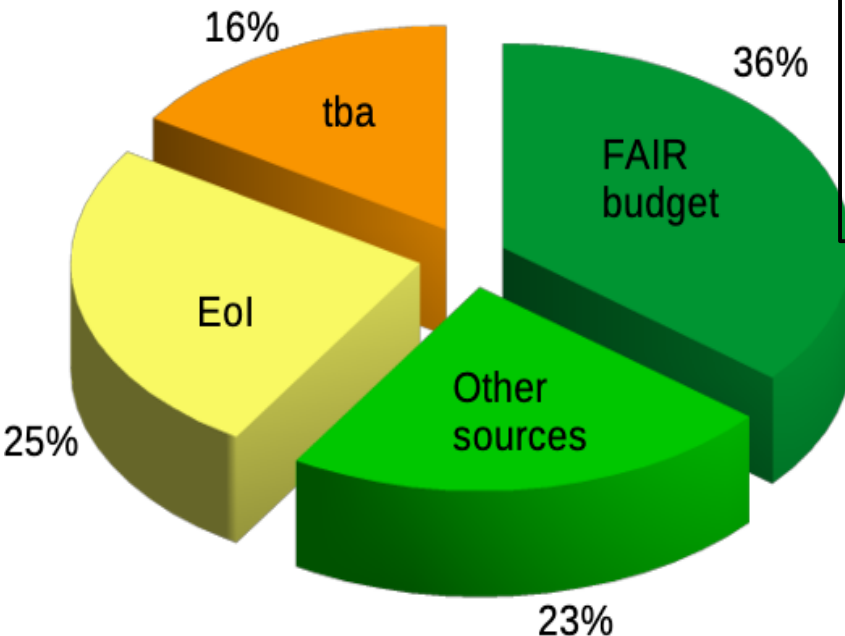


# PANDA - General Status (mostly unchanged)



[Covid 19] ... **Ukraine war** → collaboration with Russia (2<sup>nd</sup> largest FAIR-shareholder) suspended → severe funding / resource shortfalls

**Day-1 Setup**  
**50382 M€ [2005] = 100%**



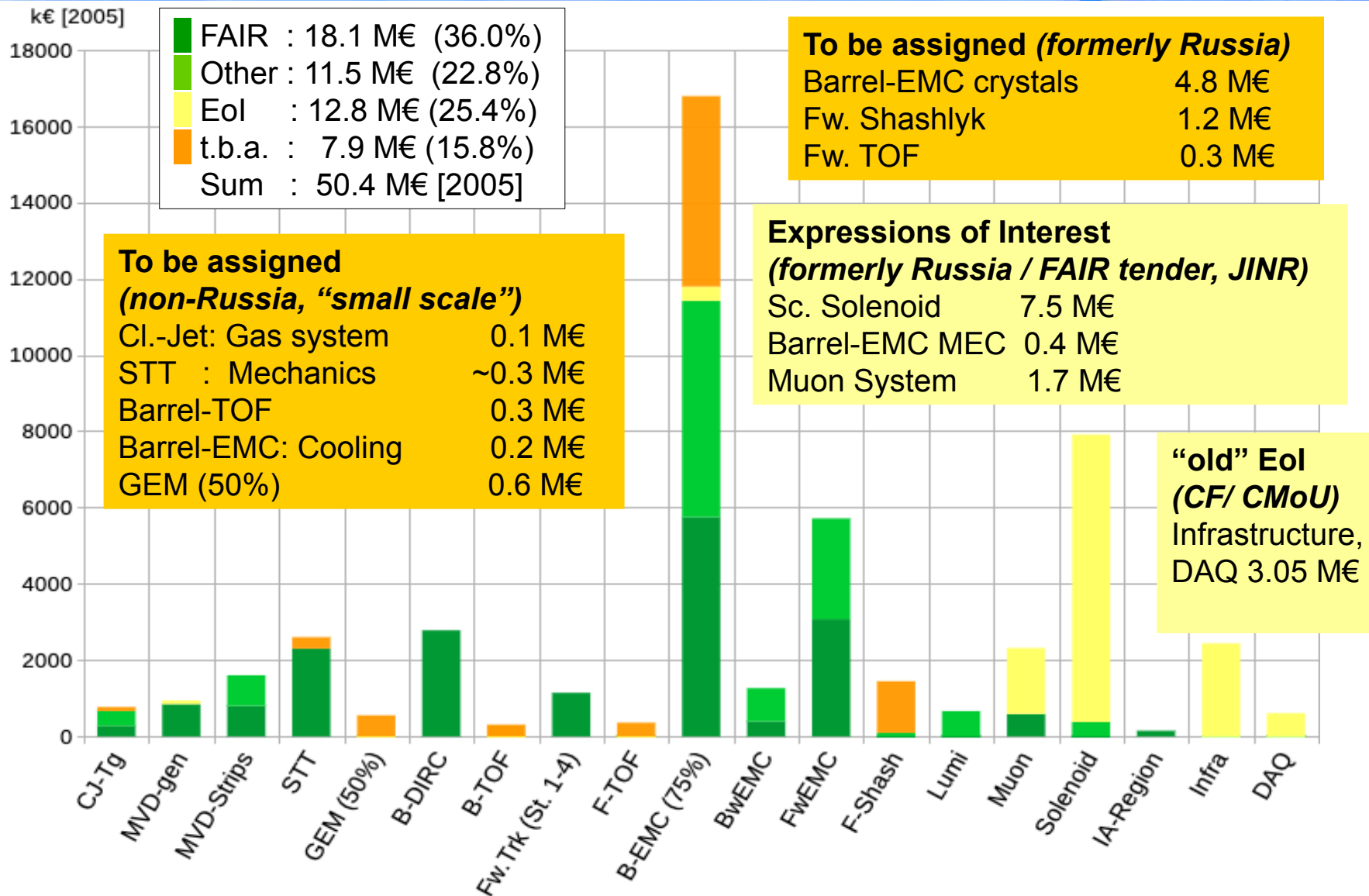
- **FAIR-Review 2022: PANDA physics unique!**
- **FAIR Council: MSV final goal!**
- but staging in between: ES, FS (FS+), not yet PANDA
- antiproton chain (HESR building, CR, pLinac, PANDA setup) “frozen”
- mitigating actions → work in progress cont'd ... reshape path to the “real” PANDA

