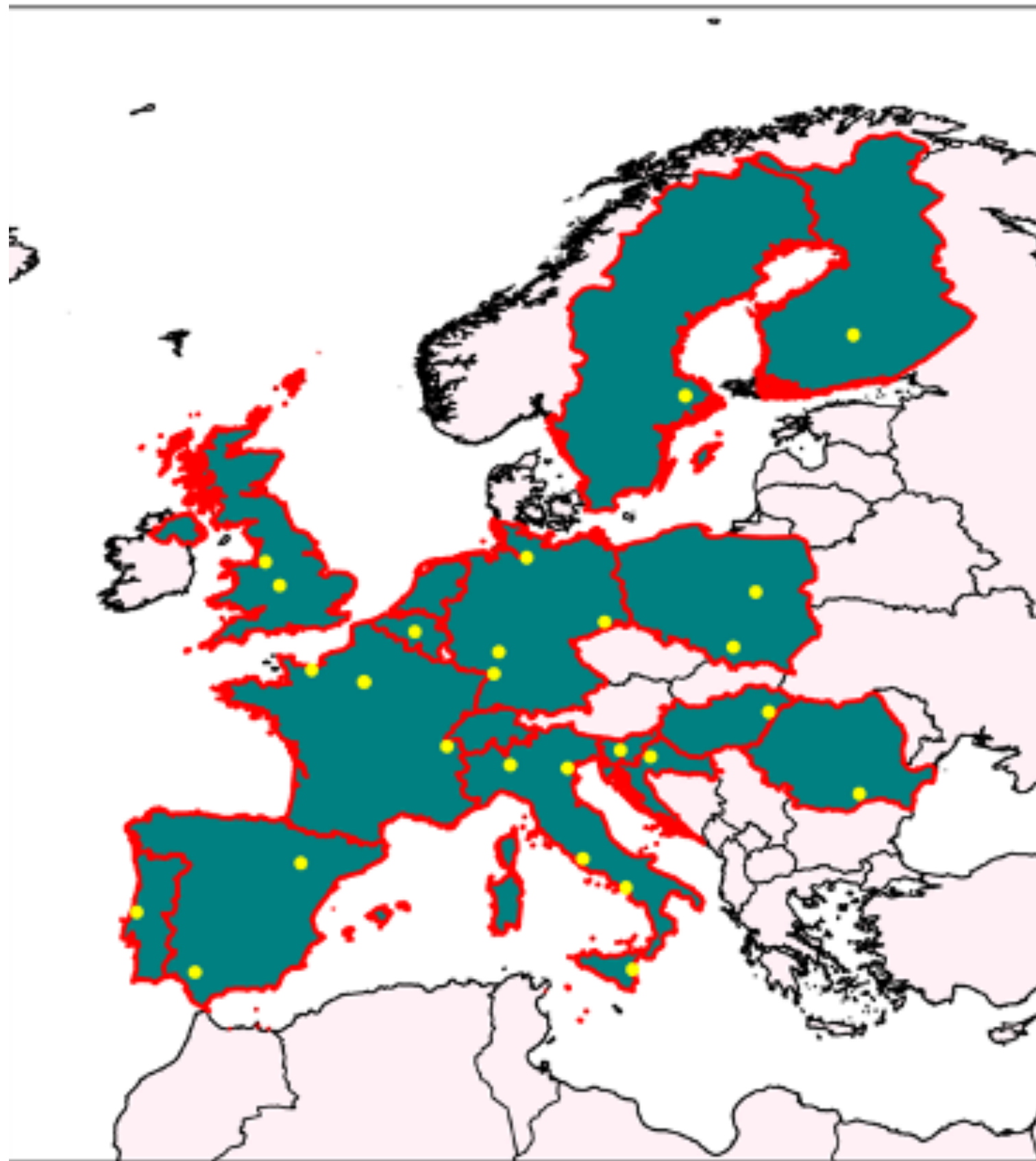




Horizon Europe call for Research Infrastructure (RI) services advancing frontier knowledge

HORIZON-INFRA-2021-SERV-01-07



EURO-LABS is a consortium of thirty-nine Research Infrastructures (RIs) from twelve countries in Europe

Finland in the north and Italy to south to Romania in the east and Portugal in the west

Goals

To provide efficient access to the available resources at a major fraction of **EUROpean Laboratories for Accelerator Based Sciences (EURO-LABS)**.

