



Izglītības un zinātnes
ministrija

Implementation of the CERN Strategy

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CERN National Contact point of Latvia

Riga, 05.06.2024



Outline

1. Scientific / research portfolio – emphasis on HEP and AT
2. Latvia @CERN and related research
3. Institute of Particle Physics and Accelerator Technologies
4. Doctoral Programme in HEP and AT
5. Participation in CERN related outreach activities
6. Latvia CERN Stakeholders Group
7. Relevant Government decisions and financial framework
8. CERN Baltic Group initiatives



Ministry of
Education and Science
Republic of Latvia

**Latvia is a reliable and
honest partner of CERN**

Latvia – CERN Strategy



researchLatvia^{*}
Value Through Knowledge





Latvia - CERN strategy

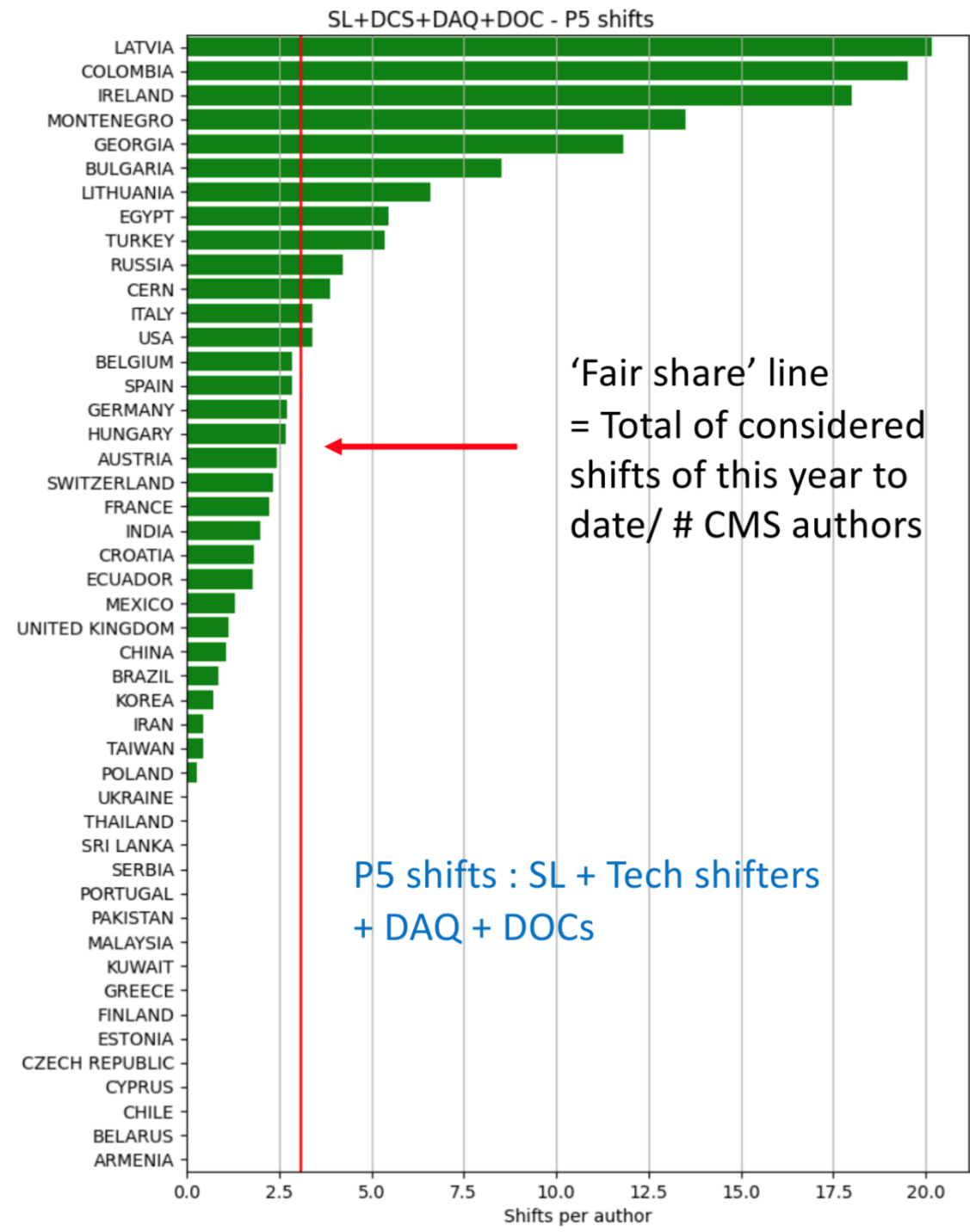
Publicly available, including its English translation

- Approved by Government in Dec 2022
- Has very clear and detailed implementation plan
- Is being successfully **coordinated** by CERN National Contact Point of Latvia and **implemented by all** involved parties
- Benefits from **comprehensive** public **funding** mechanism and **stakeholder engagement**
- The main **goals are** being **steadily assured**
 1. Meaningful and coordinated participation of Latvia at CERN in the Associate Member state status
 2. To become Full Member state within 2-3 years



Latvia is a reliable and honest partner of CERN

2022 data



I.