Day-1 setup criteria

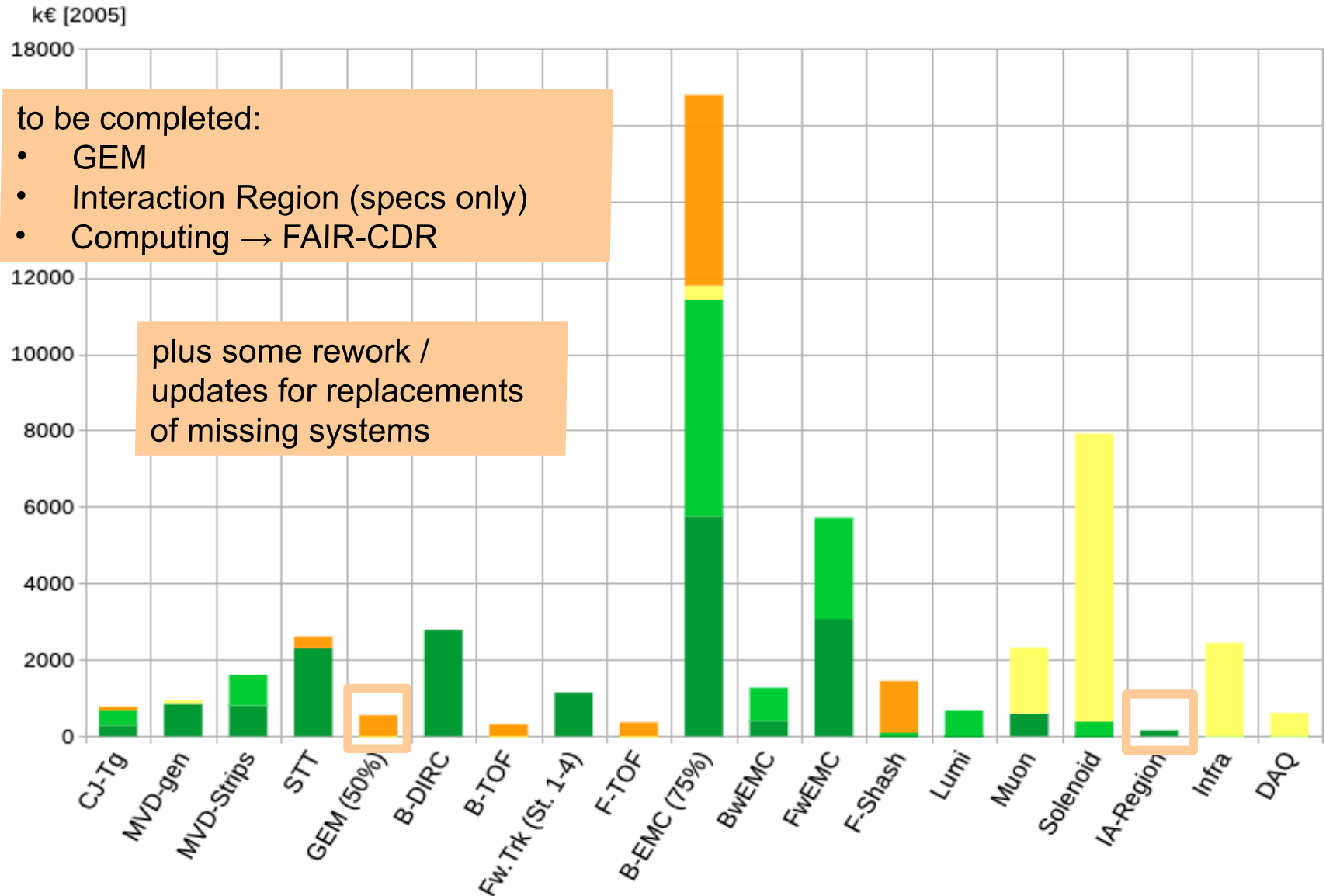
- readiness for 1<sup>st</sup> physics
- *high level of secured funding*  
→ to be regained only once missing contributions replaced

- **German Universities** collaborative funding (“Verbundforschung”) supports usage of PANDA detectors at other experiments in 2024 - 27 period
- **COSY decommissioned** after final beamtime in autumn 2023.
  - Agreement with GSI on cave & beamtime for PANDA remainders
  - Usage of COSY at FAIR as antiproton accumulator in discussion
- Former **LHCb Outer Tracker** donated and delivered to GSI.  
Re-use for forward tracking and muon detection under investigation
- **EMC crystals:** Persisting risk of losing sole manufacturer Crytur (CZ)
  - currently engaged in PWO crystals for EIC
  - no funds for PANDA crystals from Russia
- **New group** from Osaka University, Japan