Large and diverse community of users to choose the most appropriate state-of-the-art Research Infrastructures RI(s).

For conducting high impact research, fostering the sharing of knowledge and technologies across scientific fields.

Implementation of good practices for data management and activities relating to targeted service improvement at RIs.

Provide broad and focused joint training activities with hands-on experience at the RI's to develop diverse skills of the next generation researchers, for the optimal use of the large number of RIs potential for scientific and technological discoveries.

Build a super community of sub-atomic researchers and the associated technical staff.

This proposal brings together for the first time in Europe the three communities engaged in Nuclear Physics and Accelerator/Detector technology for High Energy Physics.

EURO-LABS is expected to build the foundations to create synergies and collaborations between the RIs of the Nuclear and High Energy communities, enhancing Europe's potential for successfully facing the upcoming new challenges of the coming decades.

Management Team

Scientific coordinator



A. NAVIN
GANIL



Adam Maj, IFJ
WP2



Maria Borge, CSIC
WP5



Deputy Scientific coordinator

Deputy Scientific coordinator

Deputy Scientific coordinator

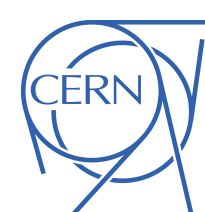
Project office Manager



M. COLONNA
INFN-LNS (Catania)



I. EFTHYMIPOULOS
CERN



WP3



M. MIKUZ
Univ. Ljubljana



WP4

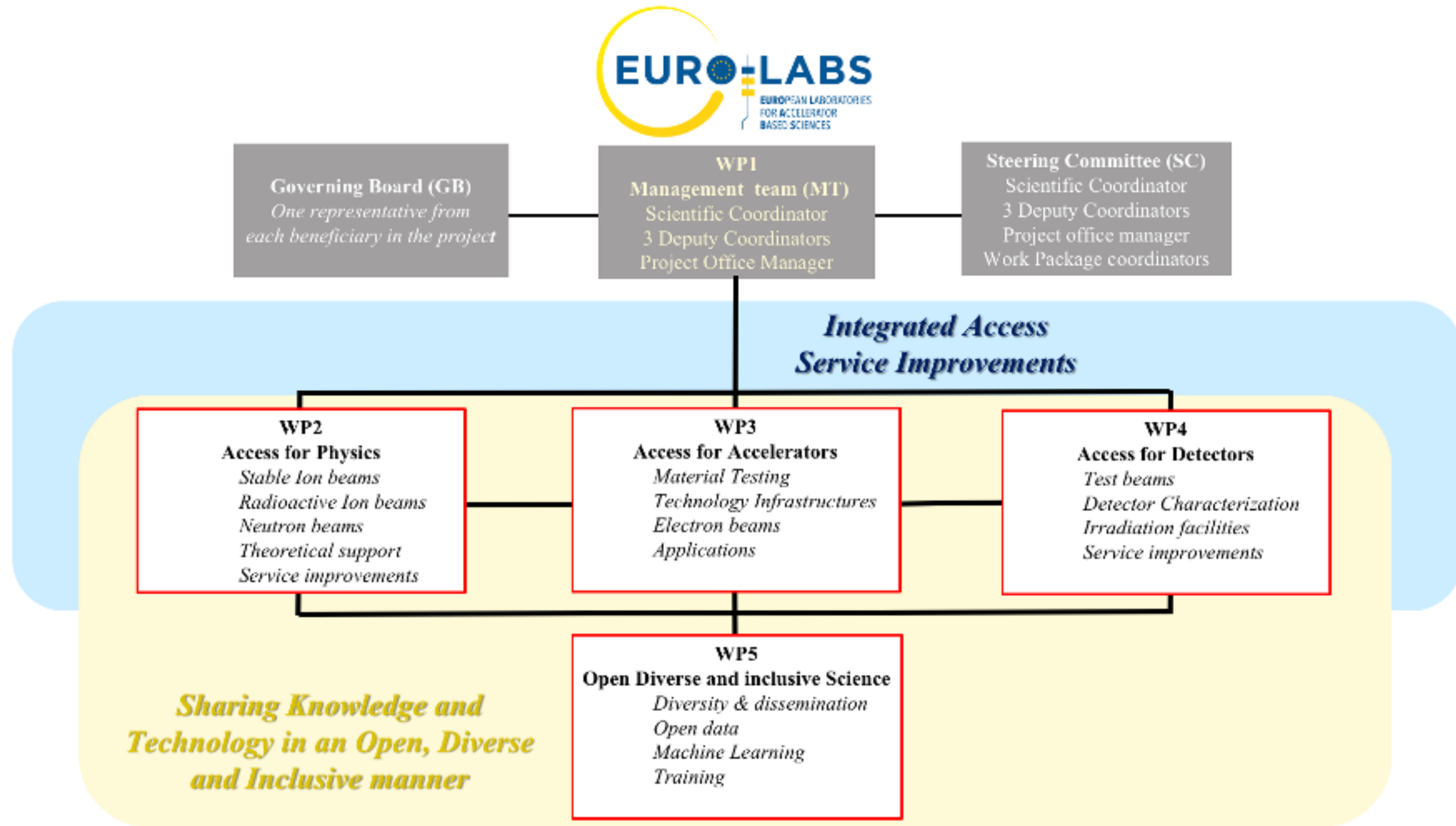


PAOLO GIACOMELLI
INFN Bologna



The Project Office will be organised by **INFN Bologna** with the collaboration of **CERN**.

EURO-LABS structure



Participants

Participant number	Participant organisation name	Short name	Country	Role	WP
1 (Coord)	Istituto Nazionale di Fisica Nucleare	INFN	Italy	Coordinator	WP1, WP2, WP3, WP5
2	Grand Accélérateur National d'Ions Lourds	GANIL	France	Partner	WP2, WP5
3	European Organization for Nuclear Research	CERN	IEIO	Partner	WP1, WP2, WP3, WP4
4	Institut Jozef Stefan	JSI	Slovenia	Partner	WP4