Meaningful and coordinated participation of Latvia at CERN in the Associate Member state status



Tasks for associate membership

1. To benefit from the **opportunities** at CERN – in the best possible way and at all levels
2. To provide sustainable contribution in attaining the **State priorities** in education, science, economic development and R&D
3. To foster environment of the **scientific excellence and industrial leadership**
4. To concentrate available and to attract new **human resources** / to use strategically available **financial instruments**
5. Within the next years to achieve “**well balanced country**” status and to ensure **60/40 proportion** for scientific HR / industrial return



Scientific/research portfolio

Based on the bottom-up initiatives / balance & diversity / strategic approach

CERN based experiments and collaborations

- **CMS** as a **HEP flagship** project (RTU+LU)
- **MEDICIS** (RTU+LU)
- AEGIS (LU)
- ISOLDE/LIEBE (LU)
- Crystal Clear Collaboration (LU)

Development of new projects and technologies at CERN

- Accelerator & Technology Sector /ATS-DO
- Engineering and Technology Departments
- Future Circular Collider study (FCC)
- International Muon Collider Collaboration

EU funded projects CERN coordinated/associated

Riga Technical University (RTU)

- I.FAST
- HITRIplus
- NIMMS

University of Latvia (UL)

- PRISMAP
- QuantHEP



Where we stand?

Benefiting from the **opportunities** at CERN – **in the best possible way** and **at all levels** - *participation and contribution*

1. Consortium (RTU+LU) in the **CMS experiment** – **since 2017**
2. Consortium (RTU+LU) in the **MEDICIS experiment** – **since 2020**
 - The European medical isotope programme: Production of high purity isotopes by mass separation (**PRISMAP**) project – **since 2021**
3. LU in **AEgIS** experiment – **since 2021**
4. LU in **ISOLDE** experiment – **revitalised in 2023**
5. Participation of the RTU in CERN **accelerator technology projects**
 - Future Circular Collider (**FCC**) – **since 2015**
 - International Muon Collider Collaboration (**IMCC**) – **since 2023**
 - Next Ion Medical Machine Study (**NIMMS**) project – **since 2019**
 - Innovation Fostering in Accelerator Science and Technology (**I.FAST**) project
 - Heavy Ion Therapy Research Integration plus (**HITRIplus**) Project – **since 2021**



Where Latvia is today?

Benefiting from the **opportunities** at CERN – **in the best possible way** and **at all levels** - *Where you can physically find Latvia @CERN?*

1. Latvia Accelerator Technology team is fully integrated within CERN
 - ATS-DO and @B 584
2. Close collaboration with Groups at CERN: Beams; Cryogenics and Vacuum
3. Leading role in CMS MTD and BTL in particular
 - CMS Tracker Integration Facility (TIF)
4. CMS and CMS Technical Coordination – @B40, @Prévessin site and Point5
5. AEGIS experiment – @Antimatter Factory
6. MEDICIS experiment - @ISOLDE/MEDICIS
7. + groups in Latvia @Riga Technical University and University of Latvia + Tier2 federative partners



CERN research in Latvia

Other institutes carrying out CERN related research and projects

University of Latvia

1. Institute of Chemical Physics – Prof. Elina Pajuste group - **CMS** and **MEDICIS/PRISMAP**
2. Faculty of Physics, Mathematics and Optometry - Prof. Mārcis Auziņš group – **AEgIS**
3. Institute of the Solid State Physics – Dr. Anatoli Popov group- **Crystal Clear Collaboration**
4. Institute of Atomic Physics – Dr. Uldis Bērziņš group – **ISOLDE**
5. Quantum Computing group of Prof. Andris Ambainis - **QuantHEP**

Riga Technical University

1. Institute of Particle Physics and Accelerator Technology – **leading national institute** – see following info
2. Department of artificial intelligence and systems engineering - Prof. Agris Nikitenko group – **I.FAST** + Mechatronics, **Robotics** and Operations section **at CERN**
3. Institute of technical Physics – Prof. Arturs Medvids group – **I.FAST**
4. Students of Institute of Mechanics and Mechanical Engineering - **I.FAST** and **HITRIplus**
5. Leading High Performance Computing (HPC) Centre – **Tier2** project - **WLCG**



