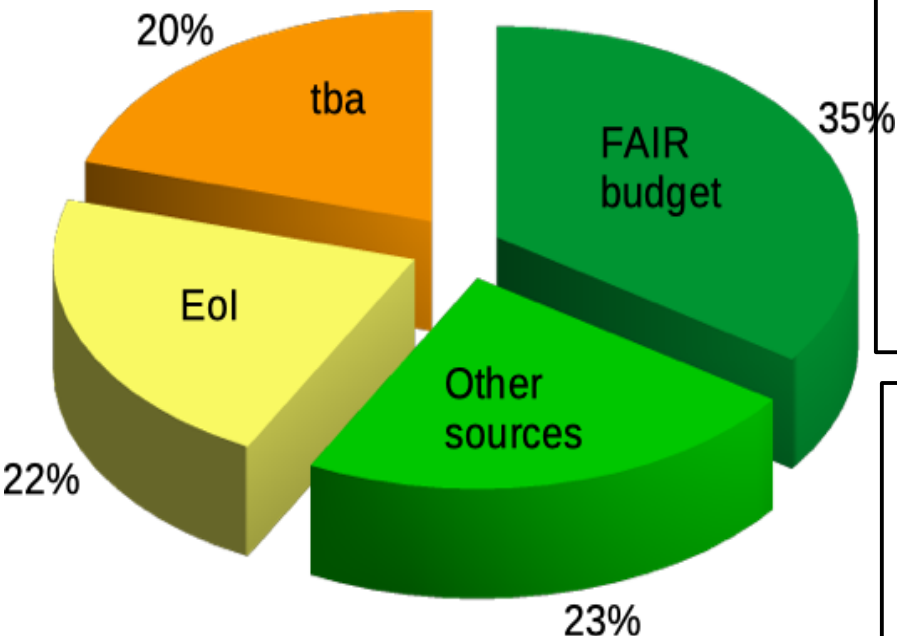


Ukraine war → collaboration with Russia = 2nd largest FAIR-shareholder suspended
→ direct funding gaps, plus indirect / economy-related, plus old ones (Covid-19)

Day-1 Setup
50382 M€ [2005] = 100%



- **FAIR-Review 2022: Great PANDA physics!**
Stays unique for next years (till ~2032 ...and beyond).
- **FAIR Council: MSV final goal!** But focus now on new staging ES, FS, (FS+)
- Activities not included therein: “Frozen”, amongst others: Antiproton chain, i.e. HESR building, CR, pLinac, PANDA
- Mitigation plans (many!) under discussion
Major reshape of path to the “real” PANDA