5	Henryk Niewodniczanski Institute of Nuclear Physics	IFJ PAN	Poland	Partner	WP2, WP4
6	Stiftung Deutsches Elektronen-Synchrotron	DESY	Germany	Partner	WP4
7	Université Catholique de Louvain	UCL	Belgium	Partner	WP4
8	Ruder Boskovic Institute	RBI	Croatia	Partner	WP4
9	Centre National De La Recherche Scientifique	CNRS	France	Partner	WP2, WP3, WP5
10	Fondazione Bruno Kessler	FBK	Italy	Partner	WP2
11	Instituto Tecnológico De Aragón	ITAINNOVA	Spain	Partner	WP4
12	The University of Birmingham	UoB	UK	Partner	WP4
13	Uniwersytet Warszawski	UNIWARSAW	Poland	Partner	WP2
14	Helmholtzzentrum für Schwerionenforschung GmbH	GSI	Germany	Partner	WP2, WP5
15	Institutul National de Cercetare-Dezvoltare Pentru Fizica si Inginerie Nucleara-Horia Hulubei	IFIN	Romania	Partner	WP2, WP5
16	Universidad De Sevilla	USE	Spain	Partner	WP2
17	Instituto Superior Técnico	IST	Portugal	Partner	WP2
18	Atommagkutató Intézet	ATOMKI	Hungary	Partner	WP2
19	Jyväskylän Yliopisto	JYU	Finland	Partner	WP2
20	Uppsala Universitet	UU	Sweden	Partner	WP3
21	Commissariat à l'Énergie Atomique et aux Énergies Alternatives	CEA	France	Partner	WP2, WP3, WP5
22	Karlsruher Institut für Technologie	KIT	Germany	Partner	WP3
23	United Kingdom Research and Innovation	UKRI	UK	Partner	WP3
24	Academisch Ziekenhuis Groningen	UMCG	Netherlands	Partner	WP2
25	Instytut Chemii i Techniki Jądrowej	INCT	Poland	Partner	WP3
26	Agencia Estatal Consejo Superior de Investigaciones Científicas	CSIC	Spain	Partner	WP5
27	Paul Scherrer Institut	PSI	Switzerland	Associated	WP4
28	Joint Institute for Nuclear Research	JINR	Russia	Associated	
29	The Institute of Physical and Chemical Research	RIKEN	Japan	Associated	
30	Michigan State University	MSU	USA	Associated	
31	Technische Universität Dresden	TUD	Germany	Associated	
32	Università degli Studi di Milano	UMIL	Italy	Partner	WP2
33	Laboratório de Instrumentação e Física Experimental de Partículas	LIP	Portugal	Associated	
34	Agenzia Nazionale per le Nuove Tecnologie, l'energia e lo Sviluppo Economico Sostenibile	ENEA	Italy	Associated	

