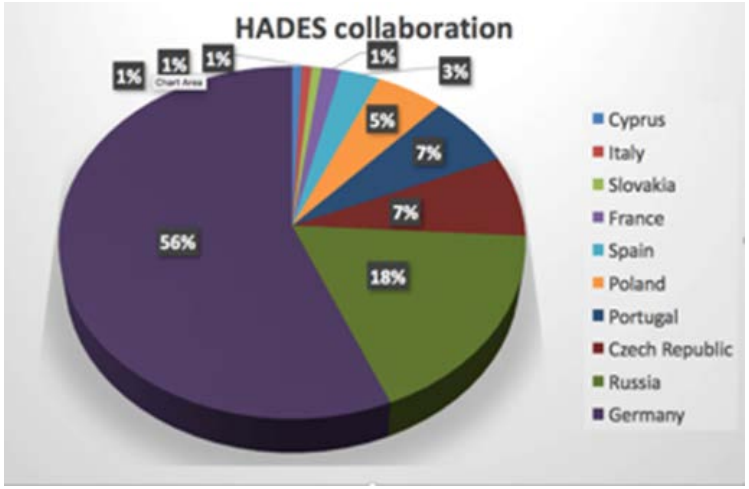
Until 2019: Installation of CBM/HADES UV photo-detector for RICH, ECAL detector

2020: Installation Forward detector

2022: Installation MDC readout upgrade

2019-2024… (experiment campaign at SIS18 - FAIR phase 0)

- Five proposal submitted (1 ½ granted)
  - π+$(CH_2)_n$/LH_2: baryon em transition form factors, baryonic resonances with strangeness
  - p+A/p+p: strangeness/vector mesons in medium, hyperon em transition form factors
  - A+A: downward (in energy) beam energy scan

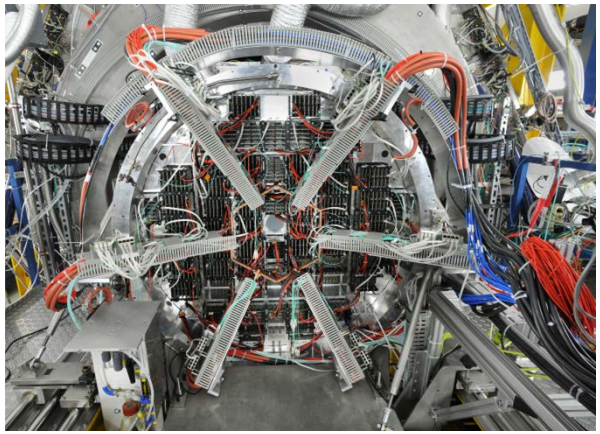


2025… on (HADES at SIS100)

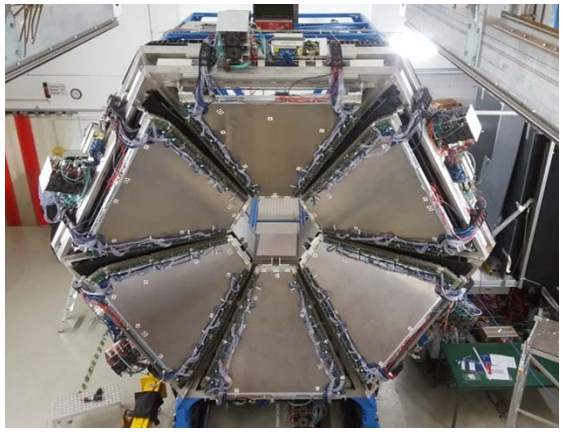
- Transfer spectrometer to new experimental hall
- Cold matter physics (p+A)
- Exclusive measurements (p+p)
- A+A collisions

