

Overview of CERN Baltic Group

and

activities in the development of
“*Advanced Particle Therapy
center for the Baltic states*”
initiative

Prof. Toms Torims

Convener of the working group

« Advanced Particle Therapy Center in the Baltic States »





Science Diplomacy vis-à-vis CERN

Baltic style

Common system of values

One voice

Reliable and open

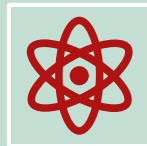
Many challenges = numerous opportunities



CBG objectives



Coordination of the Baltic research institutions activities **towards CERN** and related Collaborations/Experiments



Strengthening and development of Baltic **High Energy Physics Community**



Development of the Baltic international multidisciplinary masters/doctoral level **study programme** in High Energy Physics and Accelerator Technologies

The main principles:
transparency, honesty, sharing and collaboration

Regional dimension

Cooperation

In action

Exchange

Strong

Attractive

Trustful partners

- Riga Technical University
- University of Latvia
- Tallinn University of Technology
- National Institute of Chemical Physics and Biophysics
- Vilnius University
- Riga Stradins University
- University of Tartu
- Kaunas University of Technology
- Vytautas Magnus University
- Ventspils University of Applied Sciences
- Lithuanian Energy Institute
- Daugavpils University
- Lithuanian University of Health Sciences
- National Cancer Institute of Lithuania



How it works?

- **General Meetings:** Riga, Geneva, Tallinn, Vilnius, Kaunas
- Regular work of the Coordination Team and Technical Coordination Meetings
- Sub Group Activities and meetings
- Industry engagement

Σ 60+ joint events

- Well documented
- Well coordinated and strong together

<https://indico.cern.ch/category/10023/>



Success of CBG

- ▶ Collaboration with Baltic Assembly
- ▶ Joint/coordinated position vis-à-vis CERN
- ▶ Strong and united position at CERN Council
- ▶ Stakeholder engagement
- ▶ Major regional events and conferences
- ▶ Joint study programme
- ▶ Flagship project **Advanced Particle Therapy Center for the Baltic States**