# Day-1 Setup: Financial Status of Subsystems



# Day-1 Setup: TDR Coverage



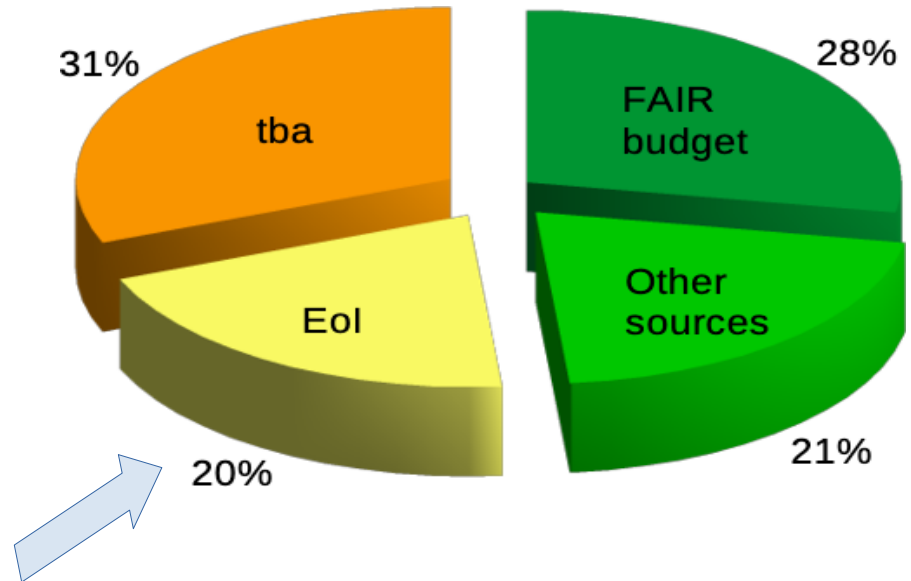
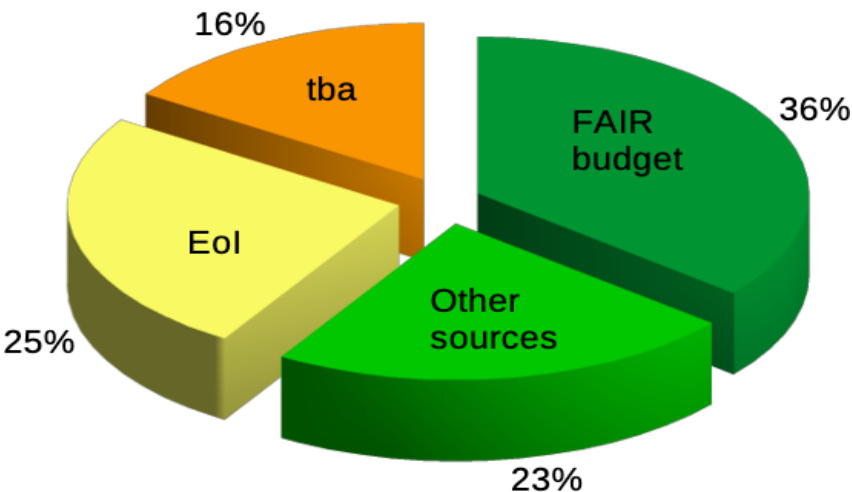
# Day-1 Setup → MSV aka Phase-2 aka Full Setup

## MSV / Phase-2:

- 65.1 M€ [2005]
- 49% secured
- Full setup (w/ Pellets, FT 5+6, Fw. Cer's., Hyp. N)

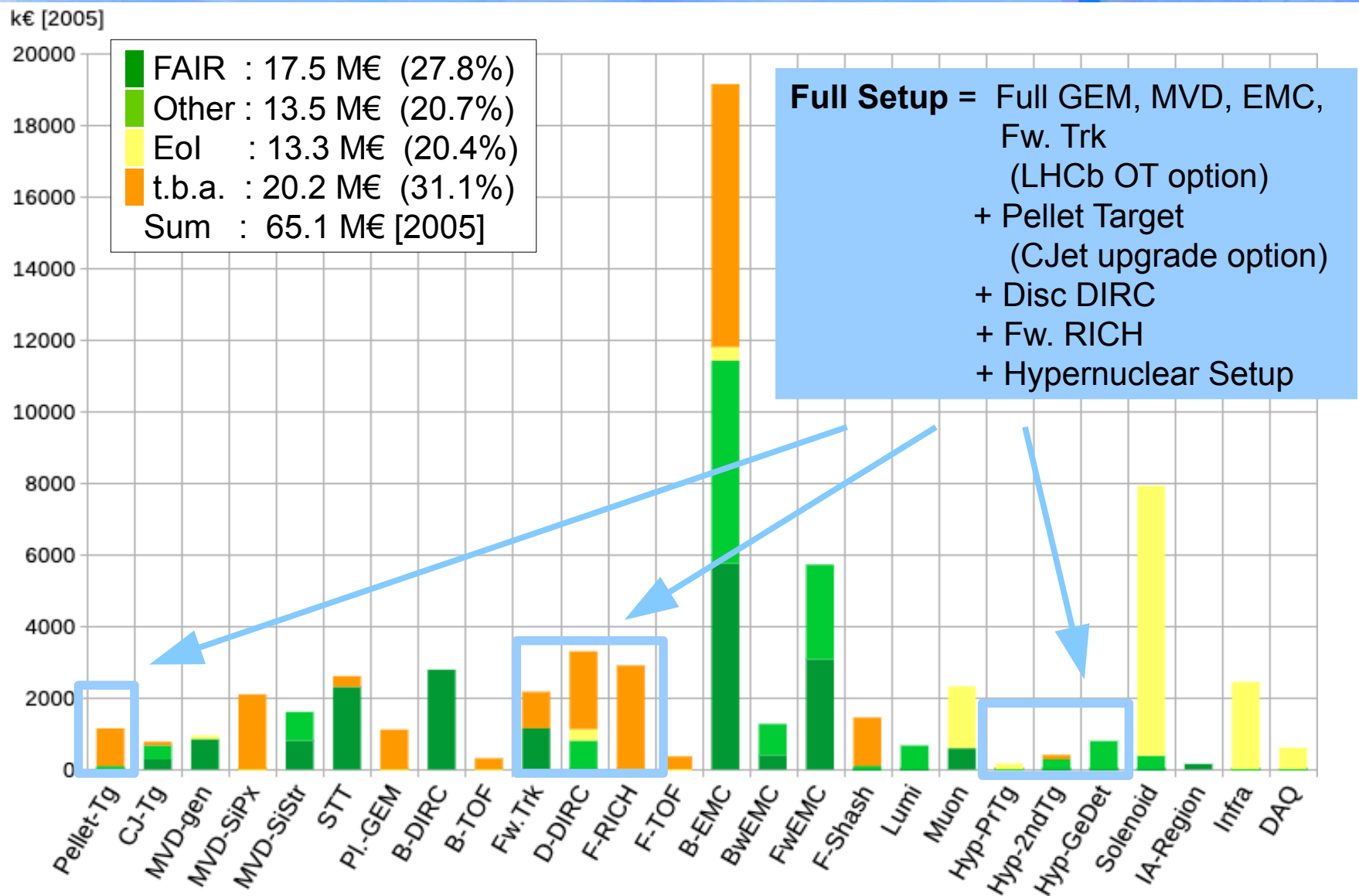
## Day-1:

- 50.4 M€ [2005]
- 59% secured
- 75% B-EMC, 50% GEM, MVD-Strips





# MSV / Phase-2: Financial Status of Subsystems



# PANDA Members



## PANDA members

320 in total, distributed over 17 countries

Germany, 175, 54.7%  
(62 HGF, 113 Univ.)

India	3	0.9 %
Switzerland	2	0.6 %
Austria	2	0.6 %
Netherlands	1	0.3 %
Romania	1	0.3 %
France	1	0.3 %
Japan	1	0.3 %

Poland, 37, 11.6%

China, 21, 6.6%

Italy, 21, 6.6%

Sweden, 15, 4.7%

Czech Republic, 13, 4.1%

Thailand, 9, 2.8%

Turkey, 8, 2.5%

U.S.A., 6, 1.9%

UK, 4, 1.3%

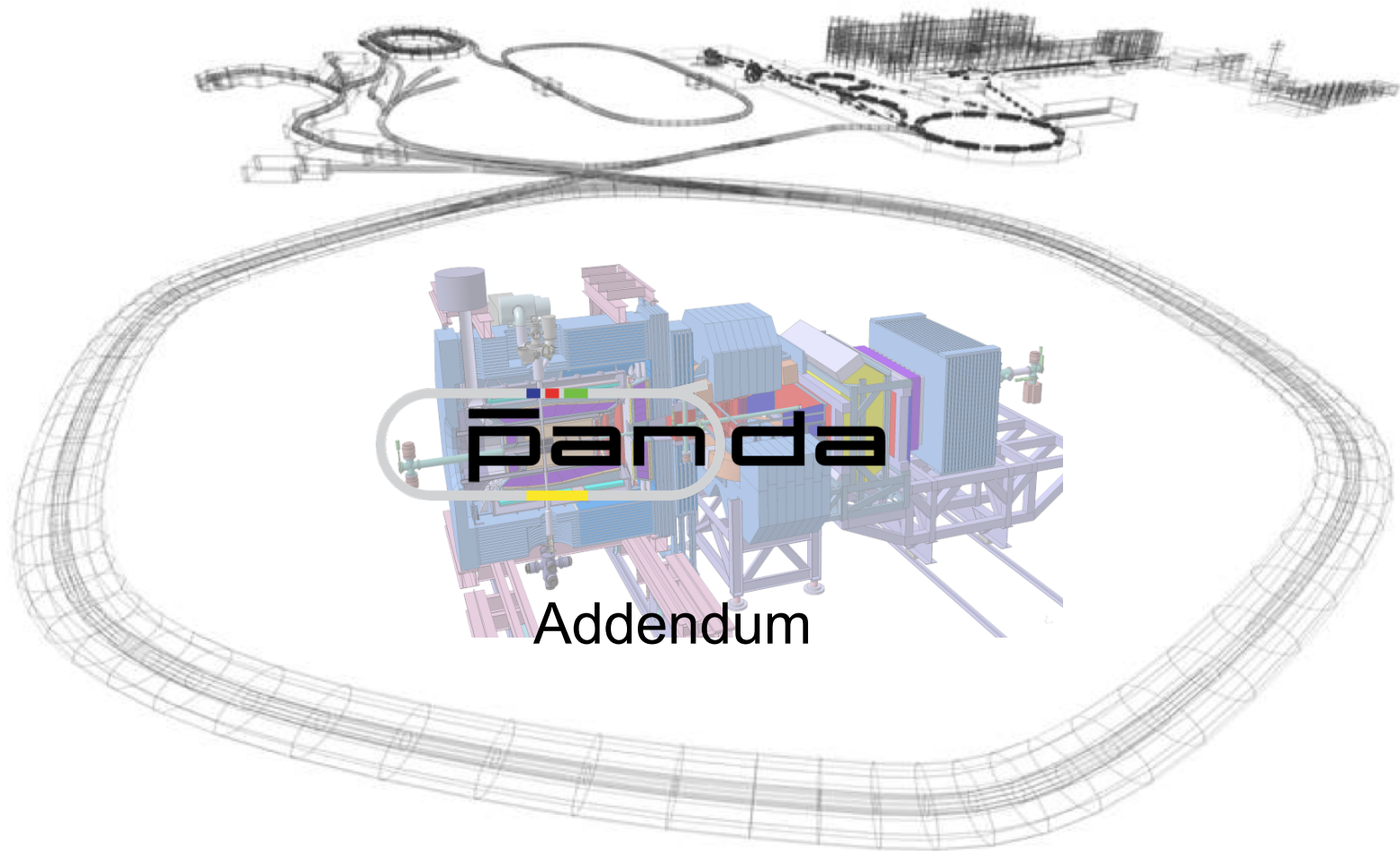


- PANDA: Excellent science, reconfirmed by 2022 FAIR-Review