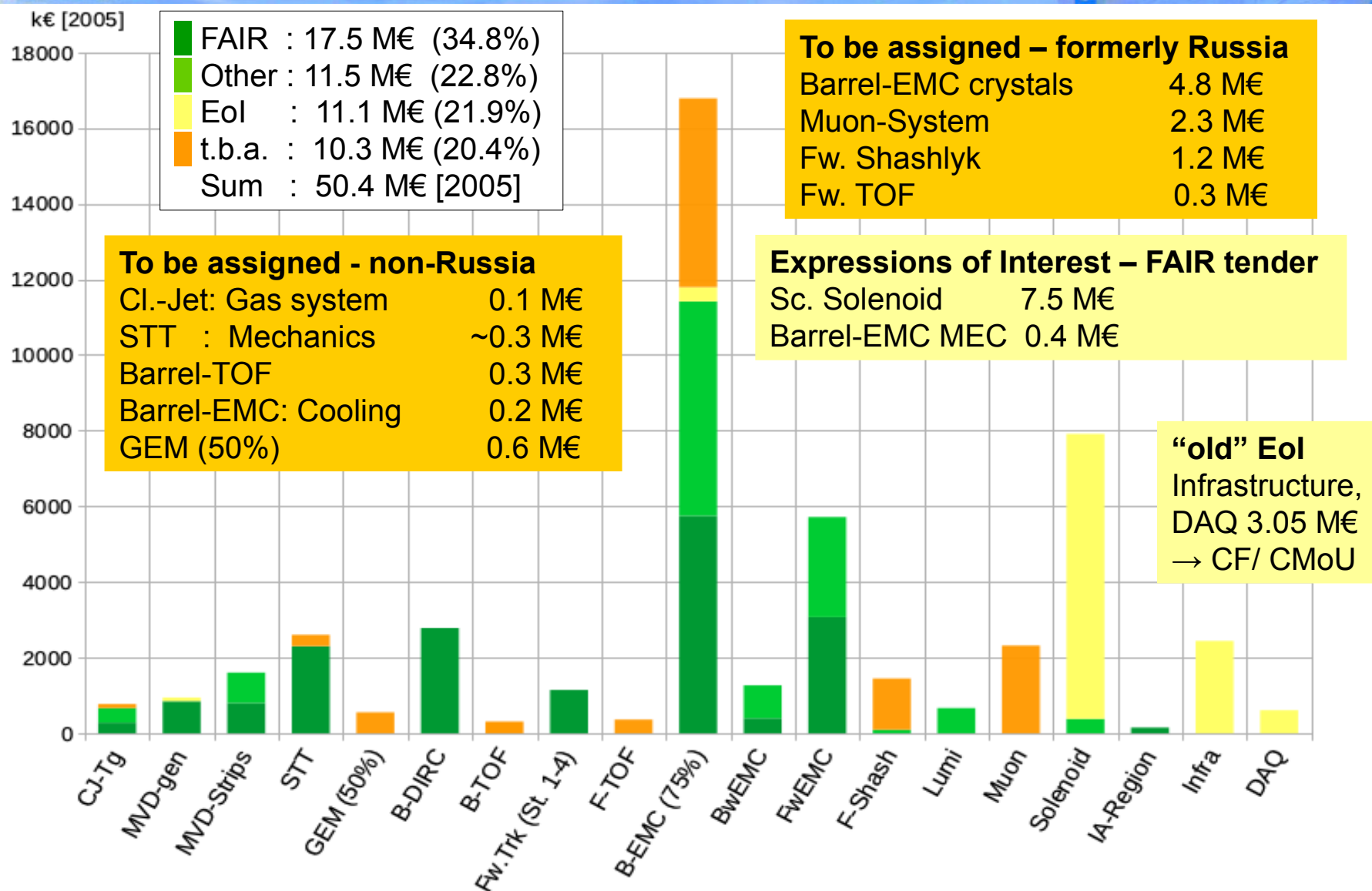
Day-1 setup, criteria

- readiness for 1st physics
- *high level of secured funding*
→ clearly cannot be maintained now, many missing contributions, C-MoU stopped

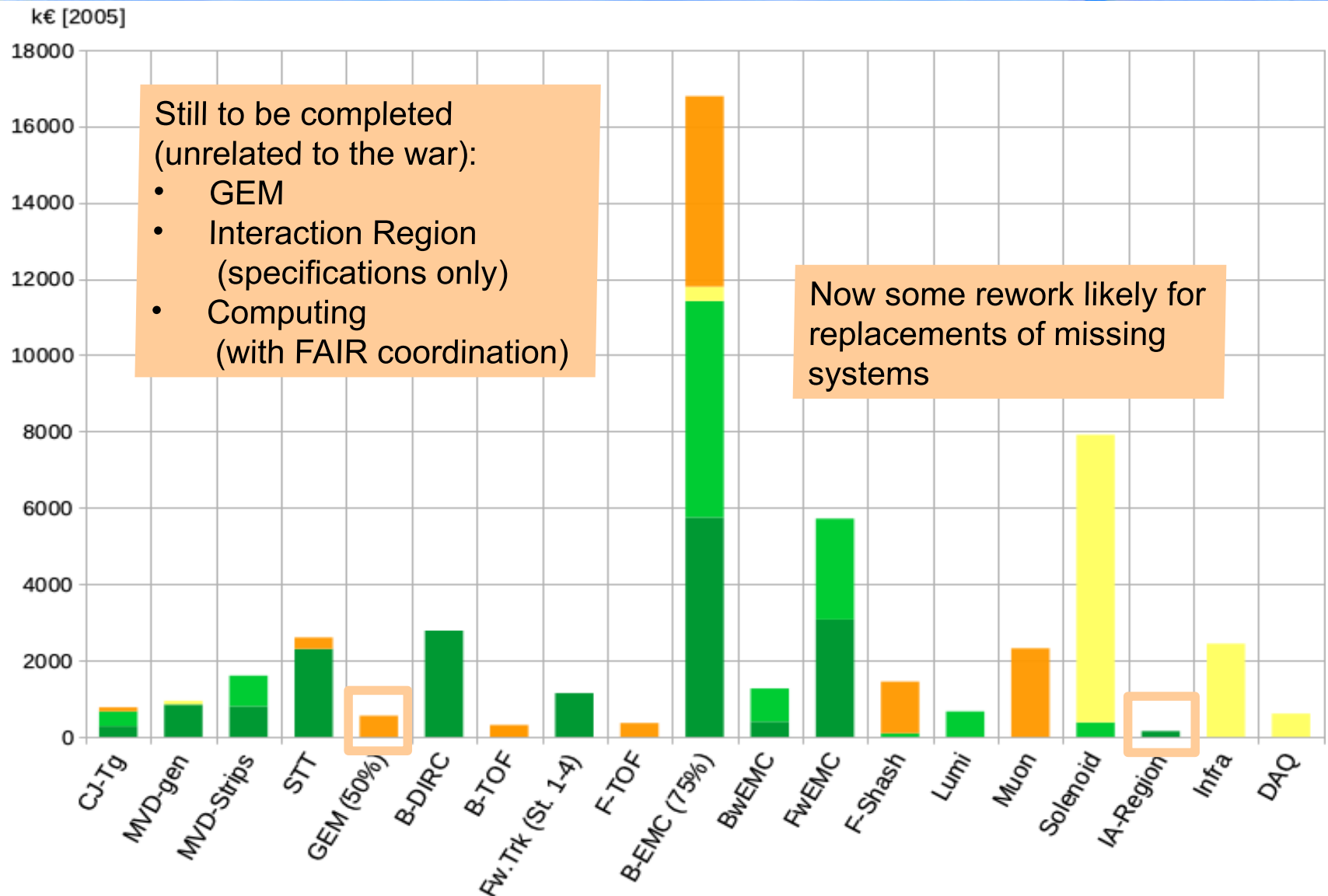
Day-1 reworked will likely look different

- **FAIR-NRW** network of universities and research facilities
16.5 M€ for 4 years since mid-2022, focus on CBM / HADES and PANDA
- **German Universities** collaborative funding (“Verbundforschung”)
applications for 2024-27 period till Jul. 1, 2023 (4 months earlier now)
- **Final COSY beamtime** in 2023. Leaves gap for FAIR detector tests
Agreement with GSI on cave & beamtime for PANDA remainders
- Former **LHCb Outer Tracker** donated to GSI (→ delivery on Jun. 23 !)
Re-use for forward tracking and muon detection under investigation
- **EMC crystals:** Risk of losing sole manufacturer Crytur (CZ) increased again
by suspended collaboration with (Bela-) / Russian institutes formerly in charge
- **In-kind contract** concluded with U Uppsala: PWO-crystals for Barrel-EMC,
205 k€ [2005] (post-production)