HADES upgrades

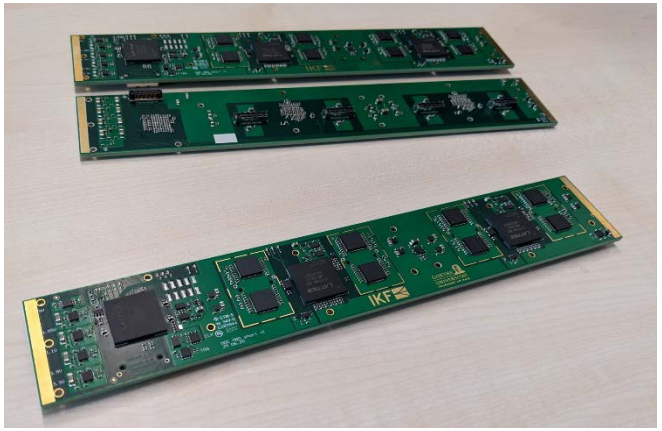
RICH Upgrade



ECAL



MDC readout upgrade



✓ **RICH (HADES/CBM phase 0 project), Univ. – finished, used in 2019 beam time** — U. Wuppertal, U. Gießen, U. Frankfurt, GSI, U. München
- Gain in lepton pair detection efficiency (x 3)
- Improved background/noise rejection:
- Better conversion pair rejection
- Precise time information (down to 300ps precision)
- Joint (CBM/PANDA/HADES) development of read-out system based on TRB3 platform.

✓ **ECAL (FAIR detector) – 2 sectors in 2019 beam time, 6 sector by end of 2021** — Rez, U. Prague, Jagiellonian U., TU Darmstadt, GSI, IPNO Paris
- π0 and η decays into γγ channel
- Electromagnetic decays of baryonic resonances
- Improved e/π separation: important for di-electron spectroscopy
- Proven technology: lead glass modules read out with Hamamatsu PMTs

✓ **Forward Detector (HADES/PANDA phase 0 project) – ready for test beam (see next slide)** — TransFAIR Jülich, AGH Cracow, Jagiellonian U., GSI,
- Enhance HADES capabilities for exclusive channels – forward region
- Hyperon production and EM decays
- PID via TOF, dE/dx(straw tube) – no magnetic field

o **MDC readout upgrade (uses PASTTREK chip) – prototype under test, installation in 2022** — Univ. Frankfurt, GSI, AGH Cracow
- Multi-hit TDC (FPGA based, TRB3 system) – essential for high rate experiments
- Read-out trigger rate increase from 50 kHz to 200 kHz

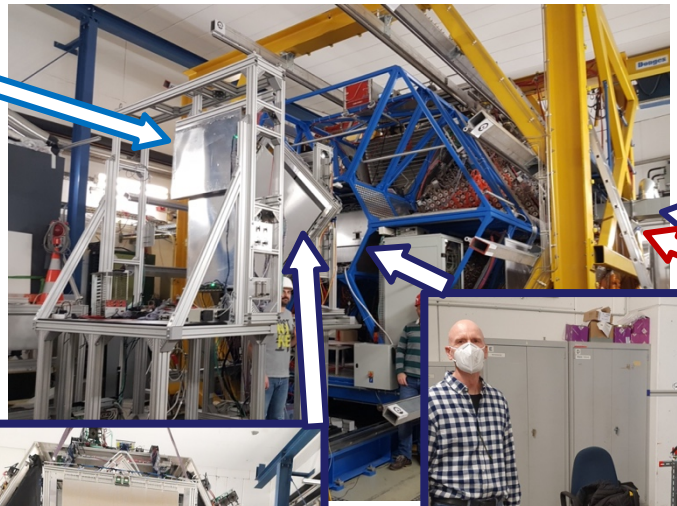
The upgraded HADES detector (five new detector systems)

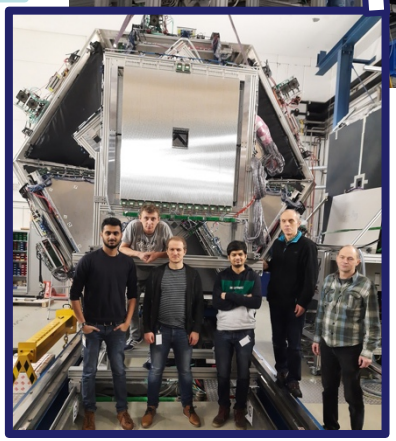
- Improved physics performance through instrumentation of the very forward hemisphere using FAIR technology.
- In particular important for the Hyperon Program.