In the spirit of CERN

Knowledge

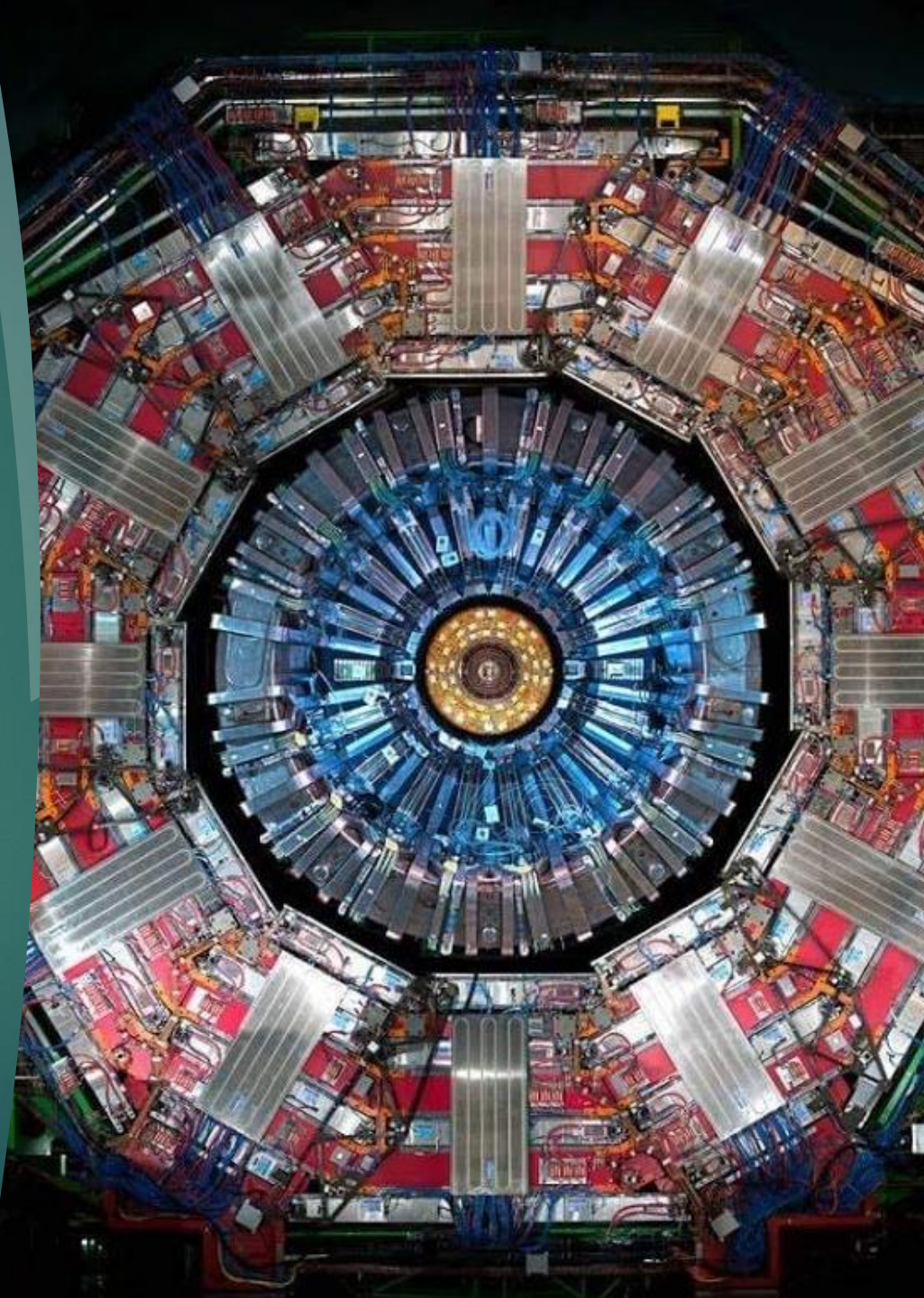
Transparent

Honest

United

Successful

Regional grasp



Science Diplomacy

Baltic style

CERN Baltic Group

We are strong
together

Trust in science
Experience to be
shared





Advanced Particle Therapy Center for the Baltic States

Advanced Technology developed at CERN

Experience

Expertise

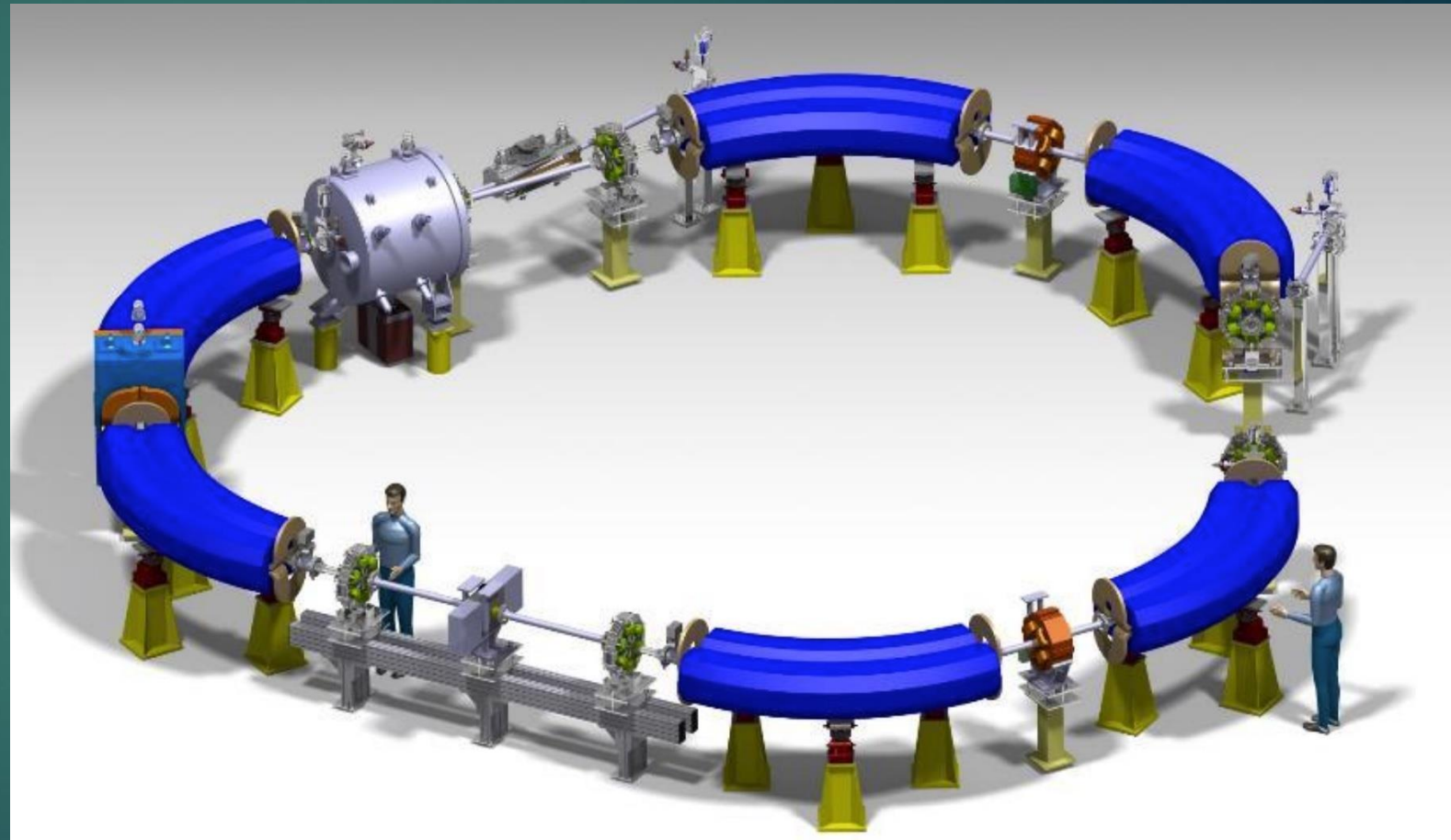
Novel

Practical

EU priorities

Medical community

Supported



Flagship project for 3B

Advanced Cancer Therapy Center

Advanced concept

- ▶ Advanced technology
- ▶ Advanced medically
- ▶ Advanced scientifically
- ▶ Advancing collaboration between 3B
- ▶ Advancing collaboration with CERN
- ▶ Advancing multidisciplinary
- ▶ Advancing STEM
- ▶ Advancing quality of life in the 3B

Regional Center

- ▶ Center of hope for the patients
- ▶ Center of the technological development
- ▶ Center to prevent brain-drain
- ▶ Center of hope and education for young scientists, doctors, researchers, technical specialist
- ▶ Center to push for the excellence
- ▶ Own high-tech lab = regional research infrastructure
- ▶ Center of gravity for the cooperation with CERN

Mandate



On April 12th 2022 within CERN Baltic Group 9th general meeting at CERN

the Advanced Particle Therapy Center in Baltic States Working Group

has been established

Partnership with CERN

Center would be done following NIMMS *main idea* – using the developed technologies within NIMMS collaboration in order to create a unique treatment center

Project has been already started in a framework of working in close collaboration with NIMMS and CERN together in delivering the facility