Budget

Project	Budget (in k€)	Fraction of budget
EURO-LABS	14500	100%
Access activities	9900	68.3%
Service improvement	3100	21.4%
Open Diverse and Inclusive Science	1077	7.4%
Management	937	6.5%

Budget	Access (in k€)	Percentage	Service improvement (in k€)	Percentage
Nucl.ear Physics facilities	5000	50.5	1700	54.8
HEP facilities	4900	49.5	1400	45.2
Accelerators	2450		700	
Detectors	2450		700	

Staff effort

Work package No	Work Package Title	Lead Participant No	Lead Participant	Person-Months	Start Month	End month
1	Project management and coordination	1	INFN	72	M1	M48
2	Access to Nuclear Physics RIs	5	IFJ PAN	336.6	M1	M48
3	Access to RIs for Accelerator R&D	3	CERN	87.7	M1	M48
4	Access to RIs for Detector R&D	4	JSI	173.1	M1	M48
5	Open Diverse and Inclusive Science	26	CSIC	156.5	M1	M48
				825.9		

In addition to the **842.7** person/months declared in the table above, **276** person/months are offered as in-kind contribution by the Consortium: **40** for WP1, **80** for WP2, **46** for WP3, **80** for WP4 and **30** for WP5

WPs and Tasks

Task	Title	Objective	RIs	User group
WP2.1	Stable ion beams	Extremely high intensity required to search rare events and the production of new chemical elements. R&D for detector materials, electronics and medical applications.	8	NP community, hadron-therapy groups, NP and HEP Accelerator & Detector community.
WP2.2	Radioactive ion beams	Experiments to explore the borders of the nuclear stability , studies of fundamental interactions and BSM physics. Research in biophysics.	6	NP community, Groups applying nuclear technique to solid-state and biophysics, nuclear astrophysicists.
WP2.3	Neutron beams	Wide energy range for the investigation of nuclear processes occurring in astrophysical scenarios. Applications in advanced nuclear technology.	5	NP community, nuclear astrophysicists, waste management technologists.
WP2.4	Theoretical support	NP community, nuclear astrophysicists, waste management technologists.	2	NP community, including NP theorists.
WP2.5	Service Improvements	Toolkit to improve remote access, improved access for biomedical applications, efficient sharing of traveling detectors, improved ion beam variety and stability, targets for high intense beams. As well applications of FAIR principles	10	All potential EURO-LABS users (NP + HEP)
WP3.1	Material testing	Test of materials with high-intensity proton and ion beams	1	Teams doing R&D for near beam devices (collimators, beam windows), targetry, vacuum
WP3.2	Technology Infrastructures	Testing of superconducting magnets, superconducting and normal RF cavities, and associated material and mechanics	6	Teams from the AMICI collaboration, validation of new RF cavities and magnet designs for FCC, MYRRHA, US/PIP-II, R&D on materials
WP3.3	Electron and plasma beams	Testing of instrumentation, beam optics, RF equipment, accelerator components with low- medium energy proton and electron beams. Testing of new acceleration concepts and instrumentation in electron beamlines driven by PW and TW-lasers.	4	Wide spectrum of research teams in accelerator R&D, like FEL, design of compact electron LINACs, work with ultra-short bunches, accelerator-based photon sources.
WP3.4	Applications	Test of developments for applications, relation to industry	2	Community doing R&D on the use of pulsed electron beams for medical applications or industrial processes.
WP4.1	Test Beams	Position-resolved tests of detectors	3	Teams involved in detector R&D, QC, related fields
WP4.2	Detector Characterization	Assessment of detector structure and evaluation of EM characteristics	2	Teams involved in Detector RD, QC
WP4.3	Irradiations	Irradiation of detectors and electronics	6	Teams involved in Detector RD, QA, related fields
WP4.4	Service Improvements	Improvement of infrastructure to face challenges of EURO-LABS	11	All users of WP4

WP4 RIs

- **CERN**
 - PS, SPS, IRRAD, GIF++
- **DESY**
 - Testbeam
- **PSI**
 - PiM1, UCN
- **RBI**
 - RBI-AF
- **ITAINNOVA**
 - EMC-Lab
- **JSI**
 - Triga
- **IFJ PAN**
 - AIC-144
- **UCL**
 - HIF-LIF-NIF
- **UoB**
 - MC40

INFN is the **coordinating institute** of EURO-LABS.