Day-1 Setup: Financial Status of Subsystems



Day-1 Setup: TDR Coverage



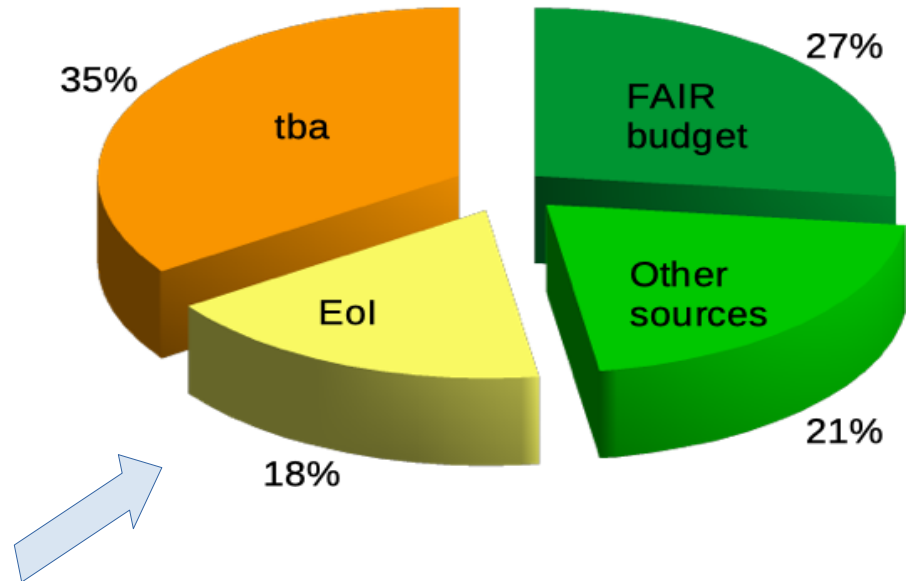
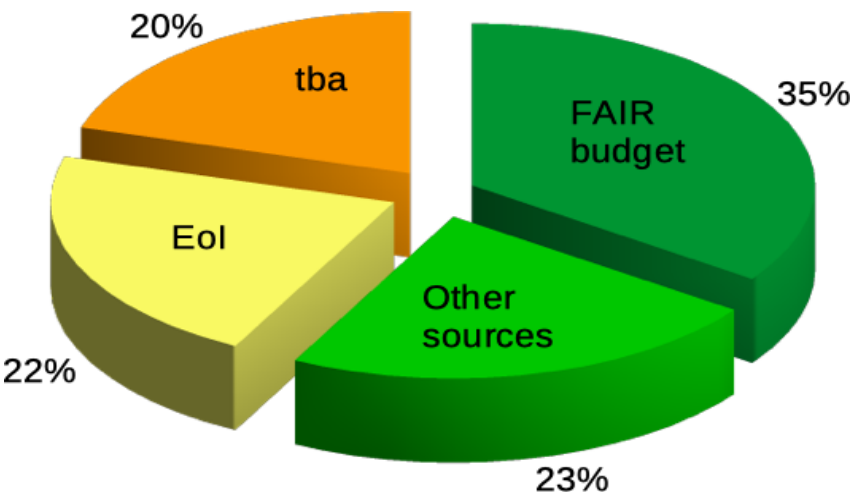
Day-1 Setup → MSV aka Phase-2 aka Full Setup

MSV / Phase-2:

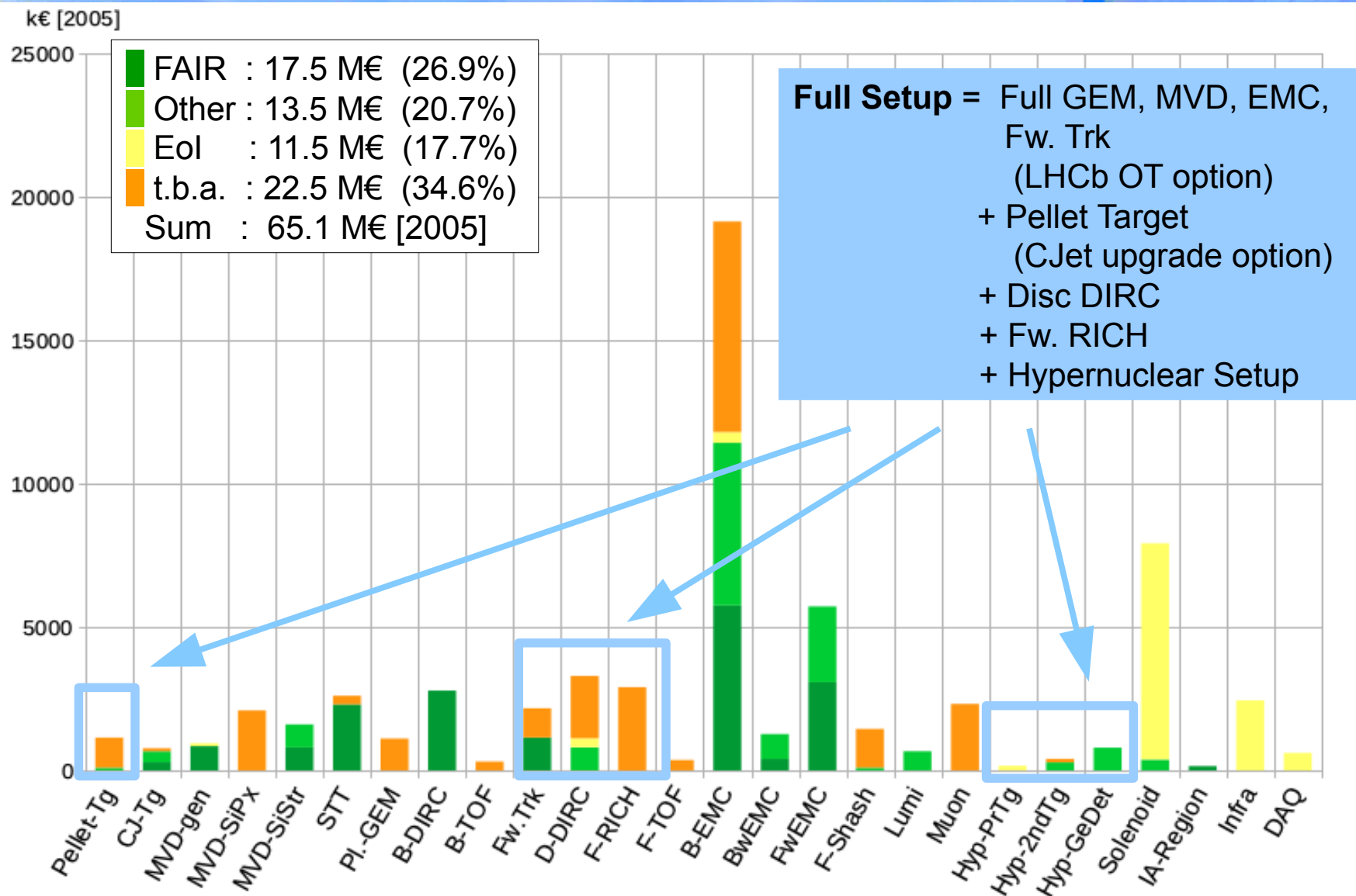
- 65.1 M€ [2005]
- 48% secured
- Full setup (w/ Pellets, FT 5+6, Fw. Cer's., Hyp. N)