Forward RPC

LIP Coimbra

- Based on R&D for neuLAND
- TRB3 read-out





STS2

Jagiellonian Univ.

- PANDA straw technology
- PANDA PASTTRECK FEE chip

STS1

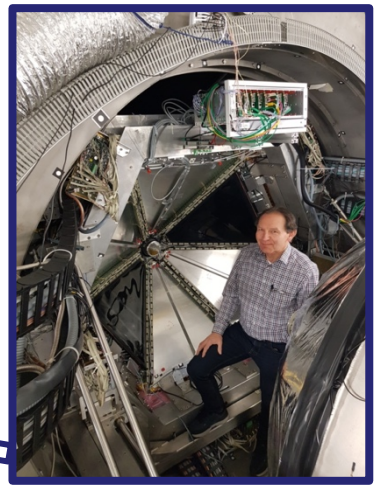
TransFAIR, Jülich

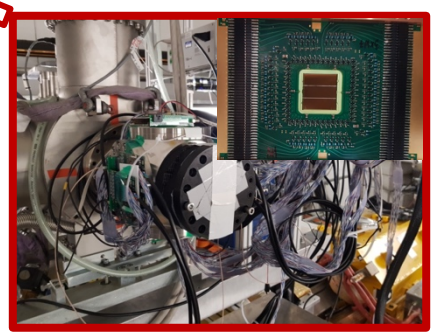
- PANDA straw technology
- PANDA PASTTRECK FEE chip

iTOF

TransFAIR, Jülich

- APD read-out
- Enhances trigger purity





T0

GSI, TU Darmstadt

- LGAD technology
- In-beam detector

HADES upgrade costs

	Status HADES experiment funding (FAIR phase 0 (@SIS18) & FAIR phase 1 (@SIS100)									
PSP Code	detector / system	Prices, K Euro								
		2005 prices				2021 prices				
		total cost 2005 prices	Secured amount	EoI	To be assigned	total cost 2021 prices	Secured amount	EoI	To be assigned	funded in FAIR Phase
1.1.2.1	Mechanics and Installation	**386**	280	106		**599**	434	165		Phase 1
1.1.2.2	Cryo Infrastructure	**69**		69		**107**		107		Phase 1
1.1.2.3.1-3	HADES Calorimeter	**605**	584	21		**939**	906	33		Phase 0
1.1.2.3.4	HADES Calorimeter (3" PMTs)	**645**	526	57	62	**1001**	817	88	96	Phase 1
1.1.2.4	Readout Electronics Modification	**168**			168	**261**			261	Phase 1
1.1.2.5.1	MDC Plane II	**207**			207	**321**			321	Phase 1
1.1.2.5.2-3	MDC FEE	**214**	197	17		**333**	306	27		Phase 0
1.1.2.6	RICH Upgrade	**43**	43			**66**	66			Phase 0
1.1.2.7	Forward Detector	**257**	232	24		**398**	361	37		Phase 0
	SUM HADES (FAIR phase 0&1)	**2594**	**1862**	**295**	**437**	**4025**	**2889**	**458**	**679**	**71,8%**
	SUM HADES@SIS18 (FAIR phase 0)	**1118**	**1056**	**63**	**0**	**1736**	**1639**	**97**	**0**	**94,4%**
										percentage secured
	This calculation uses an escalation factor of 1.552 between 2005 prices and 2021 prices.									

- The HADES upgrade for SIS18 (total costs in 2005 prices is 1,118 M€) has 94,4% secured funding (no change compared to RRB9).

- The costs of the HADES experiment at SIS100 (FAIR phase 1) amounts to 2,594 M€ (2005 prices) (plus 141 T€). The full HADES upgrade costs including the moving to the CBM cave at SIS100 has 71,8% secured funding (+7,3% compared to RRB9) at present.