The proposed project would be one of the leading in Baltic States *portfolio* of collaborations with CERN



April 12th, 2022

“Advanced Particle Therapy center for the Baltic States” working group established within the CERN Baltic group (CBG)

Convener: Prof. Toms Torims (RTU)

Vice-convener: Prof. Diana Adliene (KTU)

October 8th, 2021

CBG discussion with NIMMS collaboration on facility options

February 2022

NIMMS Helium synchrotron working group establishment with involvement of researchers from the CBG

Spring 2022

Development of a dedicated conceptual design report

Important milestone of the project

A dedicated concept paper was developed



Draft concept-paper Advanced Particle Therapy Center for the Baltic States

Background

This concept-paper is prepared following the collegial decision of the CERN Baltic Group (CBG) General meeting of 23 August 2021 “To develop a concept-paper on **Advanced Particle (Cancer) Therapy Center** in the Baltic States, in close cooperation with CERN and relevant stakeholders”.

During the 23 August general meeting, based on the previous discussions, the CBG has reiterated a clear need for one **strategic regional research project** related to the (so far *de facto* non-existent) major Research Infrastructure undertaking in the Baltic States. General meeting unanimously agreed that a very good candidate for this is the **Advanced Particle Therapy Center** in the Baltic States. It has been agreed to elaborate in this direction and to initiate an open discussion between CBG and CERN, also engaging stakeholders from Baltic medical physics, radiotherapy, and oncology communities¹.

