

Status Funding

CBM and HADES experiment

8th CBM Resource Review Board meeting
26th November 2018

Report
CBM and HADES Resource Coordinator
Jürgen Eschke

Overview

- Reminder status funding of CBM at 7th RRB meeting
- Status funding of the CBM day 1 setup
and of the CBM start version (Phase 1 setup / MSV)
- Status Contracts for FAIR shareholder contributions
- Status Funding of HADES@SIS18 (FAIR Phase 0)
and of HADES@SIS100 (FAIR Phase 1)
- Next steps

| CBM day 1 setup detector / system | Costs | Common fund | GSI and FAIR project funds | University funding (VF) | University funding (VF) | Russia | India | Poland | Romania | China | Czech Republic | Hungary | France | Korea | Ukraine | to be assigned |
|-----------------------------------|-------|-------------|----------------------------|-------------------------|-------------------------|--------------|-------|--------|---------|-------|----------------|-------------|--------|-------|---------|----------------|
| MVD | 1,28 | | | 0,51 | | | | | | | | | 0,44 | 0,10 | | |
| STS | 13,31 | | 6,48 | 0,85 | 0,36 | | 2,96 | 2,52 | | | | | | | 0,13 | |
| TRD | 3,56 | | | 1,00 | 0,59 | | | | 1,73 | | | 0,20 + 0,05 | | | | |
| RICH | 5,18 | | 1,74 | 1,13 | 0,28 | 0,35 + 1,68 | | | | | | | | | | |
| TOF | 8,20 | | 1,04 | 0,72 | 0,46 | | 0,66 | | 1,05 | 4,00 | | | | | | 0,28 |
| Online Systems (DAQ+FLES) | 3,16 | | 1,23 | 1,14 | 0,51 | | | 0,28 | | | | | | | | |
| Magnet | 5,26 | | | | | | 5,26 | | | | | | | | | |
| MuCh | 8,59 | | | | | 0,69 + 2,55 | 5,36 | | | | | | | | | |
| PSD | 1,32 | | | | | | 1,09 | | | | 0,23 | | | | | |
| Infrastructure | 3,18 | 3,18 | | | | | | | | | | | | | | |
| ECAL (not part of day 1 setup) | | | | | | | | | | | | | | | | |
| Sum in 2017 M€ | 53,04 | 3,18 | 10,49 | 5,35 | 2,43 | 1,04 + 14,20 | 5,36 | 2,80 | 2,78 | 4,00 | 0,23 | 0,20 + 0,05 | 0,44 | 0,10 | 0,13 | 0,28 |
| Sum in 2005 M€ | 37,89 | 2,27 | 7,49 | 3,82 | 1,73 | 0,74 + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 |
| escalation factor (1./1.4) | | | | | | | | | | | | | | | | |

This calculation uses an escalation factor of 1.4 between 2005 prices and 2017 prices

1,4

amounts in green are considered as secured / 86,1 % secured / with Common Fund 92,1%

amounts in blue - Expression of Interest (Eoi)

amounts in red - to be assigned

| | | | | | | | | | | | | | | | | |
|-------------------|-------|------|-------|------|------|--------------|------|------|------|------|------|-------------|------|------|------|------|
| CBM phase 1 setup | | | | | | | | | | | | | | | | |
| CBM day 1 setup | 53,04 | 3,18 | 10,49 | 5,35 | 2,43 | 1,04 + 14,20 | 5,36 | 2,80 | 2,78 | 4,00 | 0,23 | 0,20 + 0,05 | 0,44 | 0,10 | 0,13 | 0,28 |
| plus ECAL | 3,93 | | | | | 3,93 | | | | | | | | | | |
| Sum in 2017 M€ | 56,97 | 3,18 | 10,49 | 5,35 | 2,43 | 4,96 + 14,20 | 5,36 | 2,80 | 2,78 | 4,00 | 0,23 | 0,20 + 0,05 | 0,44 | 0,10 | 0,13 | 0,28 |
| Sum in 2005 M€ | 40,69 | 2,27 | 7,49 | 3,82 | 1,73 | 3,55 + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 |

80,2 % secured / with Common Fund 85,8%

Status CBM experiment funding (CBM start version@SIS100)

| PSP Code | detector / system | Prices, K Euro (2005 price) | | | | Prices, K Euro (2018 price) | | | | components belongs to CBM day 1 setup |
|-----------|---|-----------------------------|----------------|-------------|----------------|-----------------------------|----------------|--------------|----------------|---------------------------------------|
| | | total cost 2005 prices | Secured amount | Eol | To be assigned | total cost 2018 prices | Secured amount | Eol | To be assigned | |
| 1.1.1.1 | Micro Vertex Detector (MVD) | 914 | 680 | 234 | | 1313 | 976 | 336 | | 1 |
| 1.1.1.2 | Silicon Tracking System (STS) | 9504 | 9152 | 351 | | 13647 | 13143 | 505 | | 1 |
| 1.1.1.3.1 | Ring Image Cherenkov Detector (RICH) | 3697 | 3246 | 451 | | 5309 | 4661 | 648 | | 1 |
| 1.1.1.3.2 | Muon Detector (MUCH) | 6138 | 5648 | 490 | | 8814 | 8110 | 704 | | 1 |
| 1.1.1.4 | Transition Radiation Detector (TRD) | 2544 | 1984 | 561 | | 3654 | 2849 | 805 | | 1 |
| 1.1.1.5 | Time of Flight System (TOF) | 5857 | 5327 | 331 | 200 | 8411 | 7649 | 475 | 287 | 1 |
| 1.1.1.6.1 | Electromagnetic Calorimeter (ECAL) | 2805 | | 2805 | | 4029 | | 4029 | | no |
| 1.1.1.6.2 | Projectile Spectator Detector (PSD) | 944 | 944 | | | 1356 | 1356 | | | 1 |
| 1.1.1.7 | Dipol MAGNET | 3758 | 3758 | | | 5396 | 5396 | | | 1 |
| 1.1.1.8 | Online Systems (DAQ and FLES) | 2259 | 1896 | 363 | | 3243 | 2722 | 521 | | (1) |
| 1.1.1.10 | Infrastructure | 2273 | | 2273 | | 3264 | | 3264 | | 1 |
| | Sum CBM Phase 1 setup | 40693 | 32634 | 7860 | 200 | 58436 | 46862 | 11286 | 287 | 80,2% |
| | Sum CBM day 1 setup (without ECAL and full bandwidth DAQ/FLES) | 37525 | 32634 | 4691 | 200 | 53886 | 46862 | 6737 | 287 | 87,0% |

percentage secured

1,436 This calculation uses an escalation factor of 1.436 between 2005 prices and 2018 prices

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) | Universities | | | | | | | | | | | |
| MVD | 1,31 | | | 0,53 | 0,23 | | | | | | | | 0,45 | 0,10 | | |
| STS | 13,65 | | 6,65 | 0,87 | 0,37 | | 3,04 | 2,59 | | | | | | | 0,13 | |
| TRD | 3,65 | | | 1,02 | 0,60 | | | | 1,77 | | | 0,21 + 0,05 | | | | |
| RICH | 5,31 | | 1,78 | 1,16 | 0,29 | 0,36 + 1,72 | | | | | | | | | | |
| TOF | 8,41 | | 1,06 | 0,74 | 0,47 | | 0,67 | | 1,07 | 4,10 | | | | | | 0,29 |
| Online Systems (DAQ+FLES) day-1 setup | 2,72 | | 1,27 | 1,17 | | | | 0,29 | | | | | | | | |
| Magnet | 5,40 | | | | | | 5,40 | | | | | | | | | |
| MuCh | 8,81 | | | | | 0,70 + 2,62 | 5,49 | | | | | | | | | |
| PSD | 1,36 | | | | | | 1,12 | | | | 0,24 | | | | | |
| Infrastructure | 3,26 | 3,26 | | | | | | | | | | | | | | |
| ECAL (not part of day 1 setup) | | | | | | | | | | | | | | | | |
| Sum in 2018 M€ | 53,89 | 3,26 | 10,76 | 5,49 | 1,97 | 1,06 + 14,56 | 5,49 | 2,87 | 2,85 | 4,10 | 0,24 | 0,21 + 0,05 | 0,45 | 0,10 | 0,13 | 0,29 |
| Sum in 2005 M€ | 37,53 | 2,27 | 7,49 | 3,82 | 1,37 | 0,74 + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 |
| escalation factor (1./1.436) | | | | | | | | | | | | | | | | |