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	599		10		434	0							155	
Cryo Infrastructure	107		107											
HADES Calorimeter	939	39		102	455	0	310					33		
HADES Calorimeter (3" PMTs)	1001	280		20	517	88								96
Readout Electronics Modification	261													261
MDC Plane II	321													321
MDC FEE	333		27	306										
RICH Upgrade	66	66												
Forward Detector	398	39						166	111	45	0	37		
	4025													
Sum in 2021 k€	**4025**	424	143	428	1405	88	310	166	111	45	0	71	155	679
Sum in 2005 k€	2594	273	92	276	906	57	200	107	71	29	0	45	100	437
escalation factor (1./1.552)														

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

1,552

amounts in green are considered as secured

amounts in blue - Expression of Interest (EoI)

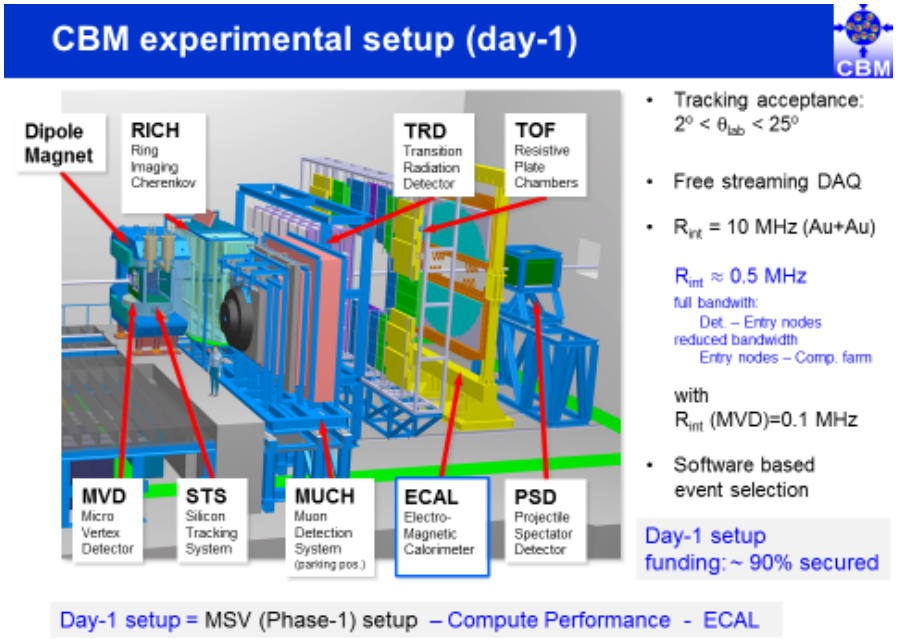
amounts in red - to be assigned

Secured Czech Contribution to HADES increased by 280 k€ to 906 k€ (2005 prices) since the 9th RRB.

Thank you for your attention!

Backup slides

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

Status CBM/HADES Technical Design Reports January 2021

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)	submission Q1 2021
9a	Online Systems I: Data Acquisition (DAQ)	submission Q2 2022
9b	Online Systems II: Computing	submission Q1 2023
10	Electromagnetic Calorimeter (ECAL)	submission t.b.d.
11	**HADES** Electromagnetic Calorimeter	approved

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			08/2024	
	Ring Image Cherenkov Detector (RICH)		3697			01/2024	
	Muon Detector (MUCH)		6138			03/2024	
	Transition Radiation Detector (TRD)		2615			11/2024	
	Time of Flight System (TOF)		5785			11/2024	
	Projectile Spectator Detector (PSD)		944			11/2023	
	Dipol Magnet		3758			10/2022	
	Online Systems (DAQ and FLES)		1825			12/2023	
	Beam monitoring system		120			02/2025	
	Infrastructure		2192			12/2023	
		92% *value weighted*	37492	93% *secured*	18,7% *value weighted*		
Phase-0 (SIS18) & Day-1 (SIS100)	HADES upgrade		2594			03/2023	
Change since report 2020-II		unchanged		6%	2,5%		

Reporting Data Date: 12.01.2021