Day-1:

- 50.4 M€ [2005]
- 58% secured
- 75% B-EMC, 50% GEM, MVD-Strips



MSV / Phase-2: Financial Status of Subsystems

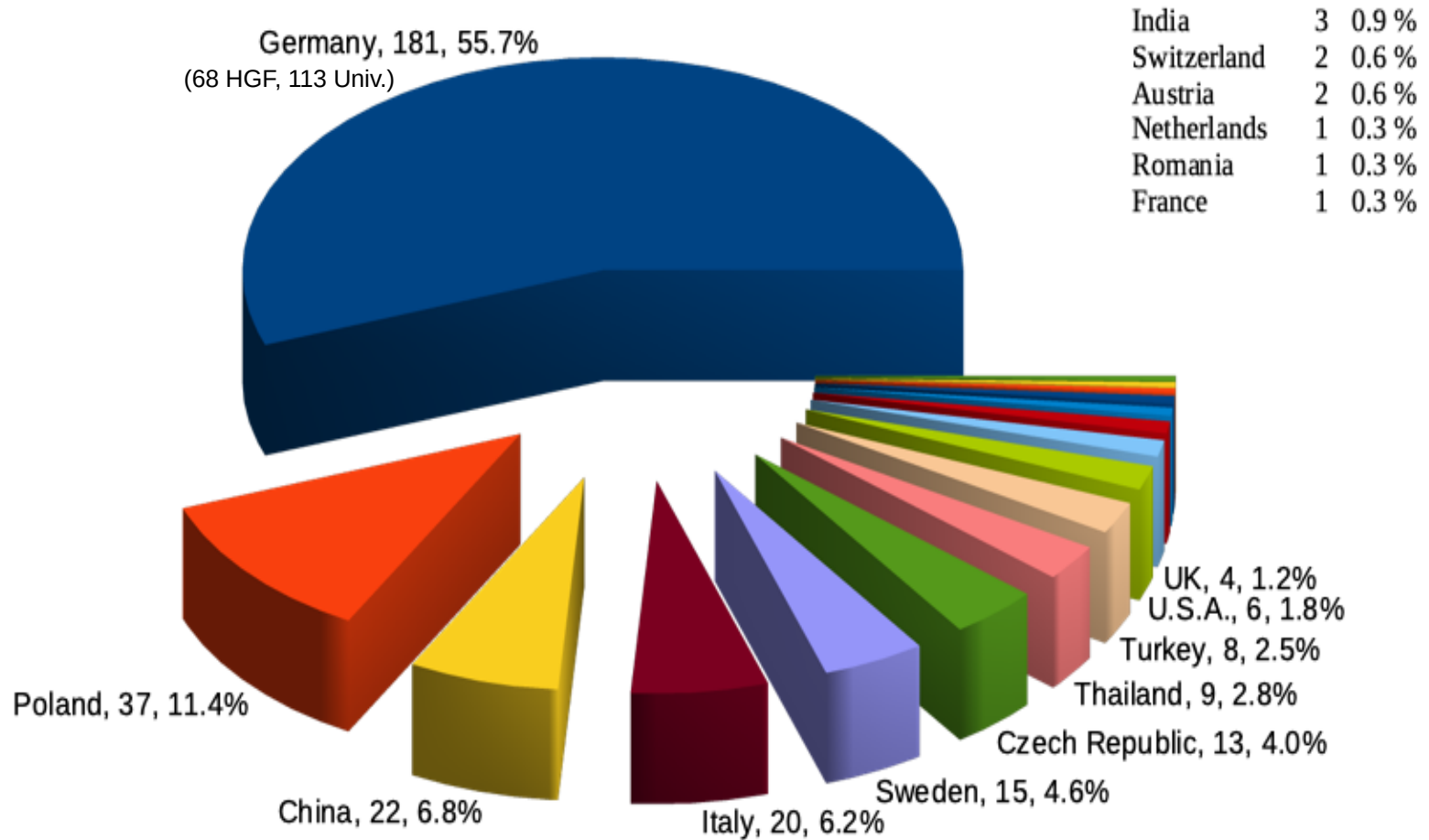


PANDA Members



PANDA members

325 in total, distributed over 16 countries

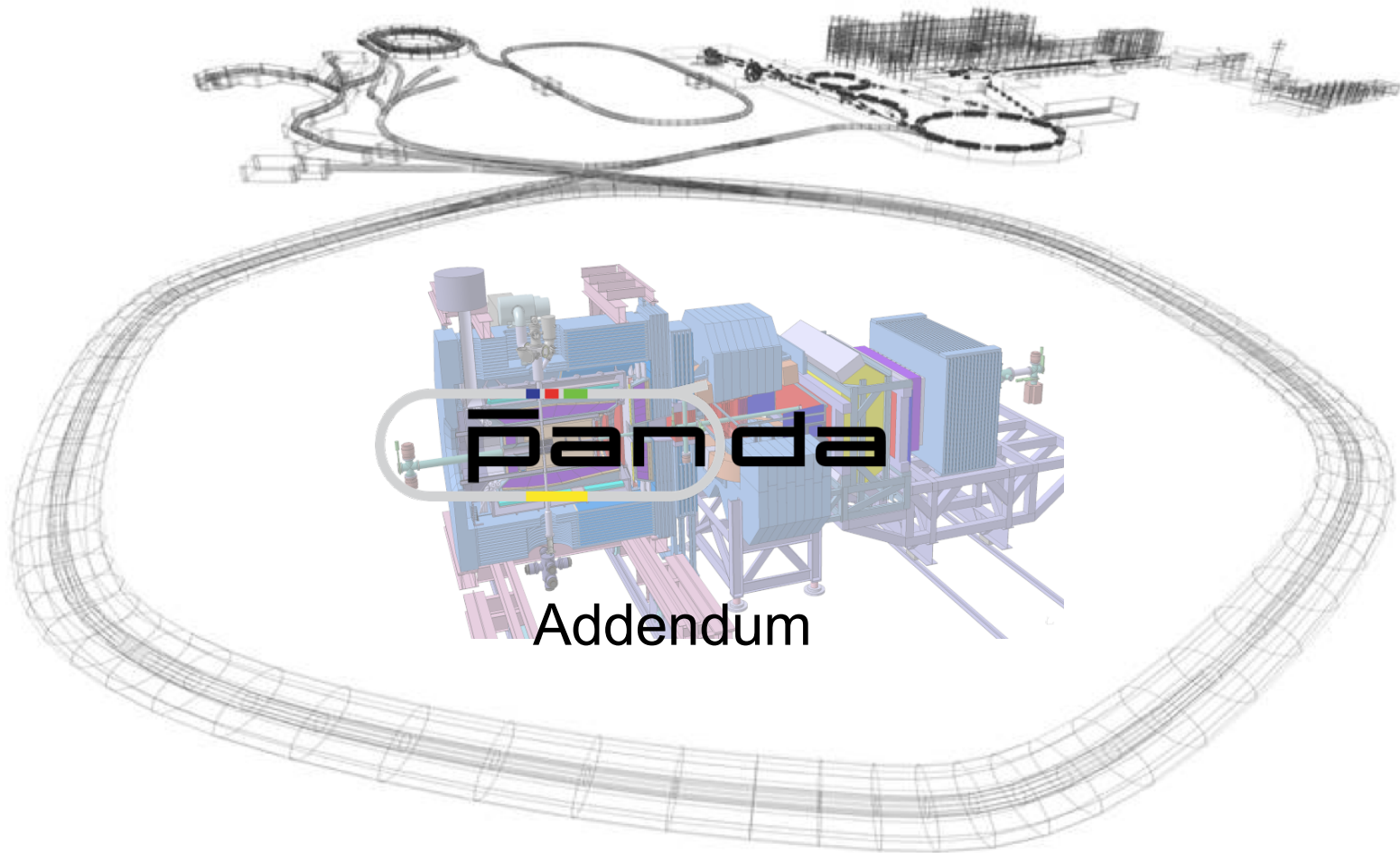


- PANDA: Excellent science, reconfirmed once more by 2022-Review
 - don't wait for too long
 - 1st antiproton run ~2032 for (still) unique physics
- Reshape path towards PANDA @FAIR
 - Intermediate program needed to keep expertise (i.e. people)
 - Start two-pronged approach with existing systems:
 - Physics at other labs (HADES/GSI, MAMI/A1, JLAB/GlueX, ELSA/CB, JLAB/PRAD, ...)
 - Precursor experiment at FAIR ("RedPANDA"), requires FS+
 - Synchronize both paths for convergence at "real" PANDA
- Watch (and make use of) opportunities
 - COSY + AA as CR / RESR replacement
 - ZEUS superconducting solenoid as BINP replacement

This needs commitment! It won't happen out of nothing.