This calculation uses an escalation factor of 1.436 between 2005 prices and 2018 prices

amounts in green are considered as secured / 87,0 % secured / with Common Fund 93,0%

amounts in blue - Expression of Interest (EoI)

amounts in red - to be assigned

| | | | | | | | | | | | | | | | | | | |
|---------------------------|-------|------|-------|------|------|--------------|-------|------|------|------|------|-------------|------|------|------|------|------|------|
| CBM phase 1 setup | | | | | | | | | | | | | | | | | | |
| CBM day 1 setup | 53,89 | 3,26 | 10,76 | 5,49 | 1,97 | 1,06 + 14,56 | 5,49 | 2,87 | 2,85 | 4,10 | 0,24 | 0,21 + 0,05 | 0,45 | 0,10 | 0,13 | 0,29 | | |
| full bandwidth (DAQ/FLES) | 0,52 | | | | 0,52 | | | | | | | | | | | | | |
| plus ECAL | 4,03 | | | | | 4,03 | | | | | | | | | | | | |
| Sum in 2018 M€ | 58,44 | 3,26 | 10,76 | 5,49 | 2,49 | 5,09 | 14,56 | 5,49 | 2,87 | 2,85 | 4,10 | 0,24 | 0,21 | 0,05 | 0,45 | 0,10 | 0,13 | 0,29 |
| Sum in 2005 M€ | 40,69 | 2,27 | 7,49 | 3,82 | 1,73 | 3,55 + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 | | |

| 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) | Universities | | | | | | | | | | | | | |
| MVD | 0,91 | | | 0,37 | 0,16 | | | | | | | | 0,31 | 0,07 | | | | |
| STS | 9,50 | | 4,63 | 0,61 | 0,26 | | 2,12 | 1,80 | | | | | | | 0,09 | | | |
| TRD | 2,54 | | | 0,71 | 0,42 | | | | 1,23 | | | 0,14 | + 0,04 | | | | | |
| RICH | 3,70 | | 1,24 | 0,81 | 0,20 | 0,25 | + 1,20 | | | | | | | | | | | |
| TOF | 5,86 | | 0,74 | 0,51 | 0,33 | | 0,47 | | 0,75 | 2,86 | | | | | | 0,20 | | |
| Online Systems (DAQ+FLES) day-1 setup | 1,90 | | 0,88 | 0,81 | | | | 0,20 | | | | | | | | | | |
| Magnet | 3,76 | | | | | | 3,76 | | | | | | | | | | | |
| MuCh | 6,14 | | | | | 0,49 | + 1,82 | 3,83 | | | | | | | | | | |
| PSD | 0,94 | | | | | | 0,78 | | | | 0,17 | | | | | | | |
| Infrastructure | 2,27 | 2,27 | | | | | | | | | | | | | | | | |
| ECAL (not part of day 1 setup) | | | | | | | | | | | | | | | | | | |
| Sum in 2005 M€ | 37,53 | 2,27 | 7,49 | 3,82 | 1,37 | 0,74 | + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 | + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 |

all numbers in 2005 prices (EURO)

amounts in green are considered as secured / 87,0 % secured / with Common Fund 93,0%

amounts in blue - Expression of Interest (Eoi)

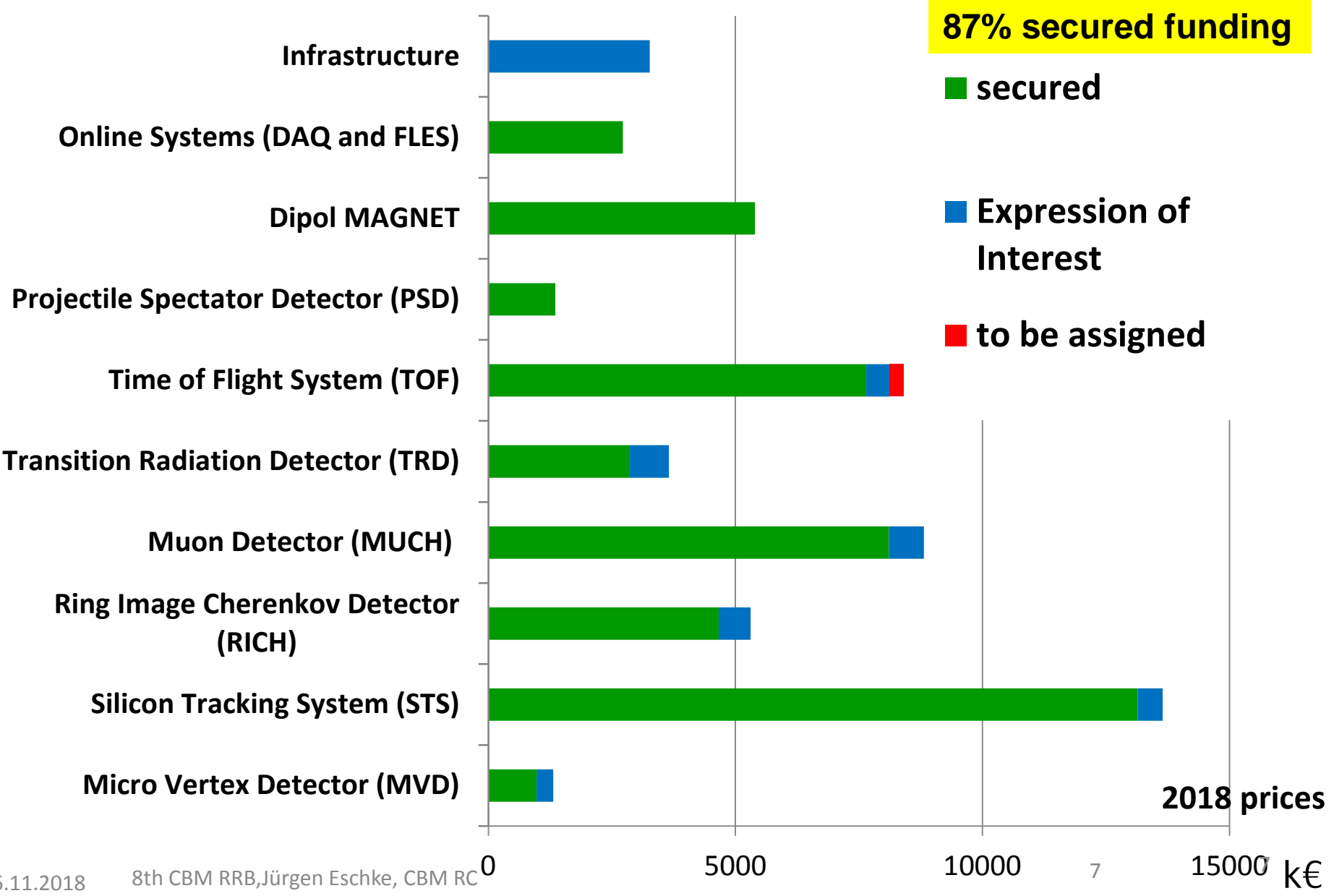
amounts in red - to be assigned

| | | | | | | | | | | | | | | | | | | |
|---------------------------|--------------|-------------|-------------|-------------|-------------|-------------|----------------|-------------|-------------|-------------|-------------|-------------|-------------|---------------|-------------|-------------|-------------|-------------|
| CBM phase 1 setup | | | | | | | | | | | | | | | | | | |
| CBM day 1 setup | 37,53 | 2,27 | 7,49 | 3,82 | 1,37 | 0,74 | + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 | + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 |
| full bandwidth (DAQ/FLES) | 0,36 | | | | 0,36 | | | | | | | | | | | | | |
| plus ECAL | 2,81 | | | | | 2,81 | | | | | | | | | | | | |
| Sum in 2005 M€ | 40,69 | 2,27 | 7,49 | 3,82 | 1,73 | 3,55 | + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 | + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 |

80,2 % secured / with Common Fund 85,8%

Funding CBM day-1 setup

(RRB8, 26 Nov. 2018)