CERN-HR-STAFF-STAT-2023

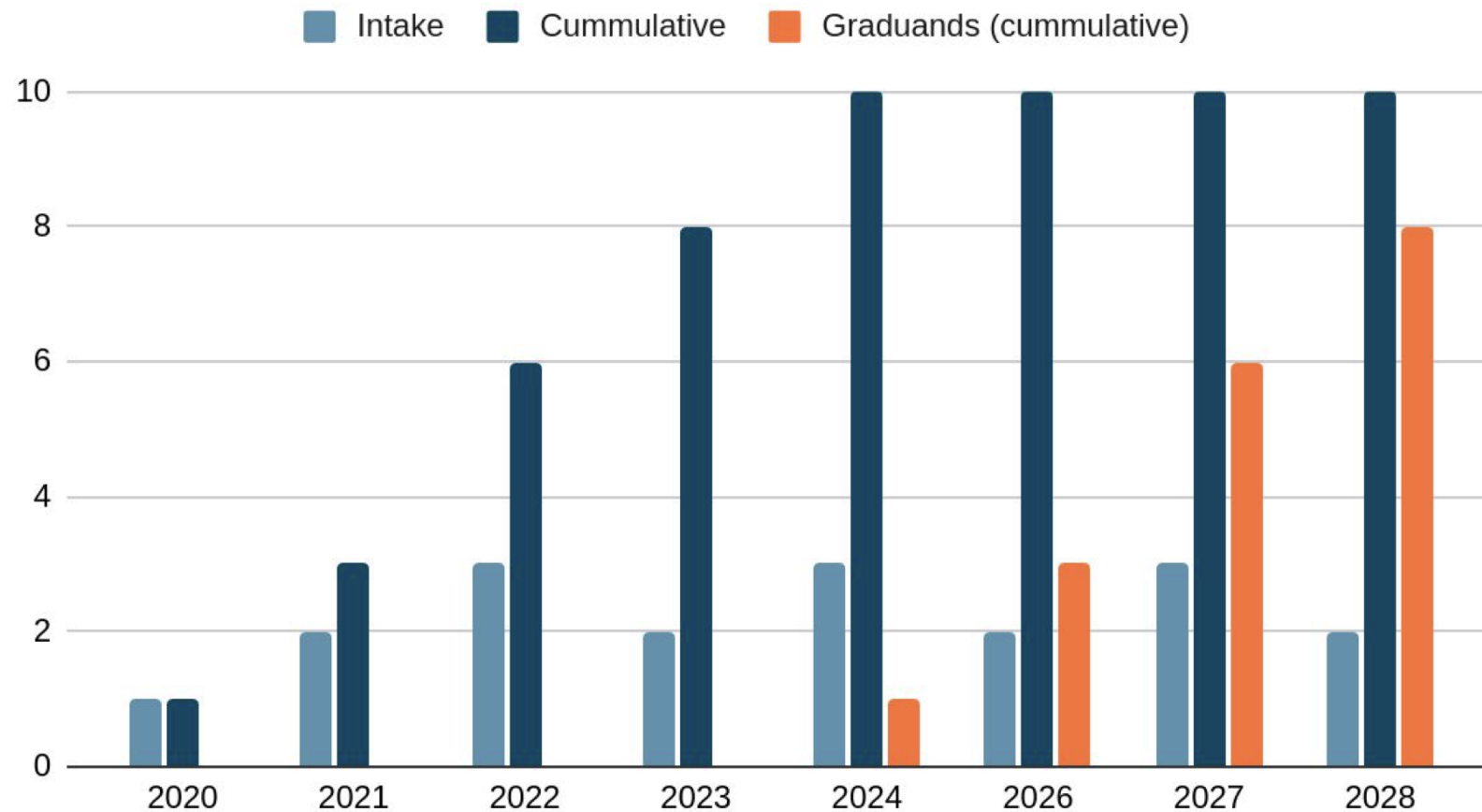
Benefiting from the **opportunities** at CERN – **in the best possible way** and **at all levels** – **reminder** – **Latvia joined CERN in Aug 2022!**

1. CERN **Doctoral** Student Programme (DOCT) – 7
2. CERN – Latvia **Doctoral** Programme – 100% paid by Latvia - 4 so far
3. CERN **Technical** Student Programme (TECH) - 1
4. CERN **Summer** Student Programme (2+2 every year) – 20 since 2013
5. **Internship** at CERN (STAG programme) – 1
6. Participation in CERN **Graduate** Programmes
 - Project Graduates (GRAD) - 1
 - Research Fellows (FELL) – 4
7. CERN (**STAF**) - 5 staff / 4F

MPE - 4 and MPA – 27
+ 21 Users

Where Latvia is today?