  - 1<sup>st</sup> antiproton run in ~2032 for unique physics
- Path towards PANDA @FAIR
  - appropriate funding decisions 2025/26 required
  - intermediate program with existing systems & expertise (people!)
    - at other labs (HADES/GSI, A1/MAMI, CB/ELSA, JLAB)
    - precursor experiment at FAIR
  - synchronized for convergence towards “real” PANDA
- Watch (and make use of) opportunities
  - COSY (+ AA ?) as CR / RESR replacement
  - ZEUS superconducting solenoid
  - HERA B calorimeter

Commitment of funding needed!

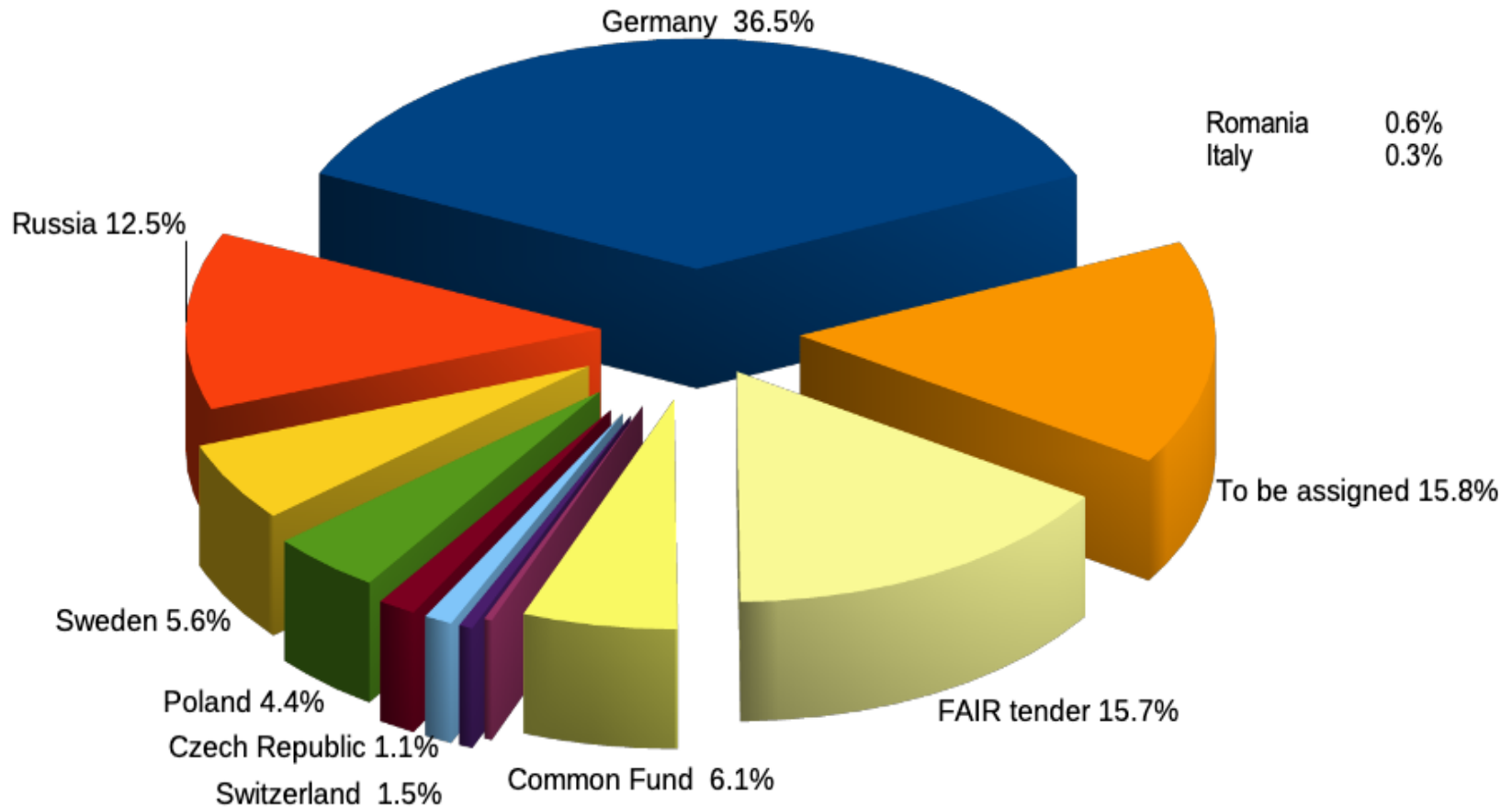


Thanks for your attention!