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) | Universities | | | | | | | | | | | |
| MVD | 1,31 | | | 0,53 | 0,23 | | | | | | | | 0,45 | 0,10 | | |
| STS | 13,65 | | 6,65 | 0,87 | 0,37 | | 3,04 | 2,59 | | | | | | | 0,13 | |
| TRD | 3,65 | | | 1,02 | 0,60 | | | | 1,77 | | | 0,21 + 0,05 | | | | |
| RICH | 5,31 | | 1,78 | 1,16 | 0,29 | 0,36 + 1,72 | | | | | | | | | | |
| TOF | 8,41 | | 1,06 | 0,74 | 0,47 | | 0,67 | | 1,07 | 4,10 | | | | | | 0,29 |
| Online Systems (DAQ+FLES) day-1 setup | 2,72 | | 1,27 | 1,17 | | | | 0,29 | | | | | | | | |
| Magnet | 5,40 | | | | | | 5,40 | | | | | | | | | |
| MuCh | 8,81 | | | | | 0,70 + 2,62 | 5,49 | | | | | | | | | |
| PSD | 1,36 | | | | | | 1,12 | | | | 0,24 | | | | | |
| Infrastructure | 3,26 | 3,26 | | | | | | | | | | | | | | |
| ECAL (not part of day 1 setup) | | | | | | | | | | | | | | | | |
| Sum in 2018 M€ | 53,89 | 3,26 | 10,76 | 5,49 | 1,97 | 1,06 + 14,56 | 5,49 | 2,87 | 2,85 | 4,10 | 0,24 | 0,21 + 0,05 | 0,45 | 0,10 | 0,13 | 0,29 |
| Sum in 2005 M€ | 37,53 | 2,27 | 7,49 | 3,82 | 1,37 | 0,74 + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 |
| escalation factor (1./1.436) | | | | | | | | | | | | | | | | |

This calculation uses an escalation factor of 1.436 between 2005 prices and 2018 prices

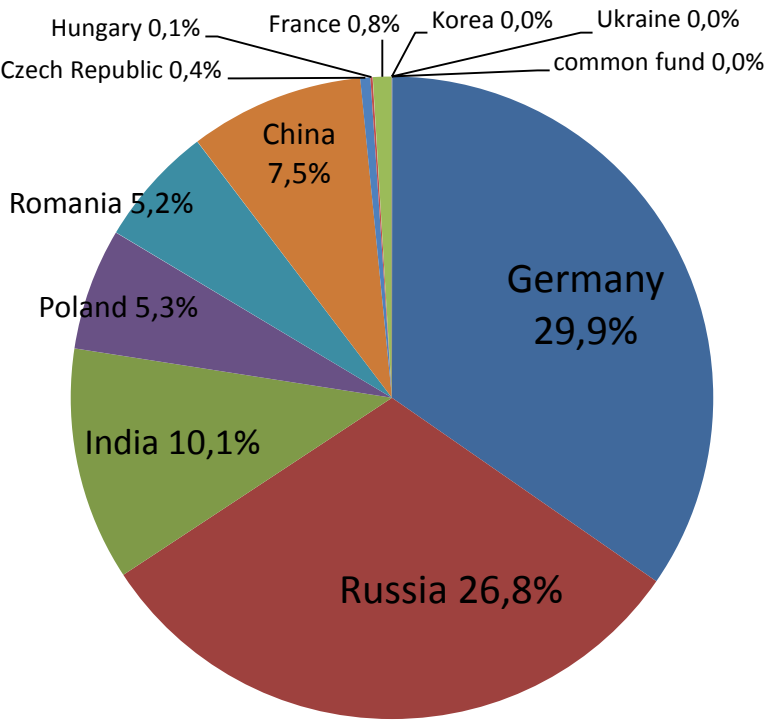
amounts in green are considered as secured / 87,0 % secured / with Common Fund 93,0%

amounts in blue - Expression of Interest (EoI)

amounts in red - to be assigned

| | | | | | | | | | | | | | | | | | | |
|---------------------------|-------|------|-------|------|------|--------------|-------|------|------|------|------|-------------|------|------|------|------|------|------|
| CBM phase 1 setup | | | | | | | | | | | | | | | | | | |
| CBM day 1 setup | 53,89 | 3,26 | 10,76 | 5,49 | 1,97 | 1,06 + 14,56 | 5,49 | 2,87 | 2,85 | 4,10 | 0,24 | 0,21 + 0,05 | 0,45 | 0,10 | 0,13 | 0,29 | | |
| full bandwidth (DAQ/FLES) | 0,52 | | | | 0,52 | | | | | | | | | | | | | |
| plus ECAL | 4,03 | | | | | 4,03 | | | | | | | | | | | | |
| Sum in 2018 M€ | 58,44 | 3,26 | 10,76 | 5,49 | 2,49 | 5,09 | 14,56 | 5,49 | 2,87 | 2,85 | 4,10 | 0,24 | 0,21 | 0,05 | 0,45 | 0,10 | 0,13 | 0,29 |
| Sum in 2005 M€ | 40,69 | 2,27 | 7,49 | 3,82 | 1,73 | 3,55 + 10,14 | 3,83 | 2,00 | 1,98 | 2,86 | 0,17 | 0,14 + 0,04 | 0,31 | 0,07 | 0,09 | 0,20 | | |

percentage secured funding



- Germany
- Russia
- India
- Poland
- Romania
- China
- Czech Republic
- Hungary
- France
- Korea

| country | secured funding | secured funding + EoI |
|----------------|-----------------|-----------------------|
| Germany | 29,9% | 34,4% |
| Russia | 26,8% | 28,7% |
| India | 10,1% | 10,1% |
| Poland | 5,3% | 5,3% |
| Romania | 5,2% | 5,2% |
| China | 7,5% | 7,5% |
| Czech Republic | 0,4% | 0,4% |
| Hungary | 0,1% | 0,5% |
| France | 0,8% | 0,8% |
| Korea | 0,0% | 0,2% |
| Ukraine | 0,0% | 0,2% |
| common fund | 0,0% | 6,0% |
| | 86,1% | 99,5% |

CBM Cost Matrix

and HADES Cost Matrix

please consult distributed cost matrix for all details!

All numbers refer to MSV

DEFINITIONS:
FAIR Budget = Amounts of money approved or expected from the FAIR Budget of 78 M Euro
Other sources = Amounts of money considered secured outside the FAIR Budget
Est = Existing expressions of interest by an institution
To be assigned (2005 price) = Amounts of money to be assigned to potentially interested funders agencies
Comments = All amounts mentioned hereby are indicated in 2005 prices