Projected CMS-Latvia HEP PhD students



Patreizējie



Projicētie

Courtesy of K.Dreimanis



To continue capacity and competency building in HEP and AT

To maintain strong CERN related scientific institute with multidisciplinary research team and presence at CERN



Dedicated doctoral programme

- In collaboration with CERN Baltic Group – **designed by CBG** Study Programme Working Group
- # of PhD students: 4th y – **1**; 3rd y **6**; 2st y **4**; 1st y **3**;
- Students are **co-supervised by CERN** staff
- Strong presence of **international students**
- Executed in Latvia with mandatory **term at CERN**
- **World class** lecturers: Latvia, CBG, CERN, PSI
- Balance between **HEP** and **AT**
- [International Study Program Council](#)
- Relevant **master programme** is being developed

- RTU, together with the CERN Baltic Group partners, aims to develop a new interdisciplinary master's study programme targeting both high-energy physics and its instrumentation, including accelerator technologies.
- Clearly identified by ECFA as a critical need for the future of the field of HEP [see R&D roadmap document: <https://cds.cern.ch/record/2784893>];
- **RTU was awarded 55 kEur from the Erasmus+ call Erasmus Mundus Design Measures in October 2022; Aim: *creation of a consortium and common tools for an international study programme in the Baltics.***
- Initial consortium created by five universities within the CBG:
 - Riga Technical University [LV, lead];
 - University of Latvia [LV];
 - University of Tartu [EE];
 - Kaunas University of Technology [LT];
 - Vilnius University [LT].



- Work ongoing; aim to submit an Erasmus Mundus Joint Master's project proposal in February 2024 or 2025.
- Subsequently, intake of the first cohort would be the academic year of 2025/26 or 2026/27.



Where Latvia is today?

- To concentrate available and to attract new **human resources** / to use strategically available **financial instruments** – **2M+/annum + ILO costs**
- To foster environment of the **scientific excellence and industrial leadership**

1. National **Research Programme** “High-Energy Physics and Accelerator Technologies” – **300 000 EUR in 2024** – will be doubled at least
2. CERN **membership** payments – **1.066 250 CHF in 2024**
3. Comprehensive **public funding** package - **950 788 in 2024**, of which
 - participation in CERN experiments – **511 282 EUR**
 - CERN National Contact Point, incl. Outreach and education activities – **339 506 EUR**
 - Tier2 Computing Center – **100 000 EUR**



Where Latvia is today?

Providing sustainable contribution in attaining the **State priorities** in education, science, economic development and R&D

Outreach / annual activities – fully paid by Latvia

There were 1000+ LV nationals visiting CERN

1. “**shadowing**” of the LV scientific and technical personnel at CERN - 31
2. High School pupil visits to CERN - 49
3. Pupil visits to CERN – the **School of Young Physicists** - 3
4. The **Riga TechGirls** visits to CERN - 4
5. Master and doctoral student (groups) **educational visits** to CERN - 65
6. Participation in the **CERN Teacher Programme** – 100+ teachers



Where Latvia is today?

Providing sustainable contribution in attaining the **State priorities** in education, science, economic development and R&D

Outreach / annual activities – fully paid by Latvia

1. CERN **permanent exposition** in the LV National Library – **inauguration**
2. i.e. lecture course for the RSU Doctoral students: “Particle Physics technologies for the health care” – **ongoing**

+ active at

- CERN Teacher and Student Forum
- CERN 70



Geneva/CERN based ILO

To ensure meaningful Latvian business participation @CERN

CERN as priority

- ILO KPI's are directly based on industry engagement

Knowledge Transfer

- Technological and knowledge return to Latvia by engaging R&D capable companies

Well-balanced industrial return

- To ensure fulfilment of the current 'quota'
- To prepare industrial portfolio for the full-membership @CERN
- To closely collaborate with Latvian scientific and engineering community at CERN



ILO and National Contact point

Within the next years to achieve “**well balanced country**” status and to ensure **60/40 proportion** for scientific HR / industrial return

1. CERN based ILO as of Feb 2024
2. Fulfilment and coordination of the ILO functions with the LV scientific and technical groups at CERN
3. [CERN Latvia Liaison Committee](#)

+ active at:

- CERN ILO forum
- CERN KT forum
- etc.

well balanced country and to ensure 60/40 proportion?