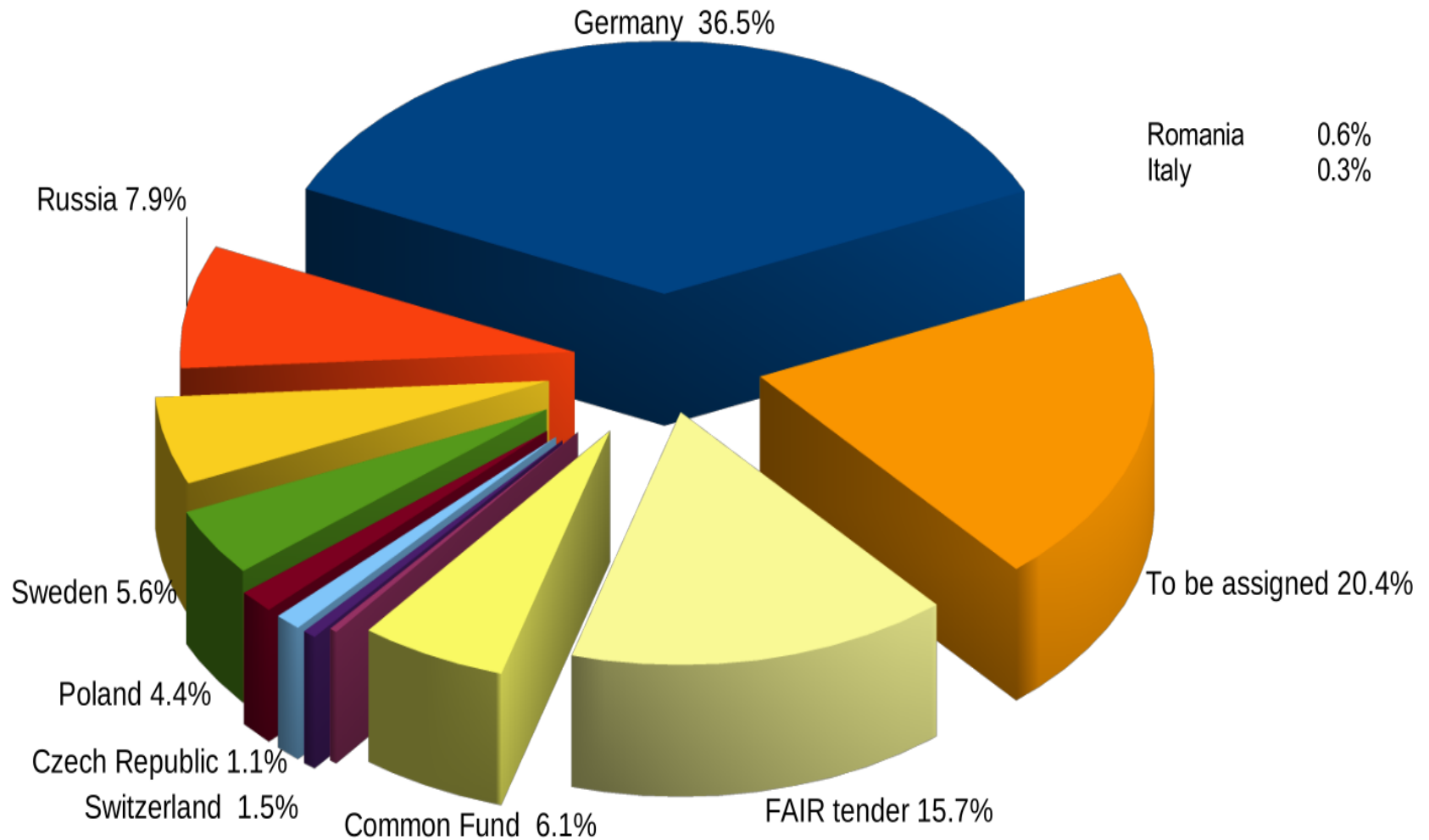


Thanks for your attention!