Such meeting “Advanced particle therapy options for Baltics” was organised in liaison with CERN on 8 October 2021². Meeting agreed that the best possible option for the Baltic States would be development of the “**The Helium synchrotron**” technology in collaboration with CERN.

During the subsequent CBG General meeting on 22 November 2021 “a need for the **joint CBG flagship project** and joint coordinated actions was emphasised. CBG shall build on its success and use the momentum of Estonia and Latvia joining CERN”. Meeting agreed “to persuade the idea of the potential Flagship project - **Advanced Particle (Cancer) Therapy Center in the Baltic States**, in close cooperation with CERN and relevant stakeholders”.

This concept has been also presented to the Baltic Assembly³ at CERN on 8 Oct 2022. Idea was presented to LIAA and EM in Brussels – full support received. Idea was presented to the ministry of education and science of Latvia – summer 2021



Addressing medical community: professional societies

October 2022 Presentation at the 8th Baltic Radiology congress

January 2023 Presentation at Lithuanian Society of Radiation Therapy conference

March 2023 Presentation for Latvian Therapeutical Radiology Association

June 2023

- Presentation at 19th Nordic-Baltic Conference on Biomedical Engineering and Medical Physics
- Brief introduction to initiative ISRS Educational Course

- Conceptual idea has been discussed with Baltic Nuclear Medicine Association
- Seminars are foreseen with the 3 medical physicist associations in the Baltic States, as well participation in 16th International Conference & Workshop “*Medical Physics in the Baltic States 2023*”

General support on the conceptual idea and initiative with reasonable comments and thoughts – what should be explored in more depth



The scientific community perspective

March 2023 Enhanced Dialogue on R&I System with European Commission – presented as one of the scientific research facility initiatives in the region

May 2023 The helium synchrotron design status presented at IPAC'23
“*CONCEPTUAL DESIGN OF A COMPACT SYNCHROTRON-BASED FACILITY FOR CANCER THERAPY AND BIOMEDICAL RESEARCH WITH HELIUM AND PROTON BEAMS*” with a dedicated section on possible development and implementation of the design in the Baltic States “*A FACILITY FOR THE BALTIC STATES*”

Regular updates from working group at CBG General meetings

Conceptual design of a compact synchrotron-based facility for cancer therapy and biomedical research with helium and proton beams

M. Vretenar,¹ M.E. Angoletta,¹ J. Borburgh,¹ L. Bottura,¹ R. Taylor,¹ G. Tranquille,¹ E. Benedetto,² T. Torims,³ K. Pajskis,³ M. Sapinski,⁴ D. Adliene,⁵ E. Korobeinikova,⁷ M. Kalniņa,⁵ E. Gershkevitch⁸

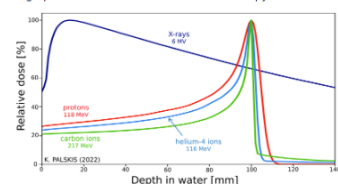


Helium Ions for Cancer Therapy

Helium radiotherapy trialed since 1975 at LBL, USA.

- Sharper Bragg peak compared to protons
- Reduced fragmentation compared to carbon ions
- Increased RBE and reduced OER to protons
- Reduced neutron risk compared to carbon ions

- Compromise of dose conformity & biological effectiveness.
- High potential for helium ion FLASH therapy treatments.

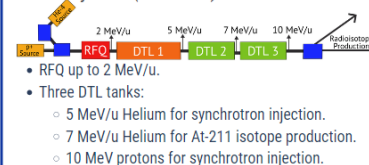


Accelerator Design

Ion Source

- Two ECR ion sources: >2 mA for protons and ⁴He²⁺.
- Delivering 8 x 10¹⁰ ions from synchrotron (2 Gy/l).