Table 44: Return on Staff Hires by Nationality in 2023

Nationality	Hired		Contribution	Return on Hired
	HC	%	%	%
AT	2	1.2	2.2	53.9
BE	6	3.5	2.7	129.3
BG			0.3	0.0
CH	9	5.2	3.7	141.8
CY	1	0.6	0.1	665.8
CZ	2	1.2	1.1	102.4
DE	5	2.9	20.5	14.2
DK	1	0.6	1.8	32.5
EE			0.1	0.0
ES	20	11.6	7.1	164.5
FI	1	0.6	1.3	44.3
FR	43	25.0	13.2	190.1
GB	13	7.6	14.6	51.7
GR	8	4.7	1.0	481.4
HR			0.1	0.0
HU			0.7	0.0
IL			2.0	0.0

IN	2	1.2	1.4	84.5
IT	20	11.6	9.8	118.3
LT	1	0.6	0.1	715.3
LV	3	1.7	0.1	2,052.9
NL	2	1.2	4.7	24.9
NO	4	2.3	2.1	111.1
PK	1	0.6	0.2	350.0
PL	11	6.4	3.0	213.8
PT	7	4.1	1.1	375.6
RO	2	1.2	1.2	93.5
RS			0.3	0.0
SE	1	0.6	2.5	23.3
SI			0.2	0.0
SK	1	0.6	0.5	112.2
TR	3	1.7	0.4	454.7
UA	2	1.2	0.1	1,430.7
NMS	1	0.6		0.0
Total	172	100.0	100.0	

“Return on Hired” is calculated as the number of hired divided by the respective MS contr



Where Latvia is today?

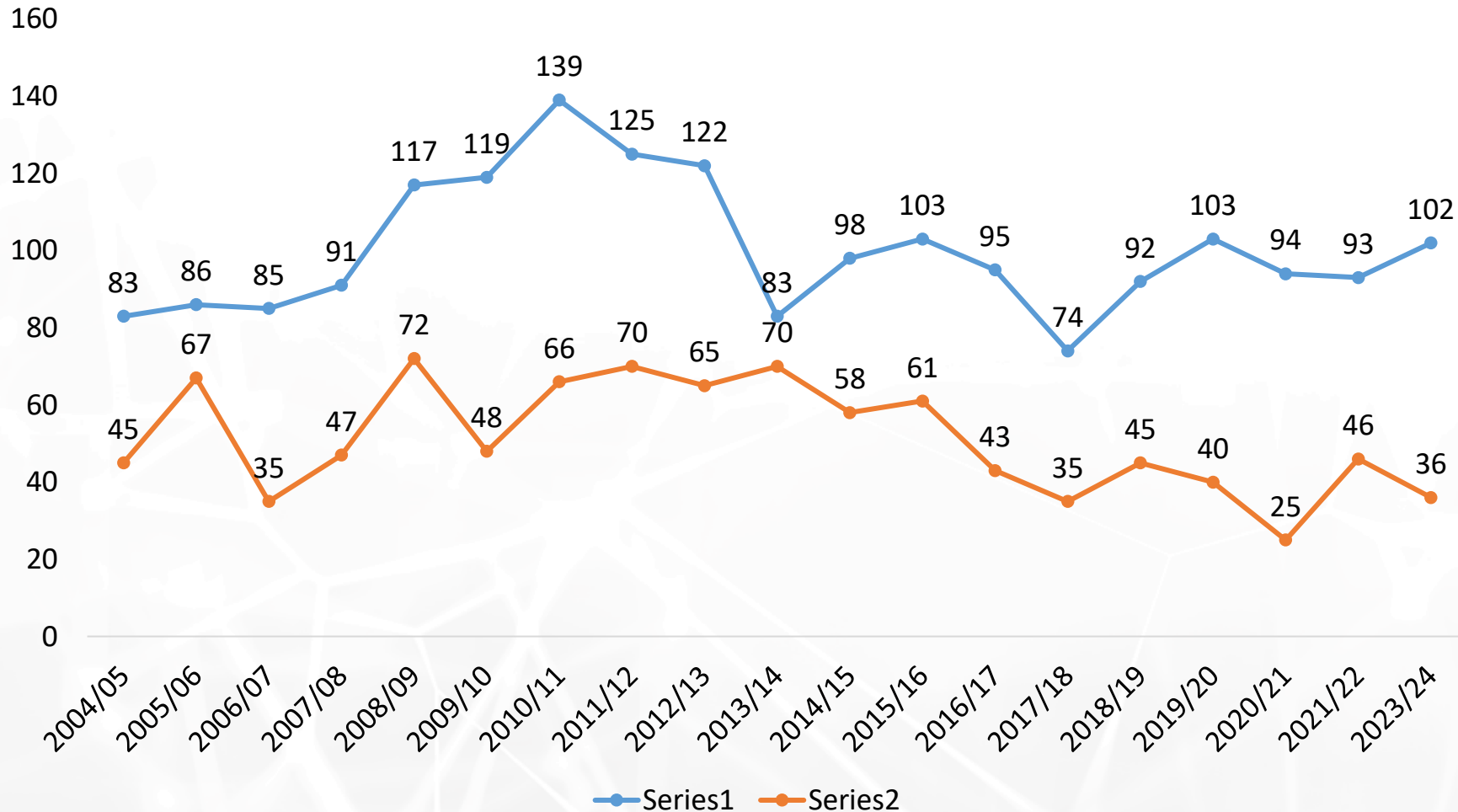
Providing sustainable contribution in attaining the **State priorities** in education, science, economic development and R&D