The **Project Office** (PO) of EURO-LABS will be at INFN Bologna.

Any administrative and/or financial question on EURO-LABS should be addressed to the PO.

Technical or scientific questions on WP4 should be addressed to **Marko**.

Summary of TA/VA access provision

Access provider short name	Short name of infrastructure	Installation	Installation	Installation Country code	Type of access	Unit of access	Estimated quantity of access to be provided	Unit cost (UC) (€)	Access costs		Estimated number of users	Estimated number of applications*
		Nr	Short name						On the basis of UC	As actual costs		
CERN	HiRadMat			CH	TA-uc	1h	4800	0	0		60	20
UU	FREIA	1	2	GERSEMI, HNOSS	TA-ac	1h	960			191191	8	4
INFN	MI	4	LASA	IT	TA-ac	1h	6400			440000	120	80
INFN	Salerno	1	THOR	IT	TA-ac	1h	272			87500	8	8
CNRS	IJCLAB	4	SUPRATECH	FR	VA-ac	1h	672			81850	4	4
CEA	IRFU	2	SYNERGIUM	FR	TA-ac	1h	640			236155	20	20
CERN	XBOX	1		CH	TA-ac	1h	400			45510	32	8
KIT	ALFA	2	FLUTE, KARA	GE	TA-uc	1h	330	49.3	16261		15	3
							880	383	336930		40	8
UKRI	CLARA	1		UK	TA-ac	1h	150			91262	16	8
INFN	LNF	3	BTF(1,2) SPARCLAB	IT	TA-ac	1h	1176			212562	14	7
							1680			212940	20	10
CEA	LIDYL	1	UHI100	FR	TA-uc	1h	640	117		74899	12	4
INCT	RAPID	3	RAPID	PL	TA-ac	1h	600			78000	60	24
CERN	CLEAR	1		CH	TA-ac	1h	1200			4434000	90	30
INFN	LNL/LNS	1	NSDBF+AIPF	IT	TA-uc	Beam hour	4400	70	308000		200	50
GANIL	GANIL-SPIRAL2	1	GANIL-SPIRAL2	FR	TA-uc	Beam hour	3256	108	351403		275	35
CNRS	IJCLab	1	ALTO	FR	TA-uc	Beam hour	1 860	100	186000		76	30
GSI	GSI-FAIR	1	GSI-FAIR	DE	TA-uc	Beam hour	3350	150	322500		300	36
CERN	ISOLDE	1	ISOLDE	IO	TA-uc	Beam hour	4500	70	315000		500	100
CERN	n_TOF	1	N_TOF	IO	TA-uc	Beam hour	504	153	77112		130	6
JYU	JYFL	1	JYFL	FI	TA-uc	Beam hour	3500	75	262500		300	60
UNIWARSAW	NLC_SLCJ	1	SLCJ	PL	TA-uc	Beam hour	1000	103.5	103500		40	8
IFJ PAN	NLC_CCB	1	CCB	PL	TA-uc	Beam hour	550	103.5	57200		20	5
IFIN	TANDEN	1	TANDEM	RO	TA-uc	Beam hour	4100	35	143500		100	40
USE	CLEAR_CNA	1	CNA	ES	TA-uc	Beam hour	640	35	22400		36	16
ATOMKI	CLEAR_ATOMKI	1	ATOMKI	HU	TA-uc	Beam hour	640	35	22400		36	16
IST	CLEAR_Lisboa	1	IST	PT	TA-uc	Beam hour	640	35	22400		36	16
FBK	ECT*	1	ECT*	IT	TA-uc	Visitor day	1280	94	120320		256	18
IFJ PAN	Theo4Exp	1	MeanField4Exp	PL	VA-ac	Hour	360			270000	40	
USE	Theo4Exp	2	Reaction4Exp	ES	VA-ac	Hour	400			292506	80	
UMIL	Theo4Exp	3	Structure4Exo	IT	VA-ac	Hour	160			189000	20	
CERN	PS & SPS			IO	TA-uc	Beam hour	8736	0	0		504	56
DESY	TESTBEAM			GE	TA-uc	Beam hour	8640	0	0		120	30
PSI	PiM1 & UCN			CH	TA-uc	Beam hour	5376	0	0		136	32
RBI	RBI-AF			HR	TA-uc	Beam hour	504	130	65520		24	12
ITAINNOVA	EMCLab			ES	TA-ac	Test hour	800			82500	56	14
CERN	IRRAD			IO	TA-uc	Beam hour	4000	0	0		65	16
CERN	GIF++			IO	TA-uc	Beam hour	4060	0	0		74	14
JSI	TRIGA			SI	TA-uc	Beam hour	700	250	175000		150	50
IFJ PAN	AIC-144			PL	TA-uc	Beam hour	800	140	120000		140	28
UCL	HIF-LIF-NIF			BE	TA-uc	Beam hour	100	720	72000		20	10
UoB	MC40			UK	TA-uc	Beam hour	300	270	81000		36	12