LINAC Injector (352 MHz)



Compact Synchrotron

Triangular ring, 33m:



Implementation in the Baltic States

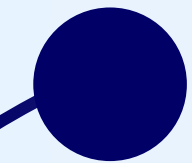
- The Baltic States are without a particle therapy centre. Support is growing in the region to construct such a facility.
- Incidence rate of 630 cases per 100 000 inhabitants: 34% receiving radiotherapy.
- 28 radiotherapy LINACs in region: **Sufficiently developed to move towards particle therapy.**
- Plans for head and neck tumours, sarcomas, complex localisations & paediatric cancers.
- Above treatment, provides **opportunities in accelerator technology, medical physics and (pre-)clinical research.**



Courtesy of: NIMMS collaboration



The bi-lateral meetings with medical and other stakeholders



Set-up of the events

- Invitations to professional associations and societies of radiologists, nuclear medicine specialists, radiation oncologists and medical physicists as well as representatives of involved universities, research institutions and political bodies
- Meetings were aimed to be in-person for maximum engagement

Meeting relevant stakeholders in all 3 of the Baltic countries

- 18th of October – Latvian stakeholders, Riga
- 16th of November – Lithuanian stakeholders, Kaunas
- 22nd of November – Estonian stakeholders, Tallinn

20 – 30 participants in each of the meetings



“Particle therapy - future for the Baltic States?”

A joint, dedicated workshop

“Particle therapy - future for the Baltic States? State-of-play, synergies and challenges”

Set-up of the event

- Conceptually – workshop and discussion with professionals and experts representing professional societies from all 3 Baltic States
- Invitations to professional associations and societies of radiologists, nuclear medicine specialists, radiation oncologists and medical physicists for **nominated representatives**

Outcomes of this event will be covered

25th of May, 2023 at CERN

more in depth in the next presentation!

- Main goals of the event:
 - *To bring together in level 1 experts as experts and to the Golden Meeting in Baltic States represented by the participating professional associations to discuss and work on ideas for development of key aspects of the initiative.*
 - *To provide fact-based and scientifically driven reasoning for each of the key aspects of the initiative based on the aforementioned stakeholder opinion.*
 - *To build multi-disciplinary synergies between the different fields and specialties involved in cancer treatment and three Baltic States at large.*
 - *To reach a joint consensus and vision of future development of the “Advanced Particle Therapy Center in the Baltic States” initiative based on the conclusions reached within the workshop.*

Strong support of the policy makers



H.E. Mr Arturs Krišjānis Kariņš
Prime Minister of the
Republic of Latvia

H.E. Ms Kaja Kallas
Prime Minister of the
Republic of Estonia

H.E. Ms Ingrida Šimonytė
Prime Minister of the
Republic of Lithuania

17 August 2022
No. 1/0822-177

Your Excellencies,

On behalf of the Health, Welfare and Family Committee of the Baltic Assembly, we would like to extend the assurances of our highest consideration to the Baltic Council of Ministers.

On 9-10 June 2022, the meeting of the Health, Welfare and Family Committee of the Baltic Assembly was held in Tallinn. The parliamentarians discussed the cooperation of the Baltic States in health care, focusing on cancer treatment, joint projects and procurements, and the implementation of the recommendations of the Baltic Assembly in 2021.

In this letter, we want to address two main issues discussed in detail during the meeting. Firstly, the joint initiative of the CERN Baltic Group and CERN on Advanced Particle Therapy Center for the Baltic States; and, secondly, joint procurements of the Baltic States.

During the meeting, the Health, Welfare and Family Committee assessed the joint initiative of the CERN Baltic Group and CERN on **Advanced Particle Therapy Center for the Baltic States** and the members of the Committee are convinced that such a project is significant and will have a huge impact on the cancer treatment in the Baltic States. The CERN Baltic Group and CERN have approached the Baltic Assembly as an interparliamentary organisation for cooperation among the parliaments of the Baltic States. After careful evaluation of the project, its benefits and also challenges, the parliamentarians would like to request the governments of the Baltic States to:

- assess the initiative on Advanced Particle Therapy Center;
- engage the corresponding ministries, national agencies and relevant stakeholders to jointly apply for co-financing from the European Union for the implementation of the joint initiative.

Find attached to the letter draft concept paper “Advanced Particle Therapy Center for the Baltic States” that in detail describes and justifies the initiative.

Attachment: Draft concept paper “Advanced Particle Therapy Center for the Baltic States”.