- To promote collaboration between Latvia and CERN, scientific groups and entrepreneurs

1. CERN **Latvia** (stakeholder) **Group** and close link with Latvian **staff at CERN – 14th meeting was on Apr @CERN**
2. Joint **doctoral study programme** “Particle Physics and Accelerator Technologies” by the RTU and LU – **up and running – thanks to CBG!**
3. Federated **Tier-2** CERN/CMS computing centre – inauguration
4. **Institute of Particle Physics and Accelerator Technologies – up and running**

Overall dynamics of physics higher education in Latvia

Physics students in Latvia over time

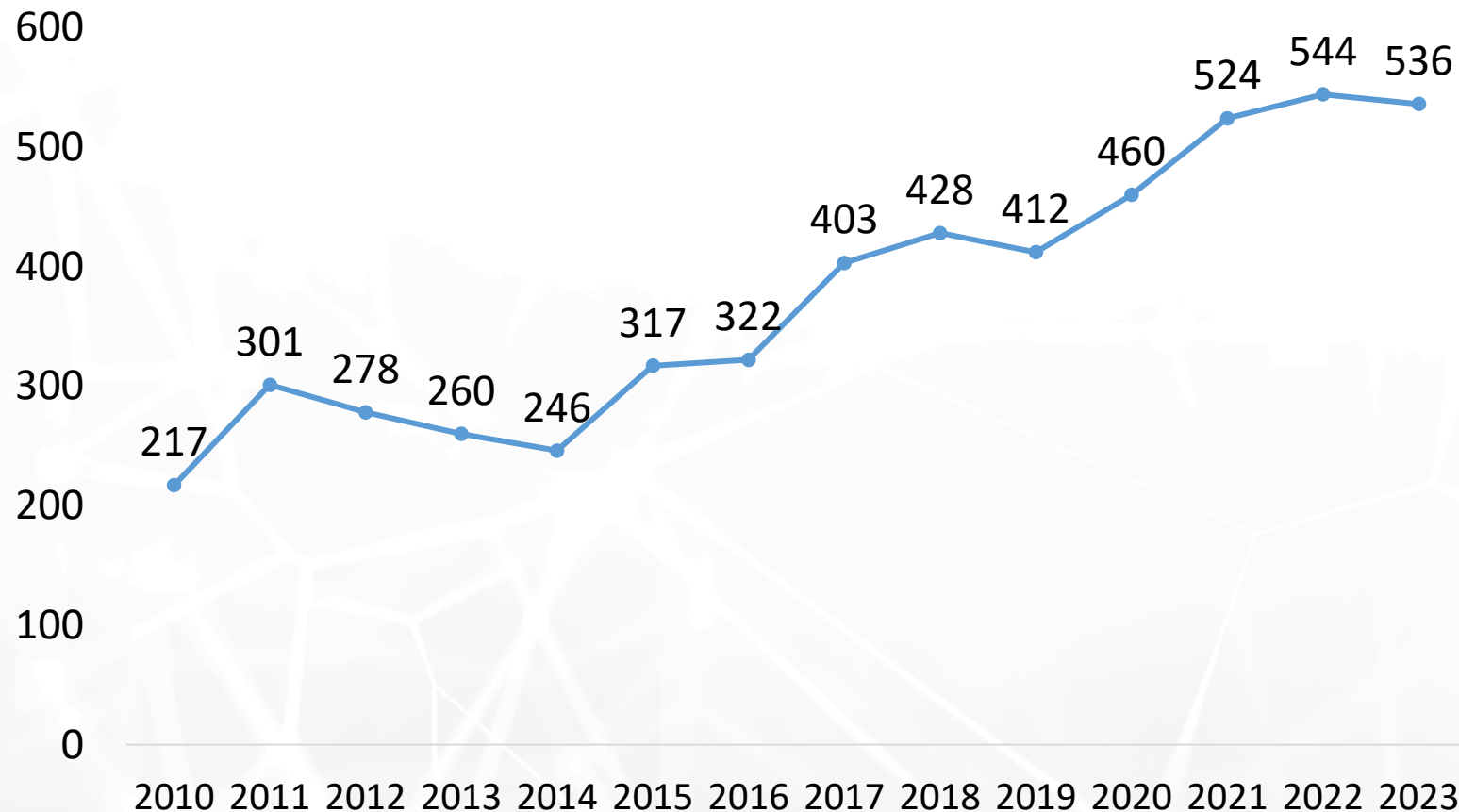


Sensitive to demographic factors.