| PSP code | System & description | TOR of approval | year of approval | Country | funding agency | Institution | 2005 prices | | | | 2018 prices | | | | Comments | | |
|---|-------------------------------------|------------------|------------------|----------------|---|---|-----------------------|-------------------------|-------------|---------------|------------------|-----------------------------|-------------------------|-------------|----------|---------------|------------------|
| | | | | | | | assigned (2005 price) | Total Cost (2005 price) | FAIR Budget | Other sources | Est (2005 price) | To be assigned (2005 price) | Total Cost (2018 price) | FAIR Budget | | Other sources | Est (2018 price) |
| 1.1.1. CBM start version @SIS100 | | | | | | | | | | | | | | | | | |
| 1.1.1.1 | Micro Vertex Detector (MVD) | submitted | 2015 | Germany | BMWF-FG | Institut für Kernphysik, Universität Frankfurt | 1 | 914 | | | 1913 | | | | | | |
| 1.1.1.1.1 | Micro Vertex Detector (MVD) | submitted | 2015 | Germany | BMWF-FG | Institut für Kernphysik, Universität Frankfurt | 1 | 929 | 366 | 163 | 759 | 0 | 526 | 234 | 0 | | |
| 1.1.1.2 | Micro Vertex Detector (MVD) | | | France | CNRS | IPHC, IN2P3-CNRS and Université de Strasbourg | 1 | 314 | | 314 | 451 | 0 | 451 | 0 | 0 | | |
| 1.1.1.3 | Micro Vertex Detector (MVD) | | | Spain | Spanish National University | Spain National University | 1 | 71 | | 71 | 103 | 0 | 103 | 0 | 0 | | |
| 1.1.2 | Beam Tracking System (BTS) | approved in 2015 | | | | | 1 | 9504 | | | 13647 | | | | | | |
| 1.1.2.1 | Beam Tracking System (BTS) | | | Germany | BMWF / Helmholtz-Gesellschaft | GSI | 1 | 4630 | 4630 | | 6649 | 6649 | 0 | 0 | 0 | | |
| 1.1.2.2 | Beam Tracking System (BTS) | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 2115 | 2115 | | 3037 | 3037 | 0 | 0 | 0 | | |
| 1.1.2.3 | Beam Tracking System (BTS) | | | Poland | Higher Education Research and Development | ICM University of Science and Technology | 1 | 572 | 572 | | 822 | 822 | 0 | 0 | 0 | | |
| 1.1.2.4 | Beam Tracking System (BTS) | | | Poland | Science and Higher Education | Marian Smoluchowski Institute of Physics, Jagiellonian University | 1 | 707 | 707 | | 1016 | 1016 | 0 | 0 | 0 | | |
| 1.1.2.5 | Beam Tracking System (BTS) | | | Poland | Education | ICM University of Science and Technology | 1 | 261 | 261 | | 374 | 374 | 0 | 0 | 0 | | |
| 1.1.2.6 | Beam Tracking System (BTS) | | | Poland | Higher Education | Institute of Electronics Systems, WUT | 1 | 260 | 260 | | 373 | 373 | 0 | 0 | 0 | | |
| 1.1.2.7 | Beam Tracking System (BTS) | | | Germany | BMWF-FG | Physikalisches Institut, Universität Tübingen | 1 | 865 | 865 | 607 | 258 | 1242 | 0 | 872 | 370 | 0 | |
| 1.1.2.8 | Beam Tracking System (BTS) | | | Ukraine | Science | High Energy Physics Department, IHEP | 1 | 94 | | 94 | 134 | 0 | 134 | 0 | 0 | | |
| 1.1.3 | Scalor System (SCAL) | approved in 2014 | | | | | 1 | 3697 | | | 5309 | | | | | | |
| 1.1.3.1 | Scalor System (SCAL) | | | Germany | BMWF-FG | Institute für Kernphysik, Universität Gießen | 1 | 450 | | 275 | 130 | 582 | 0 | 395 | 187 | 0 | |
| 1.1.3.2 | Scalor System (SCAL) | | | Germany | BMWF-FG | Physikalisches Institut, Universität Gießen | 1 | 603 | | 531 | 71 | 866 | 0 | 702 | 102 | 0 | |
| 1.1.3.3 | Scalor System (SCAL) | | | Russia | ICAT/ATOM | MEC Karlov Institute (PNP) | 1 | 1200 | 1200 | | 1723 | 1723 | 0 | 0 | 0 | | |
| 1.1.3.4 | Scalor System (SCAL) | | | Russia | ICAT/ATOM | MEC Karlov Institute (PNP) | 1 | 250 | | 250 | 359 | 0 | 359 | 0 | 0 | | |
| 1.1.3.5 | Scalor System (SCAL) | | | to be assigned | to be assigned | to be assigned | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1.1.3.6 | Scalor System (SCAL) | | | to be assigned | to be assigned | to be assigned | 1 | 1239 | | 1239 | 1780 | 0 | 1780 | 0 | 0 | | |
| 1.1.3.7 | Scalor System (SCAL) | | | to be assigned | to be assigned | to be assigned | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1.1.3.8 | Scalor System (SCAL) | | | to be assigned | to be assigned | to be assigned | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1.1.4 | Transition Radiation Detector (TRD) | approved in 2015 | | | | | 1 | 2544 | | | 3654 | | | | | | |
| 1.1.4.1 | Transition Radiation Detector (TRD) | | | Germany | BMWF-FG | Institut für Kernphysik, Universität Frankfurt | 1 | 478 | 321 | 156 | 588 | 0 | 462 | 226 | 0 | | |
| 1.1.4.2 | Transition Radiation Detector (TRD) | | | Germany | BMWF-FG | Frankfurt | 1 | 166 | 71 | 94 | 238 | 0 | 101 | 135 | 0 | | |
| 1.1.4.3 | Transition Radiation Detector (TRD) | | | Germany | BMWF-FG | Institut für Kernphysik, Universität Münster | 1 | 498 | 321 | 167 | 701 | 0 | 461 | 240 | 0 | | |
| 1.1.4.4 | Transition Radiation Detector (TRD) | | | Germany | BMWF-FG | Physikalisches Institut, Universität Gießen | 1 | 752 | 752 | | 1090 | 1090 | 0 | 0 | 0 | | |
| 1.1.4.5 | Transition Radiation Detector (TRD) | | | Russia | MEC | IPHEP | 1 | 482 | | 482 | 693 | 0 | 693 | 0 | 0 | | |
| 1.1.4.6 | Transition Radiation Detector (TRD) | | | to be assigned | to be assigned | to be assigned | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1.1.4.7 | Transition Radiation Detector (TRD) | | | Hungary | Magyar Tudományos Akadémia | Wigner Research Center | 1 | 197 | 36 | 143 | 256 | 0 | 51 | 205 | 0 | | |
| 1.1.5 | Fast of Flight System (FFS) | approved in 2015 | | | | | 1 | 587 | | | 8611 | | | | | | |
| 1.1.5.1 | Fast of Flight System (FFS) | | | Germany | BMWF / Helmholtz-Gesellschaft | GSI | 1 | 740 | 740 | | 1063 | 1063 | 0 | 0 | 0 | | |
| 1.1.5.2 | Fast of Flight System (FFS) | | | China | Central China Normal University | College of Physical Science and Technology | 1 | 2857 | 2857 | | 4103 | 4103 | 0 | 0 | 0 | | |
| 1.1.5.3 | Fast of Flight System (FFS) | | | Germany | BMWF-FG | TU Darmstadt | 1 | 104 | | 32 | 160 | 0 | 160 | 0 | 0 | | |
| 1.1.5.4 | Fast of Flight System (FFS) | | | Germany | BMWF-FG | Frankfurt | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1.1.5.5 | Fast of Flight System (FFS) | | | Germany | BMWF-FG | Physikalisches Institut, Universität Heidelberg | 1 | 740 | | 740 | 441 | 299 | 1063 | 0 | 634 | 429 | |
| 1.1.5.6 | Fast of Flight System (FFS) | | | Russia | MEC | IPHEP | 1 | 740 | 740 | | 1074 | 1074 | 0 | 0 | 0 | | |
| 1.1.5.7 | Fast of Flight System (FFS) | | | to be assigned | to be assigned | to be assigned | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1.1.5.8 | Fast of Flight System (FFS) | | | to be assigned | to be assigned | to be assigned | 1 | 200 | | 200 | 287 | 0 | 287 | 0 | 0 | | |
| 1.1.6 | Calorimeter System | submitted | 2015 | | | | 1 | 944 | | | 1356 | | | | | | |
| 1.1.6.1 | Calorimeter System | | | Russia | ICAT/ATOM | TEP | nd | 2605 | | 2605 | 4029 | | 4029 | | | | |
| 1.1.6.2 | Calorimeter System | | | Germany | BMWF-FG | GSI | 1 | 944 | | 944 | 1356 | | 1356 | | | | |
| 1.1.6.3 | Calorimeter System | | | Germany | ICAT/ATOM | MEC | 1 | 779 | 779 | | 1117 | 1117 | 0 | 0 | 0 | | |
| 1.1.6.4 | Calorimeter System | | | Czech Republic | BMWF-FG | Czech Technical University (CTU) | 1 | 83 | 83 | | 119 | 0 | 119 | 0 | 0 | | |
| 1.1.6.5 | Calorimeter System | | | Czech Republic | BMWF-FG | CTU | 1 | 83 | 83 | | 119 | 0 | 119 | 0 | 0 | | |
| 1.1.7 | Scalor MGMT | approved in 2015 | | | | | 1 | 3758 | 3758 | | 5396 | 5396 | | | | | |
| 1.1.7.1 | Scalor MGMT | | | Russia | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 3758 | 3758 | | 5396 | 5396 | | | | | |
| 1.1.8 | Online Systems (DAQ and FLS) | submitted | 2015 | | | | 1 | 2259 | | | 3243 | | | | | | |
| 1.1.8.1 | Online Systems (DAQ and FLS) | | | Germany | BMWF-GSI | GSI | 1 | 881 | 881 | | 1266 | 0 | 1266 | 0 | 0 | | |
| 1.1.8.2 | Online Systems (DAQ and FLS) | | | Germany | BMWF-FG | Frankfurt | 1 | 71 | 71 | | 102 | 0 | 102 | 0 | 0 | | |
| 1.1.8.3 | Online Systems (DAQ and FLS) | | | Germany | BMWF-FG | Frankfurt | 1 | 40 | | 40 | 57 | 0 | 57 | 0 | 0 | | |
| 1.1.8.4 | Online Systems (DAQ and FLS) | | | Poland | Science and Higher Education | Institute of Systems Systems, WUT | 1 | 203 | 200 | | 287 | 287 | 0 | 0 | 0 | | |
| 1.1.8.5 | Fast Level Event Detector (FLED) | | | to be assigned | to be assigned | to be assigned | 1 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | | |
| 1.1.8.6 | Fast Level Event Detector (FLED) | | | Germany | BMWF-FG | University Frankfurt/Institut für Kernphysik, Universität Frankfurt | 1 | 704 | 704 | | 1010 | 0 | 1010 | 0 | 0 | | |
| 1.1.8.7 | Fast Level Event Detector (FLED) | | | Germany | BMWF-FG | University Frankfurt/Institut für Kernphysik, Universität Frankfurt | 1 | 303 | | 303 | 521 | 0 | 521 | 0 | 0 | | |
| 1.1.9 | Infrastructure | submitted | 2015 | | | | 1 | 2273 | | | 3264 | | | | | | |
| 1.1.9.1 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 2273 | | 2273 | 3337 | | 3337 | | | | |
| 1.1.9.2 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 425 | 425 | | 611 | 611 | | | | | |
| 1.1.9.3 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 217 | 217 | | 308 | 308 | | | | | |
| 1.1.9.4 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 207 | 207 | | 292 | 292 | | | | | |
| 1.1.9.5 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 224 | 224 | | 314 | 314 | | | | | |
| 1.1.9.6 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 242 | 242 | | 347 | 347 | | | | | |
| 1.1.9.7 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 433 | 433 | | 621 | 621 | | | | | |
| 1.1.9.8 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 198 | 198 | | 284 | 284 | | | | | |
| 1.1.9.9 | Infrastructure | | | Germany | ICAT/ATOM | Joint Institute for Nuclear Research, Leningrad Region | 1 | 147 | 147 | | 211 | 211 | | | | | |
| Total amounts CBM Phase 1 setup | | | | | | | 40693 | 22801 | 9833 | 7860 | 200 | 58436 | 32743 | 14120 | 11286 | 287 | 80,2% |
| Total amounts CBM day 1 setup | | | | | | | 37525 | 22801 | 9833 | 4691 | 200 | 53886 | 32743 | 14120 | 6737 | 287 | 87,0% |