# Countries & Funding: Day-1 Setup

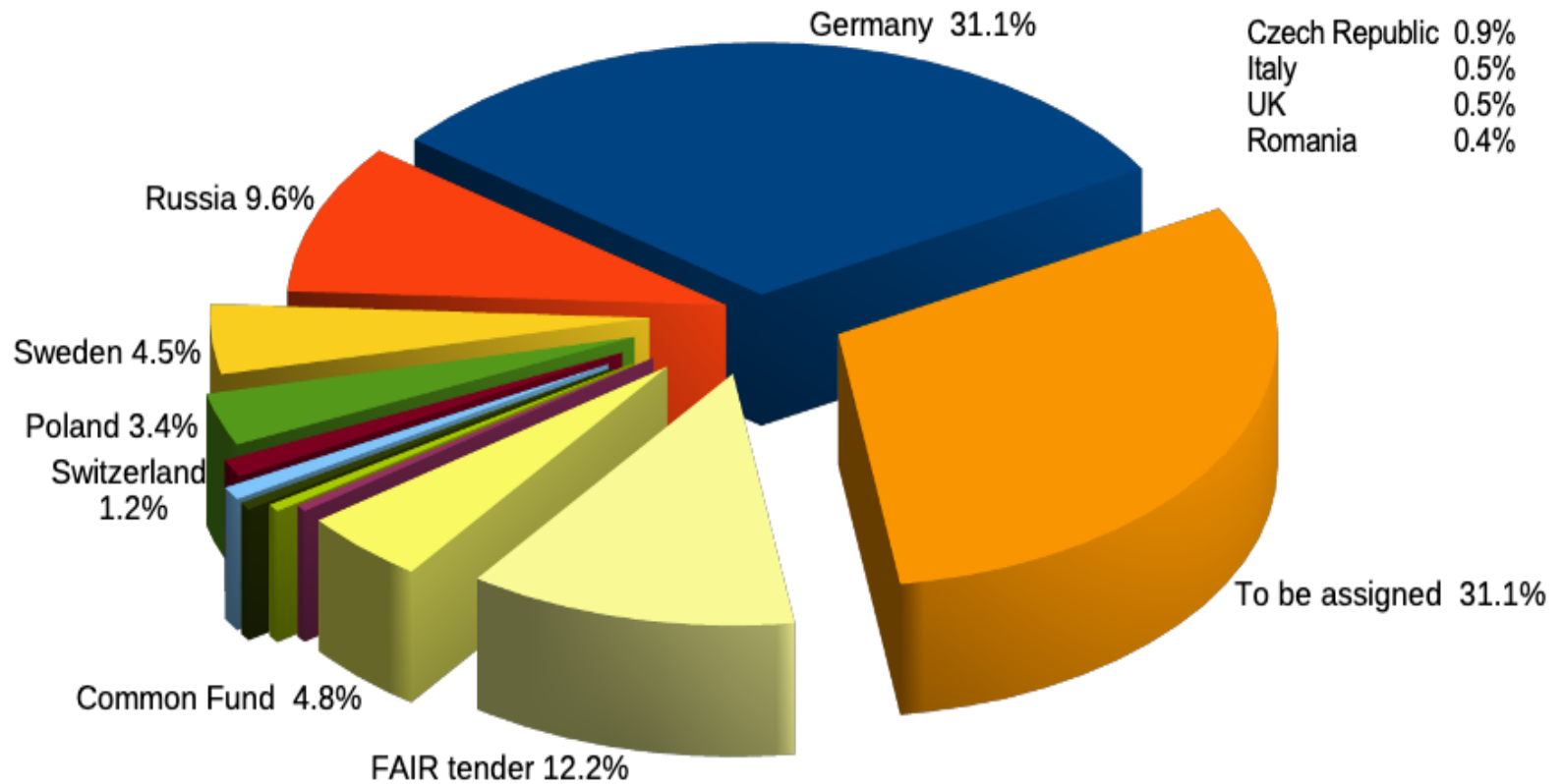
Day-1 Setup (100% = 50.4 M€ [2005])



# Countries & Funding: Phase-2 / Full Setup



Full Setup / Phase-2 / MSV (100% = 65.1 M€ [2005])





# Day-1: Scorecard



PANDA		TDR / Specs	Cost [k€ 2005]	% Funding (Sec / EoI / TBA, RU)			Construction	Construction complete	Test/ Commissioning
Day-1	Cluster Jet Target		771,00					depending on schedule towards MSV completion	
	Micro Vertex Detector (MVD) - Str		2.550,00						
	Straw Tube Tracker (STT)		2.603,00						
	Planar GEM Tracker - 50%		555,00						
	Barrel DIRC		2.782,00						
	Barrel Time of Flight (TOF)		310,00						
	Forward Tracking (w/o FT 5/6)		1.145,00						
	Forward TOF (2)		362,00						
	Barrel EMC System		8.066,00						
	Barrel EMC Crystals - 75% (2)		8.712,00						
	Backward Endcap EMC		1.267,00						
	Forward Endcap EMC		5.714,00						
	Forward Shashlyk Calorimeter (2)		1.447,00						
	Luminosity Detector		666,00						
	Muon Detectors (2)		2.318,00						
	Solenoid (1)		7.913,00						
	Interaction Region		151,00						
	Infrastructure		2.441,00						
	DAQ Hardware (3)		609,00						
			99% <i>value weighted</i>	50.382,00	58,8%	25,4%	16%		36% <i>value weighted</i>
Changes since Report 23/2							+2%		