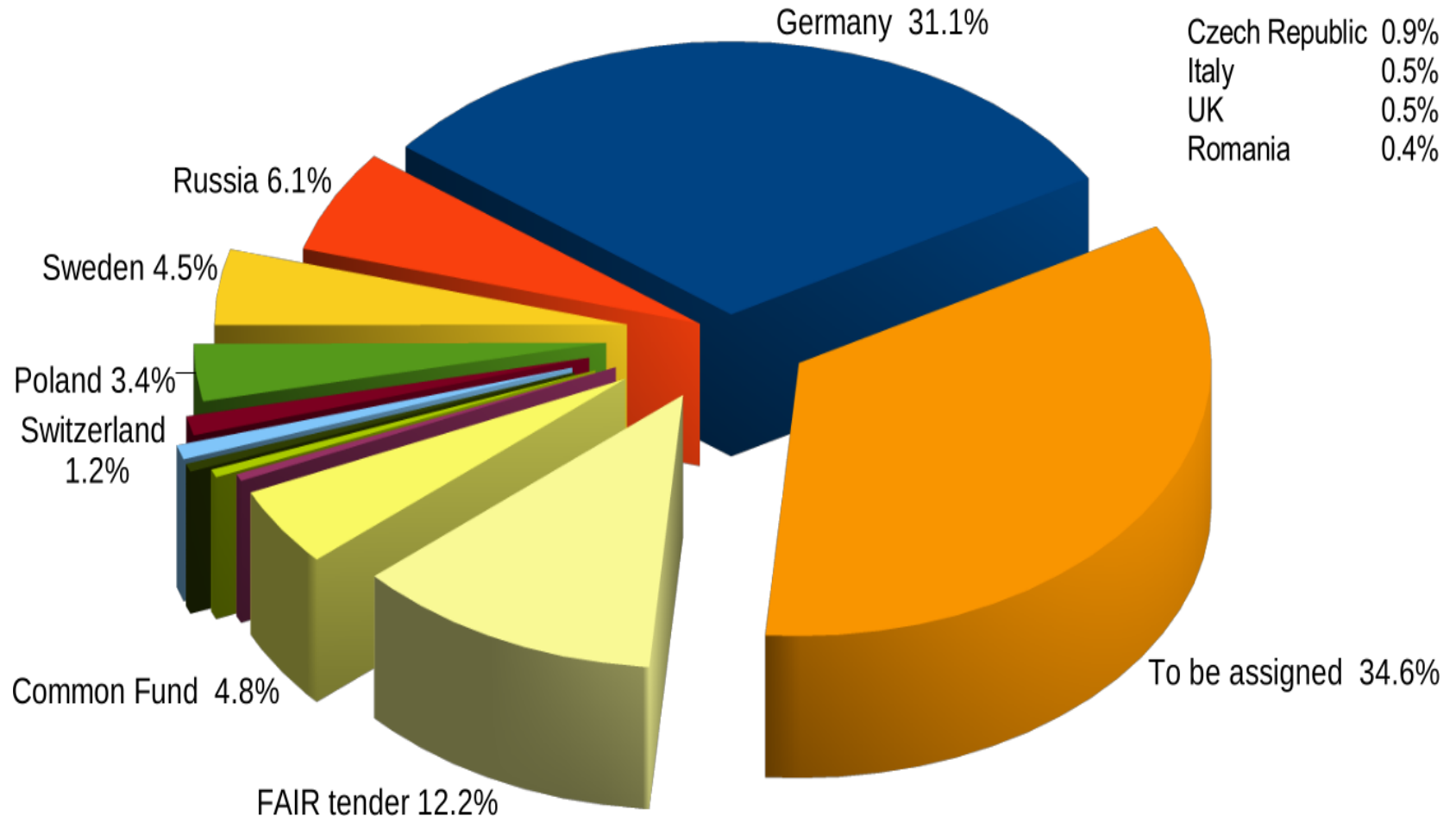
Countries & Funding: Day-1 Setup

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% value weighted	50.382,00	57,6%	21,9%	20%	44% value weighted		1% value weighted
Changes since RRB #11				-34%	+15%	+17%			

(1) cancelled Russian contract

(2) contribution formerly intended by Russia

(3) DAQ computing via operation funds

2023-05-09

Status experiment funding

Experiment/Project	Start of operation	Remarks	Prices, K Euro					
			2005 prices				2023 prices	
			Total cost	Secured amount	Eol	To be assigned	Eol	To be assigned
Pellet Target	Phase 2		1144	93	0	1051	0	1718
Cluster Jet Target	Day-1		771	668	0	103	0	168
Micro Vertex Detector (MVD)								
general	Day-1		946	849	97	0	159	0
Silicon Pixel Vertex Detectors	Phase-1		2091	0	0	2091	0	3419
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	507
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	518	3550
Forward RICH	Phase 2		2900	0	0	2900	0	4742
Forward TOF	Day-1		362	0	0	362	0	592
Target Spectrometer EMC								
Barrel EMC – Day-1	Day-1	75% coverage	16778	11413	377	4988	616	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	2211
Luminosity Detector	Day-1		666	666	0	0	0	0
Muon System	Day-1		2318	0	0	2318	0	3790
Hypernuclear Setup								
Primary Target	Phase 2		163	0	163	0	267	0
Secondary Active Target	Phase 2		403	281	0	122	0	199
Germanium Detector	Phase 2		793	793	0	0	0	0
Solenoid	Day-1		7913	380	7533	0	12316	0
Interaction Region	Day-1		151	151	0	0	0	0
Infrastructure	Day-1		2441	0	2441	0	3991	0
DAQ	Day-1		609	0	609	0	996	0
Full setup (MSV / Phase-2)			65093	31009	11537	22547	18863	36864
Day-1			50382	29037	11057	10288	18078	16821