This calculation uses an escalation factor of 1.436 between 2005 prices and 2018 prices

| PSP code | System & description | TOR of approval | year of approval | Country | funding agency | Institution | Component related to FAIR Phase | 2005 prices | | | | 2018 prices | | | | Comments |
|--|----------------------------|------------------|------------------|----------------|------------------------------|---|---------------------------------|-----------------------|-------------------------|-------------|---------------|------------------|-----------------------------|-------------------------|-------------|----------|
| | | | | | | | | assigned (2005 price) | Total Cost (2005 price) | FAIR Budget | Other sources | Est (2005 price) | To be assigned (2005 price) | Total Cost (2018 price) | FAIR Budget | |
| 1.1.2. HADES@SIS100 (FAIR Phase 1) and HADES@SIS18 (FAIR Phase 0) | | | | | | | | | | | | | | | | |
| 1.1.2.1 | Mechanics and Installation | | | | | | FAIR Phase 1 | 245 | | | | | 352 | | | |
| 1.1.2.1.1 | Mechanics and Installation | | | Germany | BMWF-GSI | GSI | FAIR Phase 1 | 6 | | 6 | | | 9 | | 9 | |
| 1.1.2.1.2 | Mechanics and Installation | | | Czech Rep. | MEPST | MEPST | FAIR Phase 1 | 153 | | | 153 | | 220 | | 220 | |
| 1.1.2.1.3 | Mechanics and Installation | | | EU | Common Fund | Common Fund | FAIR Phase 1 | 86 | | | 86 | | 123 | | 123 | |
| 1.1.2.2 | Cryo Infrastructure | | | | | | FAIR Phase 1 | 69 | | | 69 | | 99 | | 99 | |
| 1.1.2.3 | HADES Calorimeter (SCAL) | approved in 2014 | | | | | | 1250 | | | | | 1796 | | | |
| 1.1.2.3.1 | SCAL main frame | | | Poland | Science and Higher Education | Marian Smoluchowski Institute of Physics, Jagiellonian University | FAIR Phase 0 | 200 | 200 | | | | 287 | 287 | 0 | |
| 1.1.2.3.2 | SCAL Rail System | | | Germany | BMWF-GSI | GSI | FAIR Phase 0 | 25 | 25 | | | | 36 | 36 | 0 | |
| 1.1.2.3.3 | SCAL Infrastructure | | | Czech Rep. | MEPST | MEPST | FAIR Phase 0 | 293 | | | | | 421 | | 421 | |
| 1.1.2.3.3.1 | SCAL Infrastructure | | | Germany | BMWF-FG | TU Darmstadt | | 66 | | | | | 84 | | 84 | |
| 1.1.2.3.3.2 | SCAL Infrastructure | | | Russia | MEPST | MEPST | | 21 | | 21 | | | 31 | | 31 | |
| 1.1.2.3.3.3 | SCAL Infrastructure | | | Germany | BMWF-FG | TU Darmstadt | | 66 | | | | | 84 | | 84 | |
| 1.1.2.3.4 | SCAL 3 inch PMTs | | | Germany | BMWF-GSI | GSI | FAIR Phase 1 | 159 | | 159 | | | 228 | | 228 | |
| 1.1.2.3.4.1 | SCAL 3 inch PMTs | | | Germany | TU Munich | TU Munich | | 21 | | 21 | | | 31 | | 31 | |
| 1.1.2.3.4.2 | SCAL 3 inch PMTs | | | Germany | TU Darmstadt | TU Darmstadt | | 13 | | 13 | | | 18 | | 18 | |
| 1.1.2.3.4.3 | SCAL 3 inch PMTs | | | Czech Rep. | MEPST | MEPST | | 390 | | 70 | 320 | | 560 | | 101 | |
| 1.1.2.3.4.5 | SCAL 3 inch PMTs | | | to be assigned | to be assigned | to be assigned | | 62 | | 62 | | | | | | |

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) |

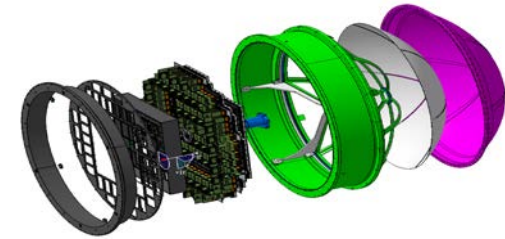
Status CBM in-kind contracts (other shareholders)

| 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 | Signing in process |
| STS | JU, Crakow | Sensors and assembly | 707 | 28.06.2016 | In preparation |
| STS | AGH, Crakow | Front End Boards, test procedures for STS- XYTER chip and FEE | 261 | 28.06.2016 | Signing in process |
| STS | GSI, Germany | STS system | 4630 | 28.06.2016 | Signed |
| HADES | JU, Crakow, Poland | HADES ECAL Mechanical frame | 200 | 30.06.2015 | Signed <small>(frame delivered and installed in HADES cave)</small> |
| 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 (draft) |
| TOF | GSI, Germany | FEE | 740 | 28.06.2016 | In preparation |
| MUCH | VECC, Kolkata <small>+12 Indian Institutes</small> | GEM chambers and FEE | 3790 | 10.12.2015 | In preparation (draft) |

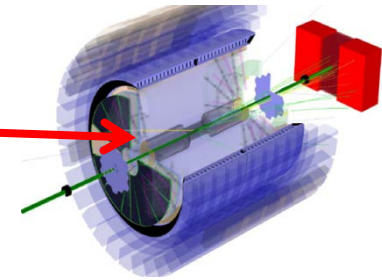
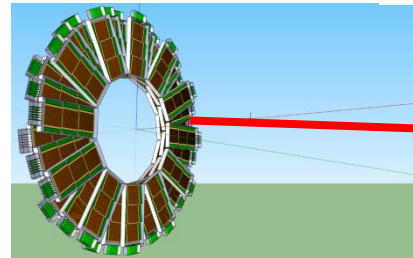
CBM – FAIR Phase 0 projects (2018 – 2024)



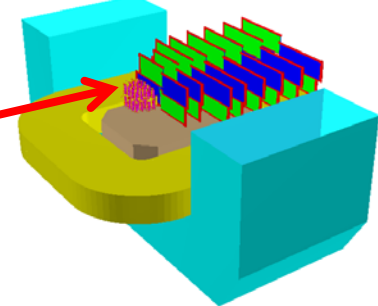
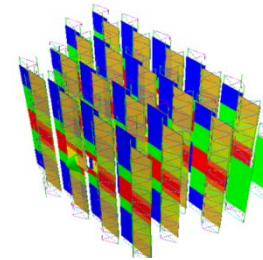
1. Install, commission and use 430 out of 1100 CBM RICH multi-anode photo-multipliers (MAPMT) including FEE in HADES RICH photon detector