(1) cancelled Russian contract  
 (2) contribution formerly intended by Russia

(3) DAQ computing via operation funds

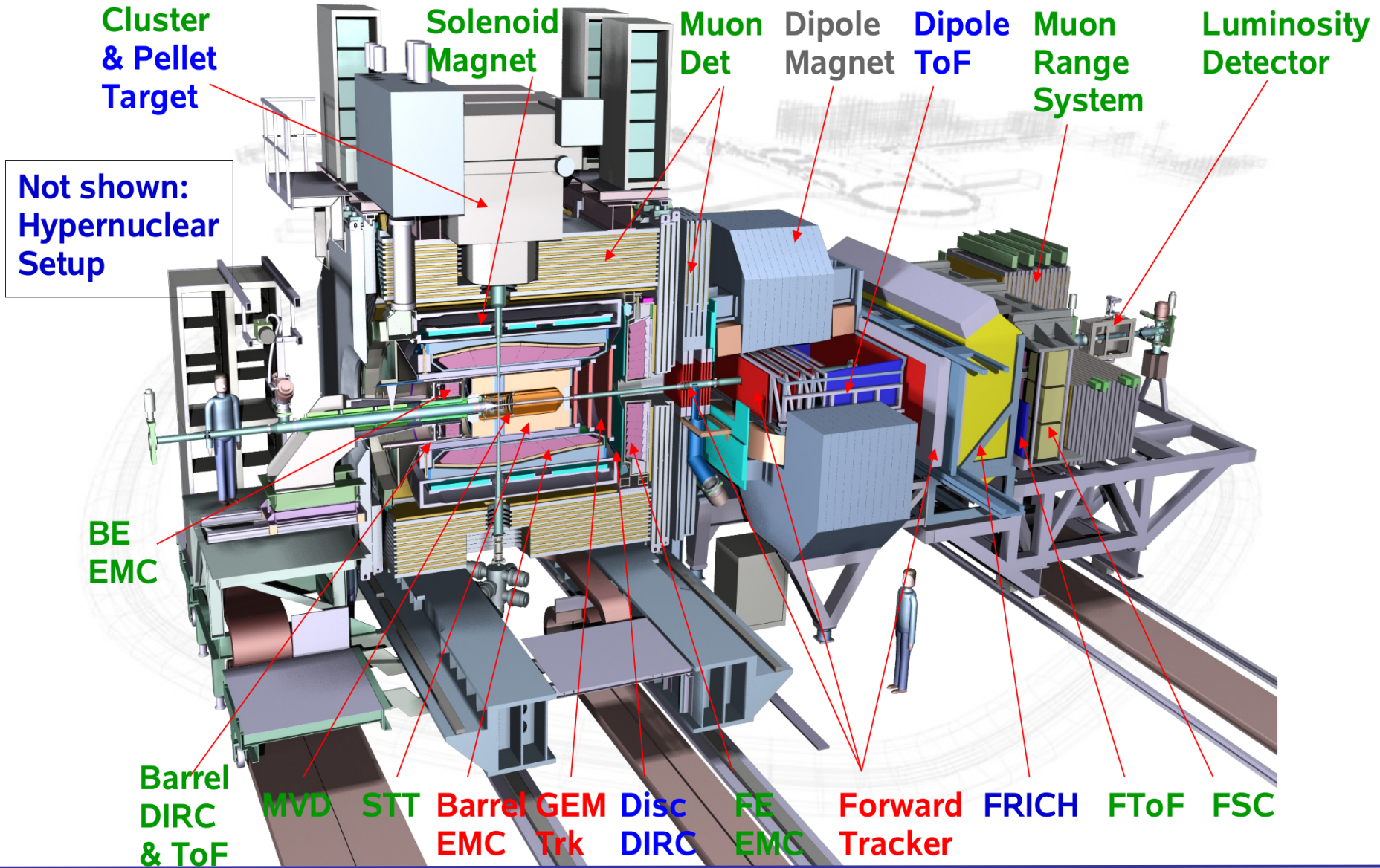


### Status experiment funding

Experiment/Project	Start of operation	Remarks	Prices, K Euro					
			2005 prices			2024 prices		
			Total cost	Secured amount	Eol	To be assigned	Eol	To be assigned
Pellet Target	Phase 2		1144	93	0	1051	0	1763
Cluster Jet Target	Day-1		771	668	0	103	0	173
Micro Vertex Detector (MVD)								
general	Day-1		946	849	97	0	163	0
Silicon Pixel Vertex Detectors	Phase-1		2091	0	0	2091	0	3507
Silicon Strip Vertex Detectors	Day-1		1604	1604	0	0	0	0
Target Spectrometer Tracking								
Straw Tube Tracker (STT)	Day-1		2603	2303	0	300	0	491
Planar GEM Trackers – Day-1	Day-1	Stations 1-2	555	0	0	555	0	0
Planar GEM Trackers – Completion	Phase-1	Station 3	555	0	0	555		907
Barrel DIRC	Day-1		2782	2782	0	0	0	0
Barrel Time of Flight (SciTil)	Day-1		310	0	0	310	0	520
Forward Tracking – Day-1	Day-1	Stations 1-4	1145	1145	0	0	0	0
Forward Tracking – Completion	Phase 2	Stations 5-6	1021	0	0	1021		1669
Forward Cherenkov Detectors								
Endcap Disc DIRC	Phase 2		3293	805	317	2171	532	3641
Forward RICH	Phase 2		2900	0	0	2900	0	4863
Forward TOF	Day-1		362	0	0	362	0	607
Target Spectrometer EMC								
Barrel EMC – Day-1	Day-1	75% coverage	16778	11413	377	4988	632	8155
Barrel EMC – Completion	Phase-1		2348	0	0	2348		3839
Backward Endcap EMC	Day-1		1267	1267	0	0	0	0
Forward Endcap EMC	Day-1		5714	5714	0	0	0	0
Forward Shashlyk Calorimeter	Day-1		1447	95	0	1352	0	2267
Luminosity Detector	Day-1		666	666	0	0	0	0
Muon System	Day-1		2318	591	1727	0	2896	0
Hypernuclear Setup								
Primary Target	Phase 2		163	0	163	0	273	0
Secondary Active Target	Phase 2		403	281	0	122	0	205
Germanium Detector	Phase 2		793	793	0	0	0	0
Solenoid	Day-1		7913	380	7533	0	12633	0
Interaction Region	Day-1		151	151	0	0	0	0
Infrastructure	Day-1		2441	0	2441	0	4094	0
DAQ	Day-1		609	0	609	0	1021	0
Full setup (MSV / Phase-2)			<b>65093</b>	<b>31600</b>	<b>13264</b>	<b>20229</b>	<b>22244</b>	<b>33924</b>
Day-1			<b>50382</b>	<b>29628</b>	<b>12784</b>	<b>7970</b>	<b>21439</b>	<b>13366</b>