EURO-LABS Timeline

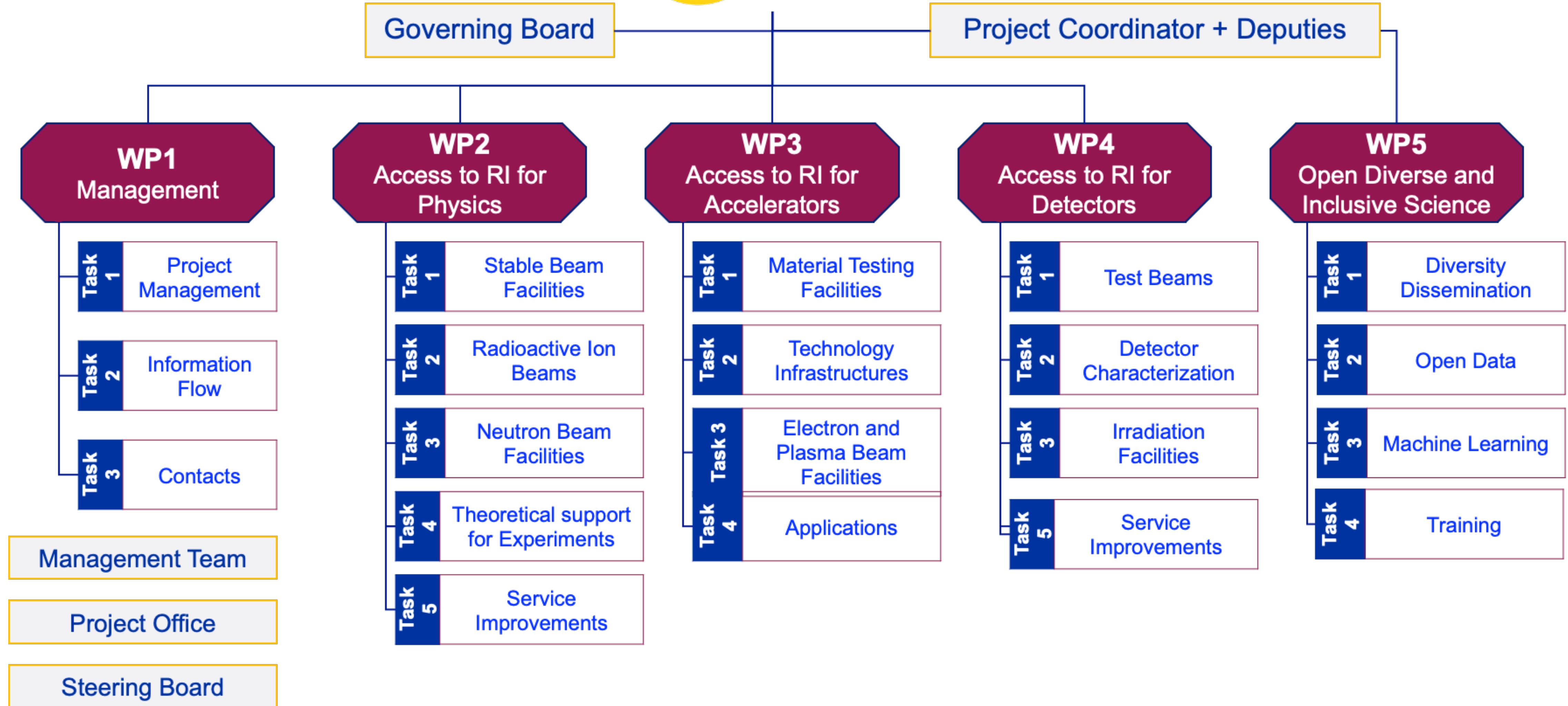
- **Deadline of the call: 23/09/2021**
- **Results of the evaluation: ~23/02/2022**
- **Grant agreement: ~ 23/05/2022**
- **Beginning of the Project: 01/06/2022 ?**
- **Duration: 01/06/2022 - 30/05/2026 ?**