2. Install, commission and use 10% of the CBM TOF modules including read-out chain at STAR/RHIC (BES II 2019/2020)

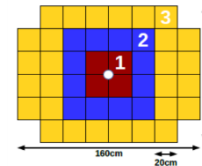


3. Upgrade BM@N experiment with 4 Silicon stations of CBM/STAR design in the BM@N experiment at the electron-positron collider JINR/Dubna (Au-beams in later years)

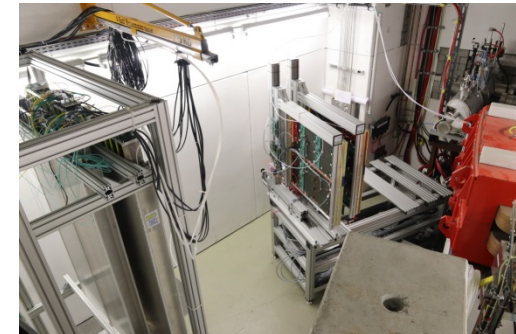


no additional core invest needed!

4. Install, commission and use the Project Spectator Detector at the BM@N experiment



5. mini CBM (mCBM@SIS18) demonstrator for full CBM data taking and analysis chain

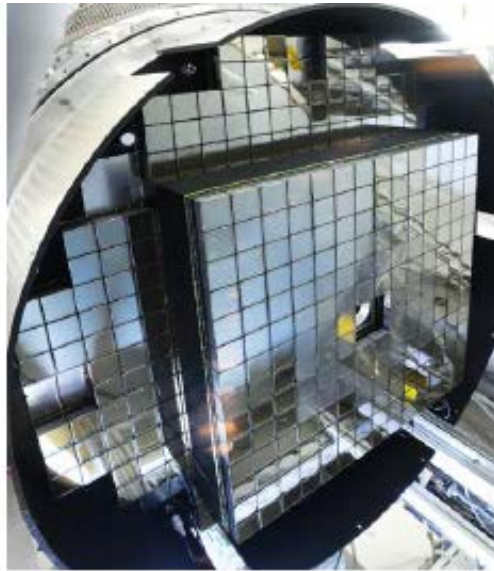


A success story: Usage of CBM funded detectors beforehand in HADES

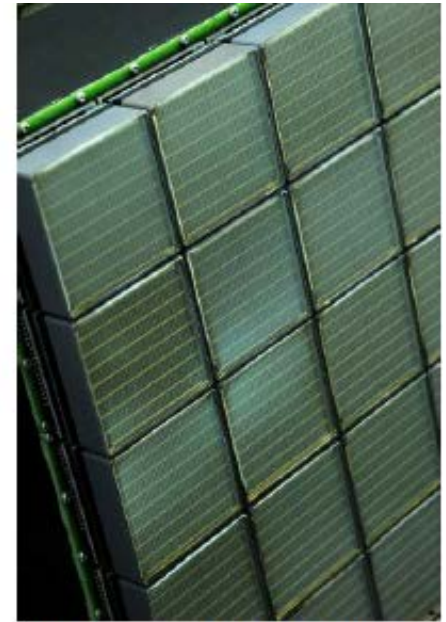
Win-win situation – efficient use of funding
Sharing of MAPMTs after 2025 between CBM and HADES possible (plug in – plug out)



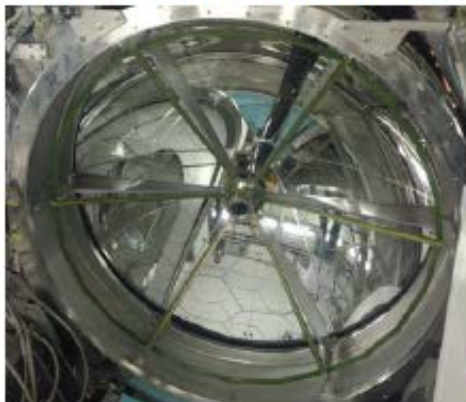
New photon detector flange
after installation of PMT backplanes



... and after installation of the
first 396 MAPMTs



Close-up of MAPMTs
mounted on backplanes



HADES RICH mirror with
CaF window in front

photos by G. Otto, GSI

Summary CBM Costs and Funding

The CBM collaboration has defined the “day 1“ setup, which will be operational, when the SIS100 beam will be switched on in 2025 (present planning), and which is funded to about 90% at present.

The total cost of the CBM day 1 version (37,53 M€ in 2005 prices) is reduced by 0,36 M€ (2005 prices) compared to the RRB7 estimate (37,89 M€ in 2005 prices), because the costs for operating the DAQ/FLES online system at full bandwidth (10 MHz event rate) is shifted to the phase 1 setup of the CBM experiment.

Conclusion:

- **The CBM day 1 setup has 87% secured funding (93% with Common Fund)**
- The CBM start version (including ECAL and the full bandwidth of the DAQ/FLES) has 80,2% secured funding (85,8% with Common Fund)

HADES Timeline

Upgrade phase, preparation for SIS18 (FAIR phase 0)

Until 2018: Installation of CBM/HADES photo-detector for RICH, ECAL detector

2019: Installation Forward detector

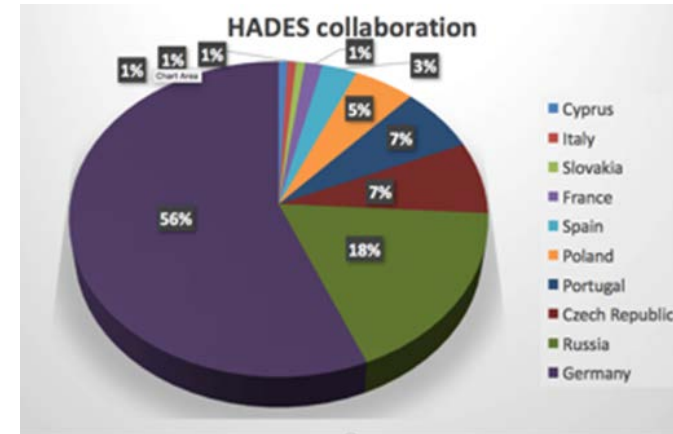
2020: Installation MDC readout upgrade

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

- we plan three long runs, e.g.:
 - $\pi^+(\text{CH}_2)_n/\text{LH}_2$: 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

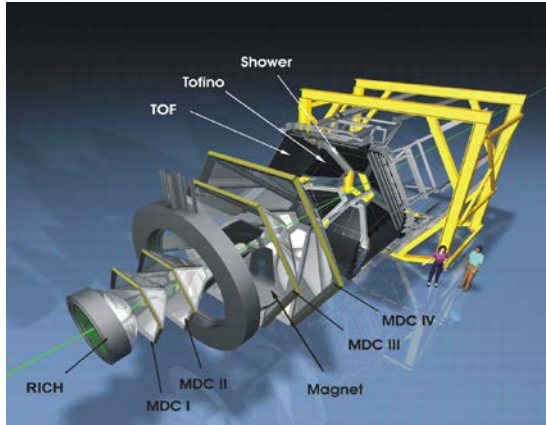
2025 on (HADES at SIS100)

- 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 |

HADES Spectrometer



RICH Upgrade



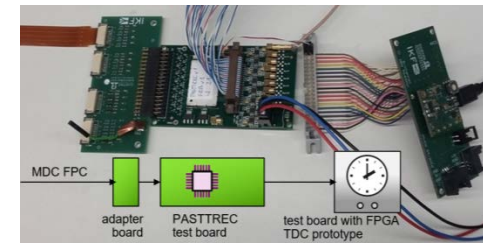
HADES Calorimeter



- ✓ **RICH (HADES/CBM phase 0 project) – finished, ready for beam**
 - 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.
- ✓ **Electromagnetic Calorimeter – 4 sectors ready for beam in 2019**
 - π^0 and η decays into $\gamma\gamma$ 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
- ✓ **MDC readout upgrade – Installation in 2020**
 - Multi-hit TDC (TRB based) – essential for high rate experiments
 - Read-out trigger rate increase from 50 kHz to 200 kHz
- ✓ **Forward Detector (HADES/PANDA phase 0 project) – installation in 2019**
 - Enhance HADES capabilities for exclusive channels – forward region
 - Hyperon production and EM decays
 - PID via TOF, dE/dx (straw tube) – no magnetic field