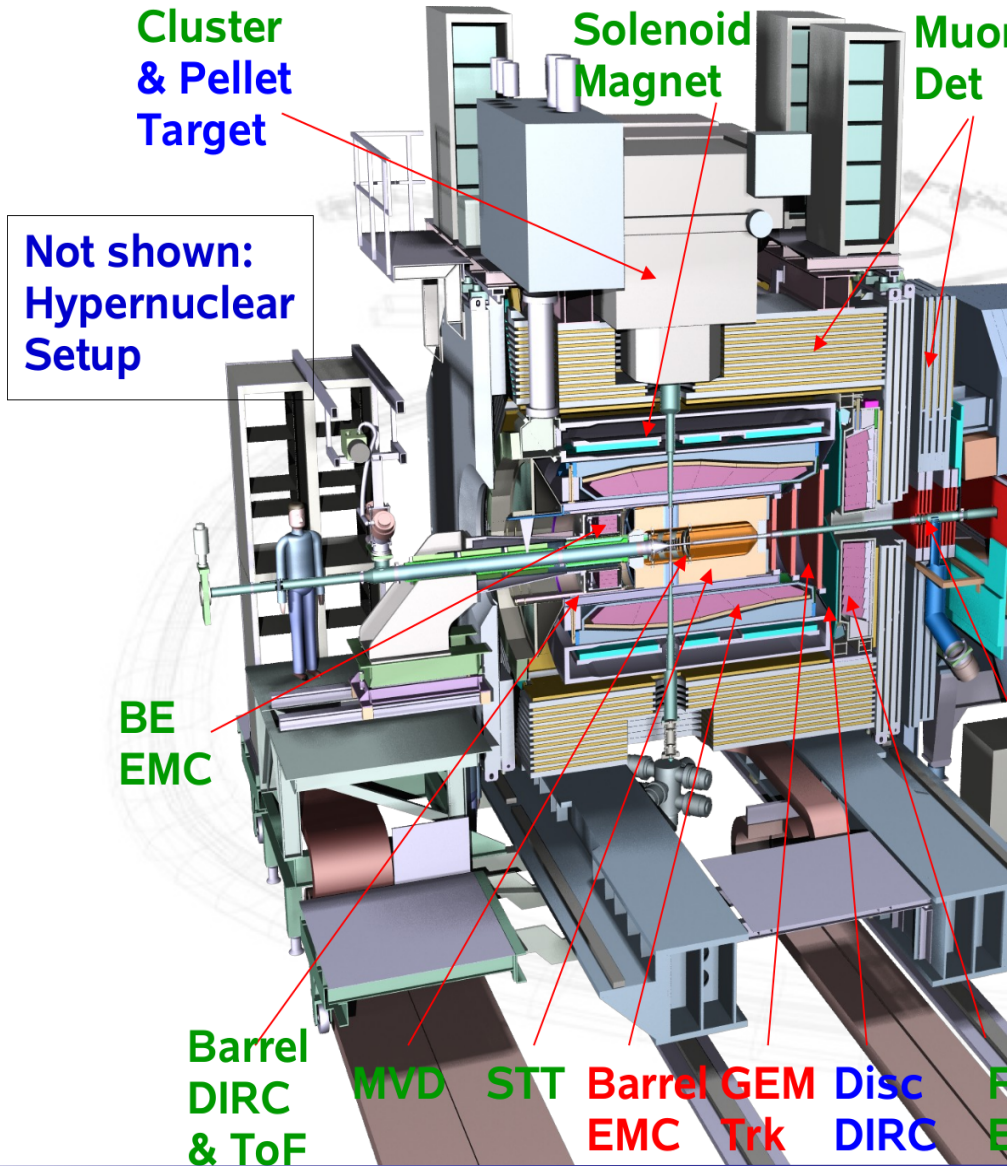
This calculation uses an escalation factor of 1.677 between 2005 prices and 2024 prices.

# Day-1 / Phase-1 / MSV-Setup





# Day-1 / Phase-1 / MSV-Setup



Cluster & Pellet Target   Solenoid Magnet   Muon Det   Dipole Magnet   Dipole ToF   Muon Range Svstem   Luminosity Detector

	Day-1	Phase-1	Phase-2
Pellet Target	-	-	✓
Clusterjet Target	✓	✓	✓
Micro Vertex Detector (MVD)	Si-Strip subsystem	✓	✓
Straw Tube Tracker (STT)	✓	✓	✓
GEM	2 out of 3 planes	✓	✓
Barrel DIRC	✓	✓	✓
Barrel ToF	✓	✓	✓
Forward Tracking	4 out of 6 stations	4 out of 6 stations	✓
Endcap Disc DIRC	-	-	✓
Forward RICH	-	-	✓
Forward ToF	✓	✓	✓
Barrel EMC	12 out of 16 slices	✓	✓
Backward Endcap EMC	✓	✓	✓
Forward Endcap EMC	✓	✓	✓
Forward Spectrometer Calorimeter	✓	✓	✓
Luminosity Detector	✓	✓	✓
Muon System	✓	✓	✓
Hypernuclear Setup	-	-	✓
Solenoid	✓	✓	✓
Interaction Region	✓	✓	✓
Infrastructure	✓	✓	✓
Data Acquisition & Trigger	✓	✓	✓

BE EMC   Barrel DIRC & ToF   MVD   STT   Barrel EMC Trk   Disc DIRC   FE EMC   Forward Tracker   FRICH   FToF   FSC