Increased enrollment since 2017 (positive effect from CERN)

Overall dynamics of physics research in Latvia

Research publications in physical sciences in Latvia
(Scopus)



Physics research output has doubled since 2014

It amounts to 16% of total research output in Latvia



Ministry of
Education and Science
Republic of Latvia

Latvia – CERN Strategy

Full membership at CERN



researchLatvia*
Value Through Knowledge





Full membership at CERN

Tasks – scientific and technical measures

1. To ensure stable **financial framework** for CERN activities in Latvia – ensuring **50/50 principle** – where proportion of the national funding is gradually exceeding CERN membership
2. To continue **capacity and competency** building in HEP and AT: to maintain strong CERN related **scientific institute** with interdisciplinary research team and presence at CERN; to run master level programme in HEP and AT
3. To facilitate **industrial return** and engagement with CERN; including ILO organised dedicated events in Latvia
4. To cultivate a **positive image** of Latvia – CERN cooperation

#LatvijaCERN

Estimated timeline for full membership

2024 2nd half

Application for Associate Member State in the pre-stage to Membership

2025

CERN visit to Latvia, to access compliance with pre-stage - "Task force"

Expected formal invitation to go in pre-stage to the full membership

2025

Cabinet of Ministers decision about application
CERN decision

2026

- Signature of pre-stage Agreement
- Saeima ratifies law on Agreement
- Latvia becomes Member State in the pre-stage to Membership of CERN

2026/2027

Completion of the full cycle
Latvia becomes Member State of CERN



Engagement of decision-makers and partners

1. To ensure **support from CERN** management and **Member States**
2. To actively participate in the work of the **CERN Council** and committees by forming a positive opinion about Latvia's eligibility for the status of a full-fledged Member State
3. To **coordinate** the participation of Latvia in the work of the CERN Council and its committees
4. To promote coordination at the level of the **Baltic States**, which involves speaking with one single voice in the context of CERN at the level of the **CERN Baltic Group** and **Baltic Assembly**



Engagement of decision-makers and partners

1. To **ensure** unwavering **support** from the Latvian government, Parliament, scientific community, entrepreneurs, and collaboration partners
2. To promote indirect support from the European Commission
3. Regular high-profile **decision maker and stakeholder** visits to CERN and events in Latvia
4. Strong policy makers **commitment to the 50/50 principle!**



Scientific and technical measures

1. To ensure **stable** State **funding** for CERN activities in Latvia – multi-annual budget planning with the steady growth
 2. To **increase the capacity and competence** in the field of high-energy physics and accelerator technologies (**done!**):
 - Establishment of a scientific institute associated with CERN in LV
 - A stable team of LV scientists operate independently at CERN
 3. To promote the awarding of **industrial contracts** from CERN (ILO)
 4. To build a **positive image** of collaboration with CERN in Latvia
- #LatvijaCERN**



Membership payments

Currency	2024	2025	2026	2027	2028
	Associate member	Associate member in pre-stage to full membership	Associate member in pre-stage to full membership	Full member	Full member
CHF	1 066 250	1 332 813	1 865 938	2 625 000	2 625 000
EUR	1 091 040	1 363 800	1 909 321	2 686 031	2 686 031



CERN experiments and programmes

Activity	2024	2025	2026	2027	2028
CMS*	384 134	404 824	491 651	539 146	586 641
MEDICIS	50 000	80 000	100 000	100 000	100 000
Muon Collider	55 925	55 925	111 850	111 850	111 850
AeGIS	3 223	2 000	2 000	2 000	2 000
Teacher programme	12 000	20 000	20 000	20 000	20 000
Student programmes	6 000	9 000	12 000	12 000	12 000
Total EUR	511 282	571 749	737 501	784 996	832 491

* 5 authors; 2->5 students at CERN; 3->4 senior scientists
+ Phase II upgrade



CERN National Contact Point @ Riga Technical University

Activity	2024	2025	2026	2027	2028
Staff and admin costs	107 791	112 800	112 800	112 800	43 498
Network events with CERN	17 500	32 500	32 500	32 500	32 500
Communication & PR	16 078	18 000	18 000	18 000	18 000
Outreach – visits to CERN	30 000	40 000	40 000	40 000	40 000
Total EUR	171 369	203 300	203 300	203 300	133 998