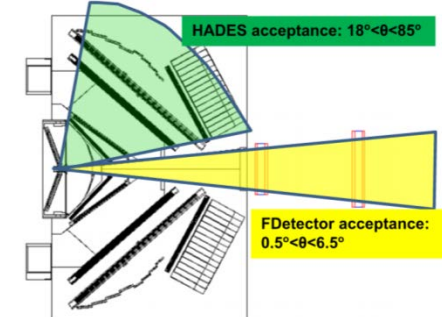
MDC readout upgrade

Installation in 2020



Forward Detector –

Installation in 2019



HADES upgrade costs

Status HADES experiment funding (FAIR phase 0 (@SIS18) & FAIR phase 1 (@SIS100))

| detector / system | Prices, K Euro | | | | | | | | funded in FAIR Phase |
|---------------------------------------|------------------------|----------------|------------|----------------|------------------------|----------------|-------------|----------------|----------------------|
| | 2005 prices | | | | 2018 prices | | | | |
| | total cost 2005 prices | Secured amount | Eol | To be assigned | total cost 2018 prices | Secured amount | Eol | To be assigned | |
| Mechanics and Installation | 245 | | 245 | | 352 | | 352 | | Phase 1 |
| Cryo Infrastructure | 69 | | 69 | | 99 | | 99 | | Phase 1 |
| HADES Calorimeter | 605 | 584 | 21 | | 869 | 838 | 31 | | Phase 0 |
| HADES Calorimeter (3" PMTs) | 645 | 263 | 320 | 62 | 927 | 378 | 460 | 89 | Phase 1 |
| Readout Electronics Modification | 168 | | | 168 | 242 | | | 242 | Phase 1 |
| MDC Plane II | 207 | | | 207 | 297 | | | 297 | Phase 1 |
| MDC FEE | 214 | 197 | 17 | | 308 | 283 | 25 | | Phase 0 |
| RICH Upgrade | 43 | 43 | | | 61 | 61 | | | Phase 0 |
| Forward Detector | 257 | 232 | 24 | | 368 | 334 | 35 | | Phase 0 |
| SUM HADES (FAIR phase 0&1) | 2453 | 1319 | 696 | 437 | 3522 | 1894 | 1000 | 628 | 53,8% |
| SUM HADES@SIS18 (FAIR phase 0) | 1118 | 1056 | 63 | 0 | 1606 | 1516 | 90 | 0 | 94,4% |

percentage secured

This calculation uses an escalation factor of 1.436 between 2005 prices and 2018 prices.

1. Costs of HADES RICH upgrade of ~1311 k€ as FAIR-Phase-0 activity @SIS18 included in CBM RICH project (additional funding CBM Wuppertal, Giessen and CBM GSI (40% (plus spares) of CBM MAPMTs
2. Additional funding from PANDA FZJ for the Forward Detector

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 | 352 | 9 | | | 220 | | | | | | | 123 | | |
| Cryo Infrastructure | 99 | 99 | | | | | | | | | | | | |
| HADES Calorimeter | 869 | 36 | | 94 | 421 | 0 | 287 | | | | 31 | | | |
| HADES Calorimeter (3" PMTs) | 927 | 259 | | 18 | 101 | 460 | | | | | | | 89 | |
| Readout Electronics Modification | 242 | | | | | | | | | | | | 242 | |
| MDC Plane II | 297 | | | | | | | | | | | | 297 | |
| MDC FEE | 308 | | 25 | 283 | | | | | | | | | | |
| RICH Upgrade | 61 | 61 | | | | | | | | | | | | |
| Forward Detector | 368 | 36 | | | | | 154 | 103 | 42 | 0 | 35 | | | |
| | 3522 | | | | | | | | | | | | | |
| Sum in 2018 k€ | 3522 | 392 | 133 | 396 | 521 | 679 | 287 | 154 | 103 | 42 | 0 | 65 | 123 | 628 |
| Sum in 2005 k€ | 2453 | 273 | 92 | 276 | 363 | 473 | 200 | 107 | 71 | 29 | 0 | 45 | 86 | 437 |
| escalation factor (1./1.436) | | | | | | | | | | | | | | |

This calculation uses an escalation factor of 1.436 between 2005 prices and 2017 prices

1,436

amounts in green are considered as secured
amounts in blue - Expression of Interest (Eol)
amounts in red - to be assigned

Secured Czech Contribution to HADES increased by 117k€ (2005 prices) and by 402k€ (2005 prices) for Eol since the 7th RRB.

Summary HADES Costs and Funding

The total cost of the HADES upgrade (FAIR phase 0 (SIS18) and FAIR phase 1 (SIS100)) of 2,453 M€ (2005 prices) is almost unchanged.

- The HADES upgrade for SIS18 (total costs in 2005 prices is 1,118 M€) has 94,4% secured funding.
- The full HADES upgrade costs including the moving to the CBM cave at SIS100 has 53,8% secured funding at present, mainly because the ECAL instrumentation with new 3" Photomultiplier is not fully funded yet.

Next steps

HADES: Take data at SIS18

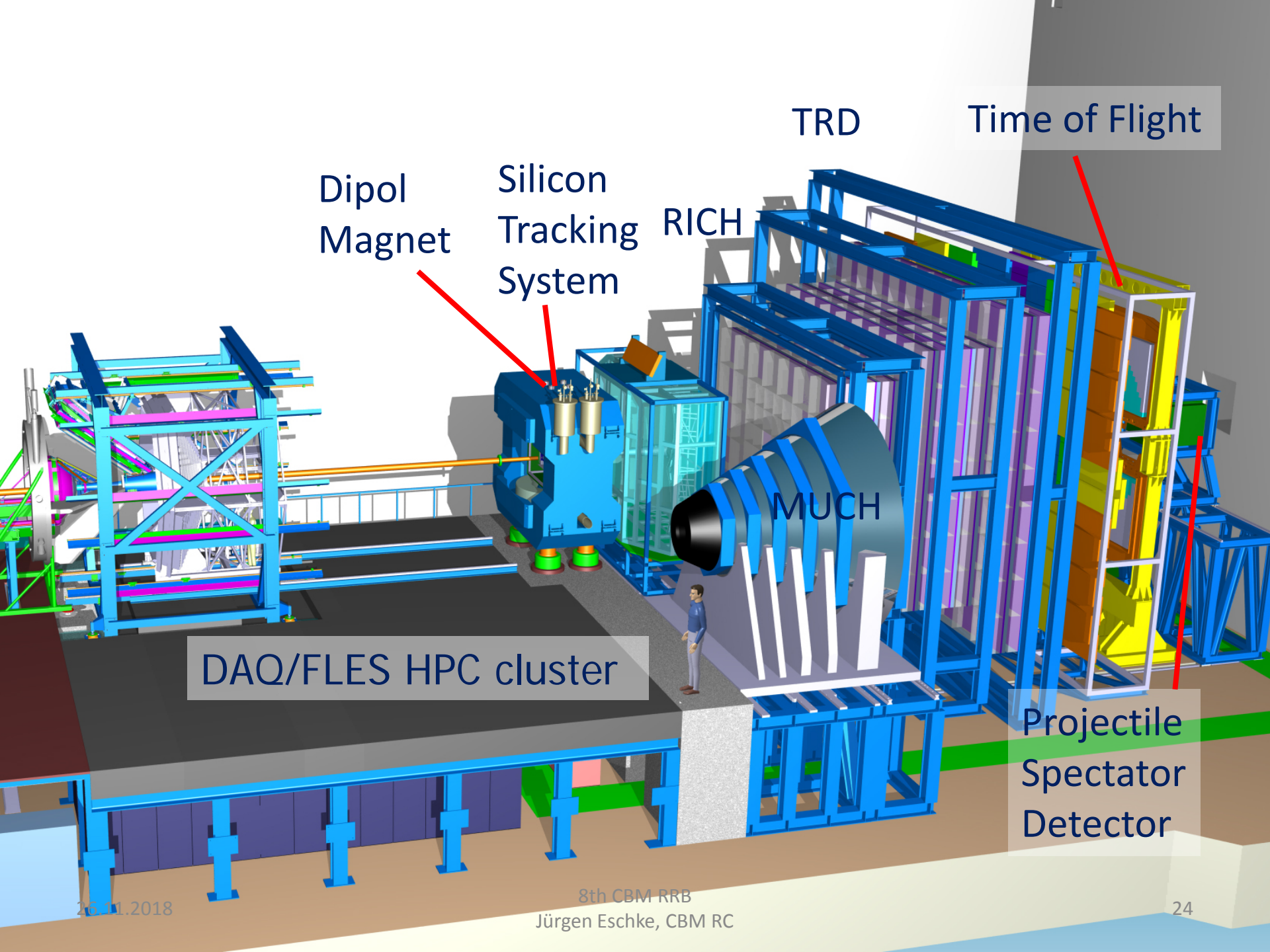
CBM:

- finalize and sign missing collaboration and in-kind contracts
- efforts to fully secure the funding for CBM day-1 setup
- CBM construction MoU (next talk) → start signing process soon



**Thank you for your
attention!**

Backup slides



Dipol Magnet

Silicon Tracking System

RICH

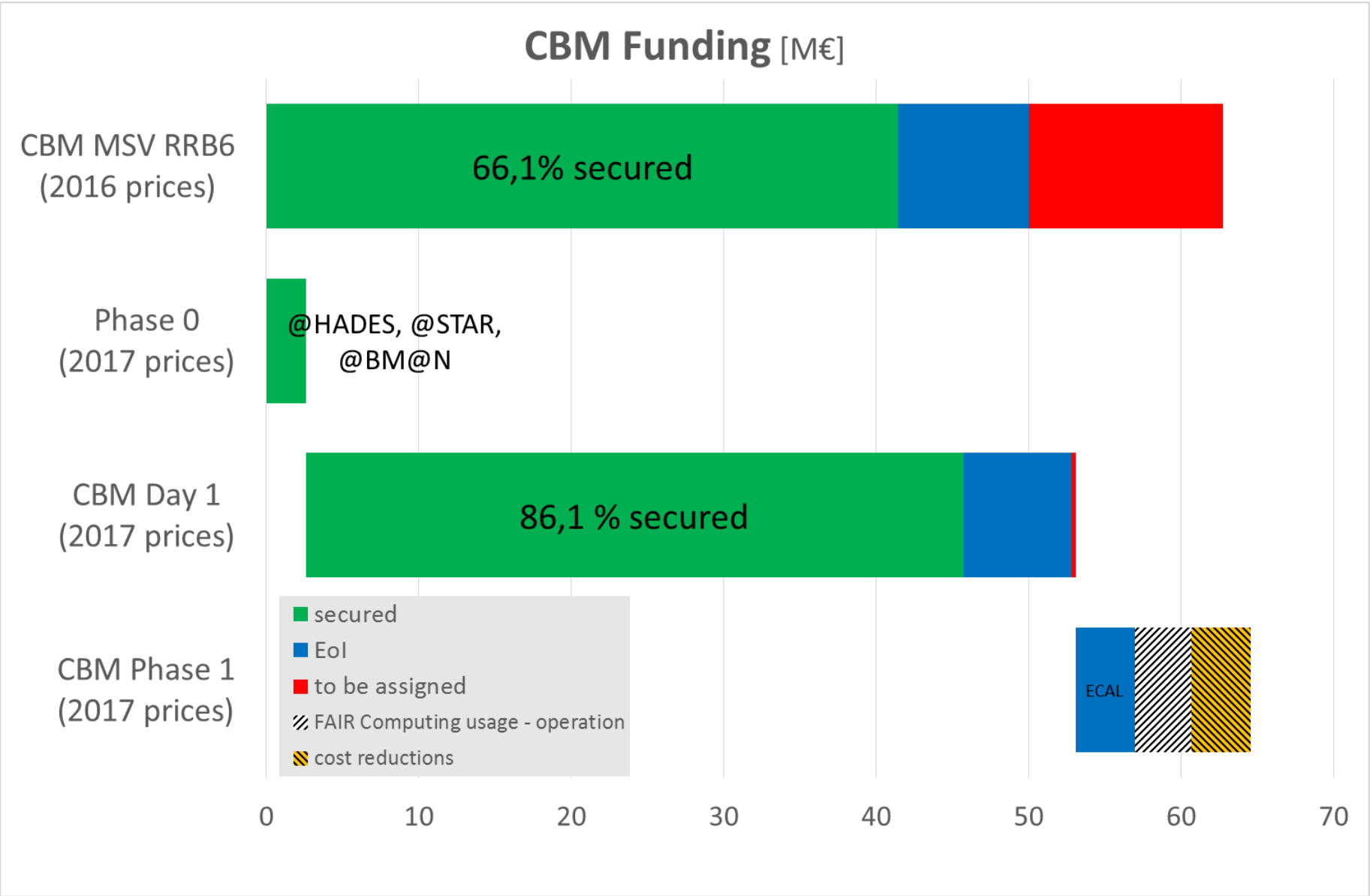
TRD

Time of Flight

MUCH

DAQ/FLES HPC cluster

Projectile Spectator Detector



Costs and funding of CBM phase 0 activities

| Phase 0 Activity | Hardware k€ |
|---|--------------------|
| HADES RICH | 1311 ¹⁾ |
| STAR TOF | 467 ¹⁾ |
| STAR FLES | --- |
| Upgrade BM@N experiment with 4 Silicon stations of CBM/STS design | 3250 ²⁾ |
| PSD at BM@N | 800 ¹⁾ |
| mCBM@SIS18 CBM full system test setup | 389 ³⁾ |

no additional core invest needed !

- 1) Funding secured by CBM funds 2) Funding provided by JINR Dubna
 3) preparation cave, platforms and DAO – funding secured

New escalation factor – decision of the FAIR council summer 2017

| Year | new Inflation Factor |
|--------------|-------------------------------------|
| 2005 | 1,000 |
| 2008 | 1,164 |
| 2009 | 1,104 |
| 2010a | 1,138 |
| 2010b | 1,138 |
| 2011 | 1,204 |
| 2012 | 1,220 |
| 2013 | 1,227 |
| 2014 | 1,224 |
| 2015 | 1,211 |
| 2016 | 1,364 |
| 2017 | 1,400 |
| 2018 | 1,436 |
| 2019 | 1,474 |
| 2020 | 1,513 |
| 2021 | 1,552 |
| 2022 | 1,593 |
| 2023 | 1,635 |
| 2024 | 1,677 |
| 2025 | 1,721 |

HADES construction Costs (completion in year 2000)

| HADES system | total cost [in 1998 Euros, (DM/2)] | GSI | Collaboration Members | Other |
|-----------------------------------|------------------------------------|------|-----------------------|-------|
| RPC | 1100 | - | 1100 (EU) | - |
| Magnet | 2150 | 2150 | - | - |
| Forward Wall | 400 | 50 | 150 | 200 |
| MDC | 2300 | 140 | 2160 | |
| RICH | 1500 | - | 1500 | - |
| TOF | 1050 | - | 1050 | - |
| Shower | 390 | - | 390 | - |
| Infrastructure costs not included | | | | |
| | 8890 | 2340 | 6350 | 200 |

Taking into account the total construction costs of HADES, the level of funding rises to:

HADES (Phase 0): 98,6%
 HADES (Phase 1): 89,5 %

All numbers in kEUR (DM/2), based on 1998 DM prices

Status CBM/HADES Technical Design Reports November 2018

| 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 2019 |
| 9a | Online Systems: Data Acquisition (DAQ) | submission 2019 |
| 9b | Online Systems: First Level Event Selection (FLES) | submission 2020 |
| 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 | | | 09/2023 | |
| | Silicon Tracking System (STS) | | 9504 | | | 02/2024 | |
| | Ring Image Cherenkov Detector (RICH) | | 3697 | | | 07/2023 | |
| | Muon Detector (MUCH) | | 6138 | | | 03/2024 | |
| | Transition Radiation Detector (TRD) | | 2544 | | | 01/2024 | |
| | Time of Flight System (TOF) | | 5857 | | | 12/2023 | |
| | Projectile Spectator Detector (PSD) | | 944 | | | 11/2021 | |
| | Dipol Magnet | | 3758 | | | 09/2022 | |
| | Online Systems (DAQ and FLES) | | 1896 | | | 06/2023 | |
| | Infrastructure | | 2273 | | | 01/2023 | |
| | | 86% <i>value weighted</i> | 37525 | 87% <i>secured</i> | 9% <i>value weighted</i> | | |
| Phase-0 (SIS18) & Day-1 (SIS100) | HADES upgrade | | 2453 | | | 03/2023 | |