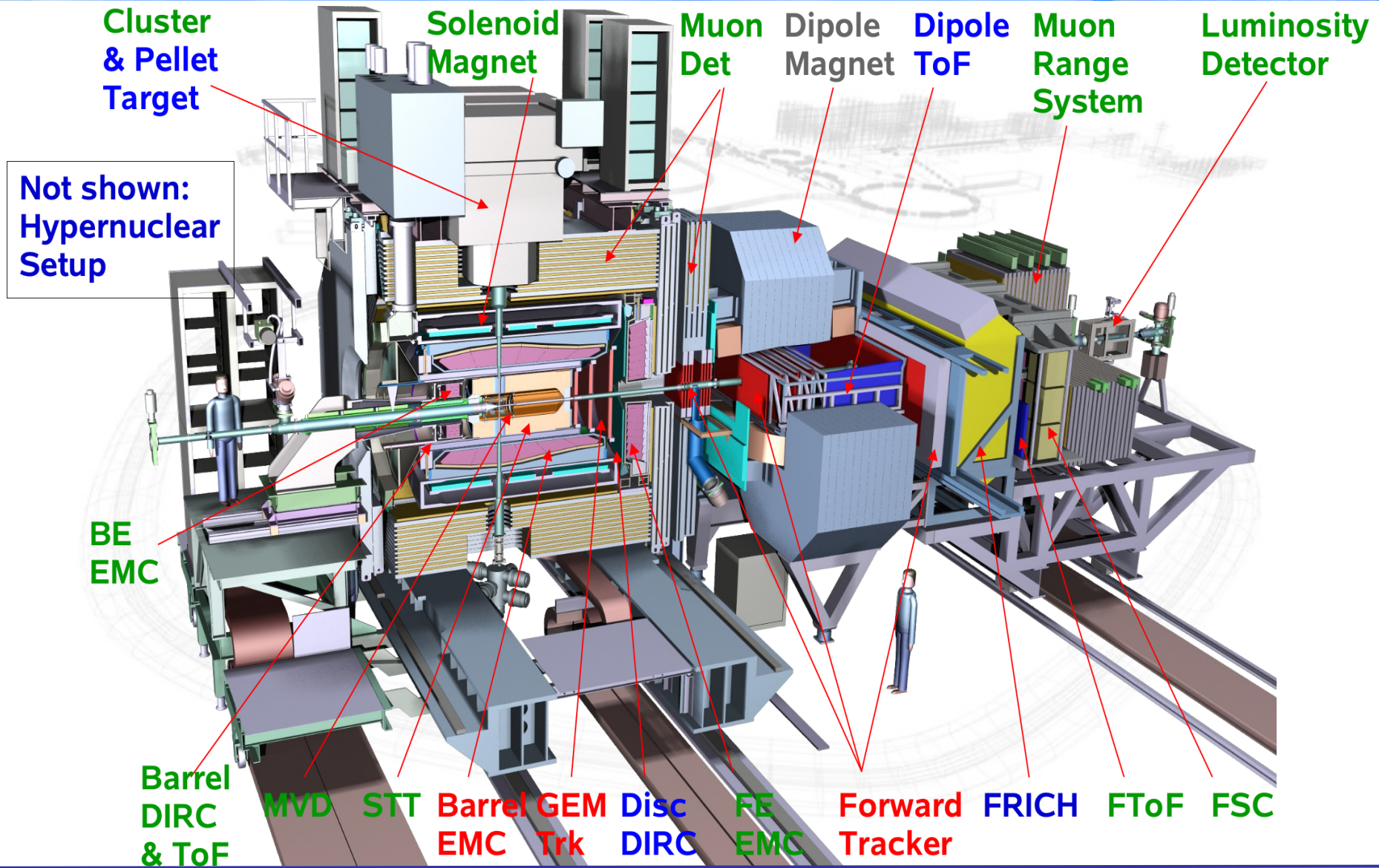
This calculation uses an escalation factor of 1.635 between 2005 prices and 2023 prices.

Status Experiment Funding

Subproject (TDR date)	2005 prices, k Euro								Start of operation foreseen
	Total cost	Diff. to RRB #11	Secured amount	Diff. to RRB #11	Eol / RU Pl.	Diff. to RRB #11	To be assigned	Diff. to RRB #11	
Pellet Target (-)	1144	0	93	0	0	-700	1051	700	Phase 2
Cluster Jet Target (2013)	771	0	668	0	0	0	103	0	Day-1
Micro Vertex Detector (2013)									
general	946	0	849	0	97	0	0	0	Day-1
Silicon Pixel Vertex Detectors	2091	0	0	0	0	0	2091	0	Phase-1
Silicon Strip Vertex Detectors	1604	0	1604	0	0	0	0	0	Day-1
Target Spectrometer Tracking									
Straw Tube Tracker (2013)	2603	0	2303	0	0	0	300	0	Day-1
Planar GEM Trackers (tba) – Day-1	555	0	0	-555	0	0	555	555	Day-1
Planar GEM Trackers – completion	555	0	0	0	0	0	555	0	Phase 1
Barrel DIRC (2017)	2782	0	2782	0	0	0	0	0	Day-1
Barrel Time of Flight (2018)	310	0	0	0	0	0	310	0	Day-1
Forward Tracking (2018) – Day-1	1145	0	1145	0	0	0	0	0	Day-1
Forward Tracking (2018) – completion	1021	0	0	0	0	0	1021	0	Phase 2
Forward Cherenkov Detectors									
Endcap Disc DIRC (2019)	3293	0	805	0	317	-1471	2171	1471	Phase 2
Forward RICH (tba)	2900	0	0	0	0	-2900	2900	2900	Phase 2
Forward TOF (2018)	362	0	0	0	0	-362	362	362	Day-1
Target Spectrometer EMC (2008)									
Barrel EMC – Day-1	16778	-192	11413	-569	377	-4373	4988	4750	Day-1
Barrel EMC – completion	2348	0	0	0	0	0	2348	0	Phase 1
Backward Endcap EMC	1267	0	1267	0	0	0	0	0	Day-1
Forward Endcap EMC	5714	0	5714	0	0	0	0	0	Day-1
Forward Shashlyk Calorimeter (2016)	1447	0	95	0	0	-1352	1352	1352	Day-1
Luminosity Detector (2019)	666	0	666	0	0	0	0	0	Day-1
Muon System (2014)	2318	0	0	-591	0	-1727	2318	2318	Day-1
Hypernuclear Setup (tba)									
Primary Target	163	0	0	0	163	0	0	0	Phase 2
Secondary Active Target	403	0	281	0	0	0	122	0	Phase 2
Germanium Detector	793	0	793	0	0	0	0	0	Phase 2
Solenoid (2009)	7913	2113	380	-5420	7533	7533	0	0	Day-1
Interaction Region	151	0	151	0	0	0	0	0	Day-1
Infrastructure (2021)	2441	0	0	0	2441	0	0	0	Day-1
DAQ (2021)	609	0	0	0	609	0	0	0	Day-1
Computing	0	0	0	0	0	0	0	0	Day-1
Sum	65093	1921	31009	-7135	11537	-5352	22547	14408	

This calculation uses an escalation factor of 1.635 between 2005 prices and 2023 prices.

Day-1 / Phase-1 / MSV-Setup



Day-1 / Phase-1 / MSV-Setup