Conclusions

- **First joint EU proposal between Nuclear Physics, HEP accelerators and HEP detectors!**
 - Initially not easy to organise, but with some effort we managed.
 - Total EC budget: **14.5 million €**
- **HEP communities have two ongoing EU projects: **I.FAST** and **AIDAinnova****
 - Agreed to leave a larger share of the pie to Nuclear Physics (~50%)
- **28 Beneficiaries** (partners)
- **6 Associated partners**
- **39 Research Infrastructures in 12 countries**
 - 15 for Nuclear Physics
 - **24 for HEP**
- **Mostly Transnational Access**
 - Nevertheless also a non-negligible amount of money for service improvements
- **Beginning of the Project: **01/06/2022** ?**

Backup slides

EURO-LABS structure



WP2 Access to RI for Physics



Paul Greenless JYFL

Task 1

Stable Beam
Facilities

ALTO Orsay, CLEAR (Debrecen, Lisbon, Seville), GANIL Caen, GSI Darmstadt, IFIN-HH Bucharest, JYFL Jyväskylä, LNL-LNL (Legnaro, Catania), NLC (SLCJ Warsaw & CCB Krakow)

Iulian Stefan IJC

Task 2

Radioactive Ion
Beams

ALTO, GANIL Caen, GSI Darmstadt, JYFL Jyväskylä, ISOLDE CERN, LNL-LNL (Legnaro, Catania)

Alberto Mengoni ENEA/NTOF-CERN

Task 3

Neutron Beam
Facilities

ALTO Orsay, CLEAR (Seville, Debrecen), GANIL Caen, n-ToF CERN

Gert Aarts ECT*

Task 4

Theoretical Support for
Experiments
(TA & VA)

ETC* FBK (Trento)

Theo4Exp VA

(Krakow, Seville, INFN-Milano).

Marko Duranto GSI

Task 5

Service Improvements

Streamlined
procedures. +Remote
access

Bio medical

Ion source
improvements

Target developments

Traveling detectors (γ)

WPs and Tasks

Task 1.1: Project management and coordination

WP1

- **Task 2.1:** TA to RIs delivering Stable Ion Beams,
- **Task 2.2:** TA to RIs delivering Radioactive Ion Beams (RIB)
- **Task 2.3:** TA to RIs delivering Neutron Beams
- **Task 2.4:** encompasses two RIs targeted to offer theoretical support for experiments (TA + VA): ECT* Trento (TA) and Theo4Exp VA.
- **Task 2.5:** Service improvement

WP2

- **Task 3.1: (TA) Material testing** – participating RIs : CERN-HiRadMat
- **Task 3.2: (TA) Technology infrastructures** – participating RIs : UU-FREIA, INFN(LASA,THOR), CNRS/IJLAB-SUPRATECH, CEA/LRFU-Synergium, CERN-XBOX
- **Task 3.3: (TA) Electron and plasma beams** – participating RIs : KIT-ALFA(KARA,FLUTE), STFC-CLARA, INFN-LNF(BTF,SPARC-LAB), CEA/LIDYL-LPA-UHI100
- **Task 3.4: (TA) Applications** – participating RIs: INCT-RAPID, CERN-CLEAR.

WP3

- **Task 4.1:** TA Access to *Test Beam* RIs (CERN, DESY and PSI)
- **Task 4.2:** Access to **Detector Characterization** RIs (RBI (Croatia) and the Electromagnetic Compatibility Laboratory ITAINNOVA (Spain)).
- **Task 4.3:** Access to **Irradiation** RIs (Birmingham (UK), CERN (IRRAD and GIF++), JSI (Slovenia), IFJ-PAN (Poland) and UCLouvain (Belgium)).
- **Task 4.4:** Service improvements at each RI

WP4

- **Task 5.1:** Diversity and dissemination
- **Task 5.2:** Open Science and Data Management
- **Task 5.3:** Machine Learning
- **Task 5.4:** Training

WP5

Gantt chart of Milestones and Deliverables

		Year 1												Year 2												Year 3												Year 4																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																						
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Summary of staff effort