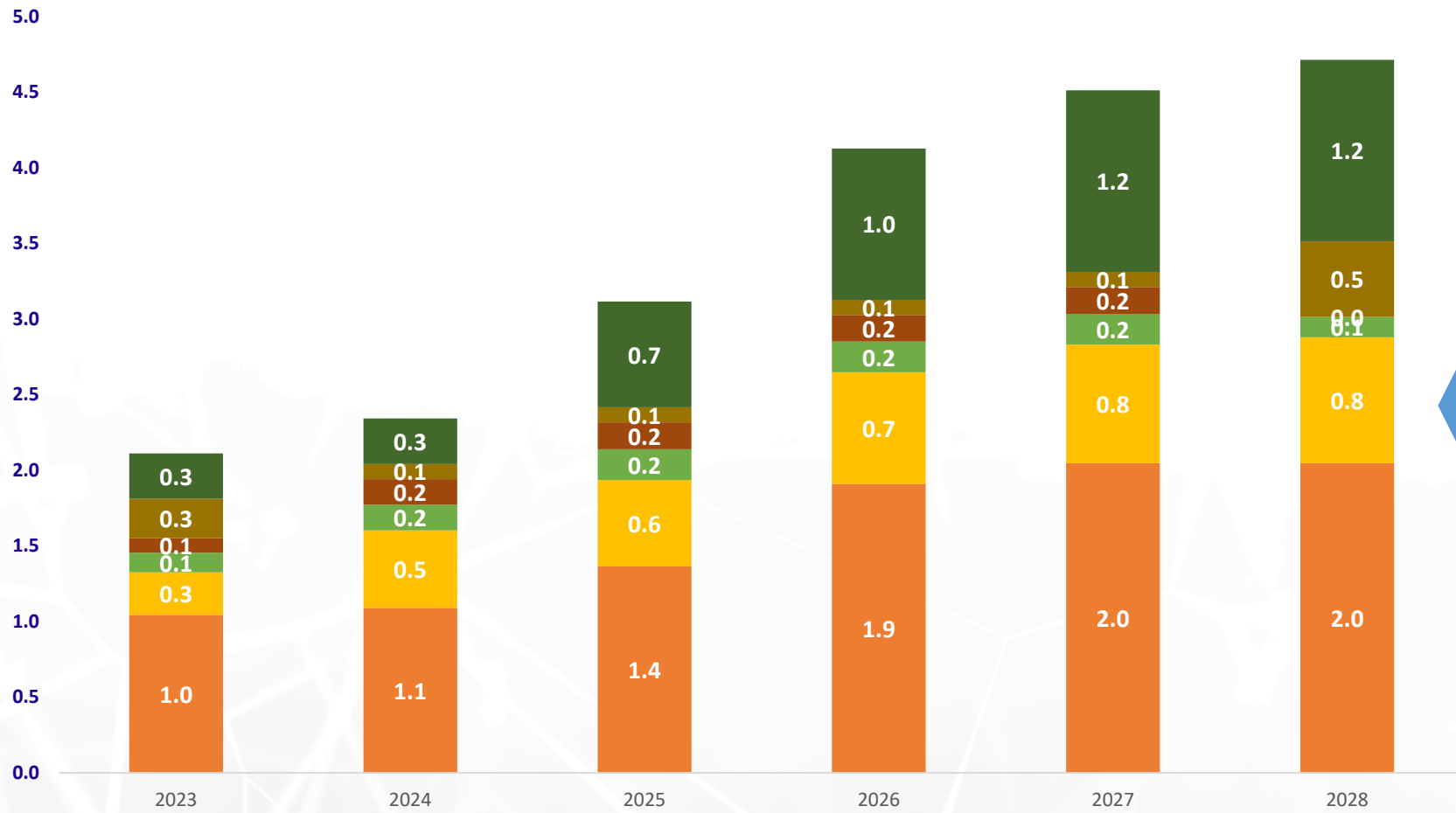


National CERN activities

	2024	2025	2026	2027	2028
State Research Prog. in HEP and AT	300 000	700 000	1 000 000	1 200 000	1 200 000
Tier 2 Site	100 000	100 000	100 000	100 000	500 000
Total EUR	400 000	800 000	1 100 000	1 300 000	1 700 000

Proposed Latvia - CERN budget until 2028

Latvia - CERN budget (in million euros)



Ensuring 50/50 principle – where proportion of the national funding is gradually exceeding CERN membership

- CERN Membership Fee
- CERN experiments and programmes
- CERN contact point activities
- Latvian representation at CERN
- Tier2 computing centre
- State Research programme



Take away messages

Latvia is a reliable and honest partner of CERN

CERN – Latvia membership was and is a very good deed

Latvia has delivering tangible contribution to the CERN
scientific programme

Latvia is ready to take the next step – to become a full
member of CERN

**Latvia is
navigating
steadily**

at cruise
speed and
with
straight-
forward
course