Participant number	Short name	WP1	WP2	WP3	WP4	WP5	Total PM per participant
1	INFN	48.0	45.5	21.0	0.0	48.0	162.5
2	GANIL	0.0	12.0	0.0	0.0	24.0	36.0
3	CERN	24.0	0.0	16.5	82.0	0.0	122.5
4	JSI	0.0	0.0	0.0	18.0	0.0	18.0
5	IFJ PAN	0.0	72.0	0.0	11.0	0.0	83.0
6	DESY	0.0	0.0	0.0	16.0	0.0	16.0
7	UCLouvain	0.0	0.0	0.0	3.0	0.0	3.0
8	RBI	0.0	0.0	0.0	8.0	0.0	8.0
9	CNRS	0.0	10.0	2.0	0.0	18.0	30.0
10	FBK	0.0	0.0	0.0	0.0	0.0	0.0
11	ITAINNOVA	0.0	0.0	0.0	17.0	0.0	17.0
12	UoB	0.0	0.0	0.0	18.1	0.0	18.1
13	UNIWARSAW	0.0	24.0	0.0	0.0	0.0	24.0
14	GSI	0.0	43.0	0.0	0.0	54.0	97.0
15	IFIN	0.0	4.0	0.0	0.0	0.0	4.0
16	USE	0.0	52.8	0.0	0.0	0.0	52.8
17	IST	0.0	0.0	0.0	0.0	0.0	0.0
18	ATOMKI	0.0	8.0	0.0	0.0	0.0	8.0
19	JYU	0.0	12.5	0.0	0.0	0.0	12.5
20	UU	0.0	0.0	20.0	0.0	0.0	20.0
21	CEA	0.0	0.0	20.0	0.0	12.5	32.5
22	KIT	0.0	0.0	0.0	0.0	0.0	0.0
23	UKRI	0.0	0.0	6.0	0.0	0.0	6.0
24	UMCG	0.0	12.0	0.0	0.0	0.0	12.0
25	FEP	0.0	0.0	0.0	0.0	0.0	0.0
25	INCT	0.0	0.0	16.0	0.0	0.0	16.0
26	CSIC	0.0	0.0	0.0	0.0	0.0	0.0
27	PSI	0.0	3.0	0.0	0.0	0.0	3.0
28	JINR	0.0	0.0	0.0	0.0	0.0	0.0
29	RIKEN	0.0	0.0	0.0	0.0	0.0	0.0
30	MSU	0.0	0.0	0.0	0.0	0.0	0.0
31	TUD	0.0	0.0	0.0	0.0	0.0	0.0
32	UMIL	0.0	40.8	0.0	0.0	0.0	40.8
33	LIP	0.0	0.0	0.0	0.0	0.0	0.0
Total PM		72.0	339.6	101.5	173.1	156.5	842.7

Service improvement

WP4

- **4.4.1:** Data base handling of beam time and irradiation requests (4.1.1 CERN TB, 4.3.1 IRRAD & 4.3.2 GIF++)
- **4.4.2:** Precision motion stages for large detector setups (4.1.2 DESY test beams)
- **4.4.3:** Beam monitor (4.1.3 PSI test beams)
- **4.4.4:** Ion beam focusing lens (4.2.1 RBI-AF)
- **4.4.5:** Cooling System and Graphical User Interface for EMC test station (4.2.2 ITAinnova)
- **4.4.6:** Beam profile monitor (4.3.1 CERN IRRAD)
- **4.4.7:** Cadmium shielding in the tangential channel (4.3.3 JSI TRIGA)
- **4.4.8:** 2-D scanning table for irradiation (4.3.4 IFJ-PAN AIC-144)
- **4.4.9:** Test chamber for the heavy ions irradiation facility (4.3.5 UCL CRC)
- **4.4.10:** Scanning system upgrade for high fluence delivery (4.3.6 UoB MC40)

WP3

HiRadMA@ CERN : study to use a lower energy extracted beam from SPS (down to 20 GeV if possible) that would open interest for MC studies.

FREIA @ Uppsala : new electronics for RF powers to increase the offer of frequencies not just the ones of LHC. Interesting for MURRHA cavities or others, Tools to measure online the magnetic field of the magnets while tested at cold.

KARA +FLUTE @ KIT : Simulation, measurement and data management framework, basically a framework for experiment preparation and data analysis for the users of the facilities - potentially exported to other facilities beyond KIT

WP2

2.5
Service Improvements
<i>Streamlined procedures. +Remote access</i>
<i>Bio medical</i>
Ion source improvements
Target developments
Traveling detectors (g)