Sincerely yours,

Chair of the
Health, Welfare and Family
Committee

Regīna Ločmele
Republic of Latvia

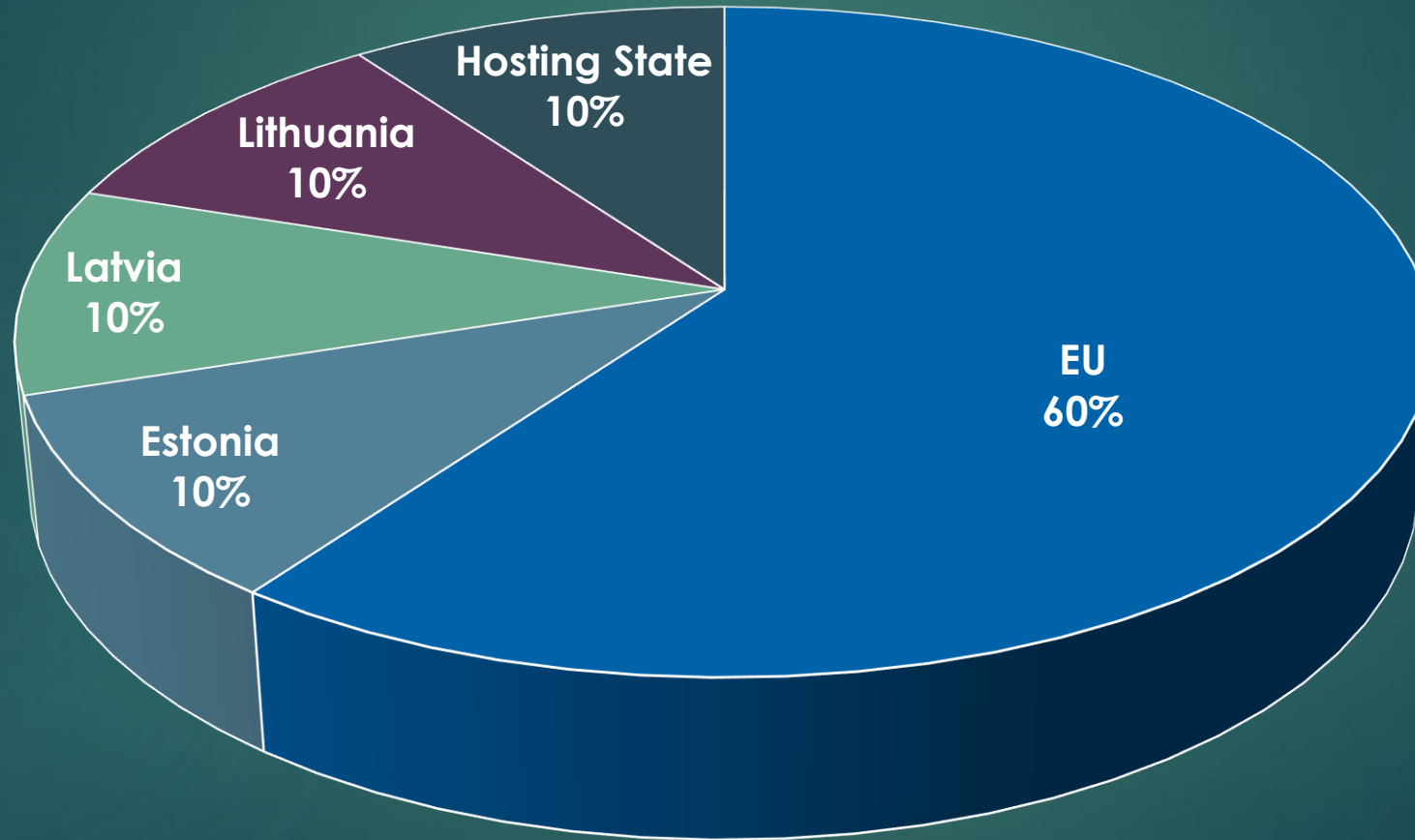
Vice Chair of the
Health, Welfare and Family
Committee

Hele Everaus
Republic of Estonia

Vice Chair of the
Health, Welfare and Family
Committee

Antanas Vinkus
Republic of Lithuania

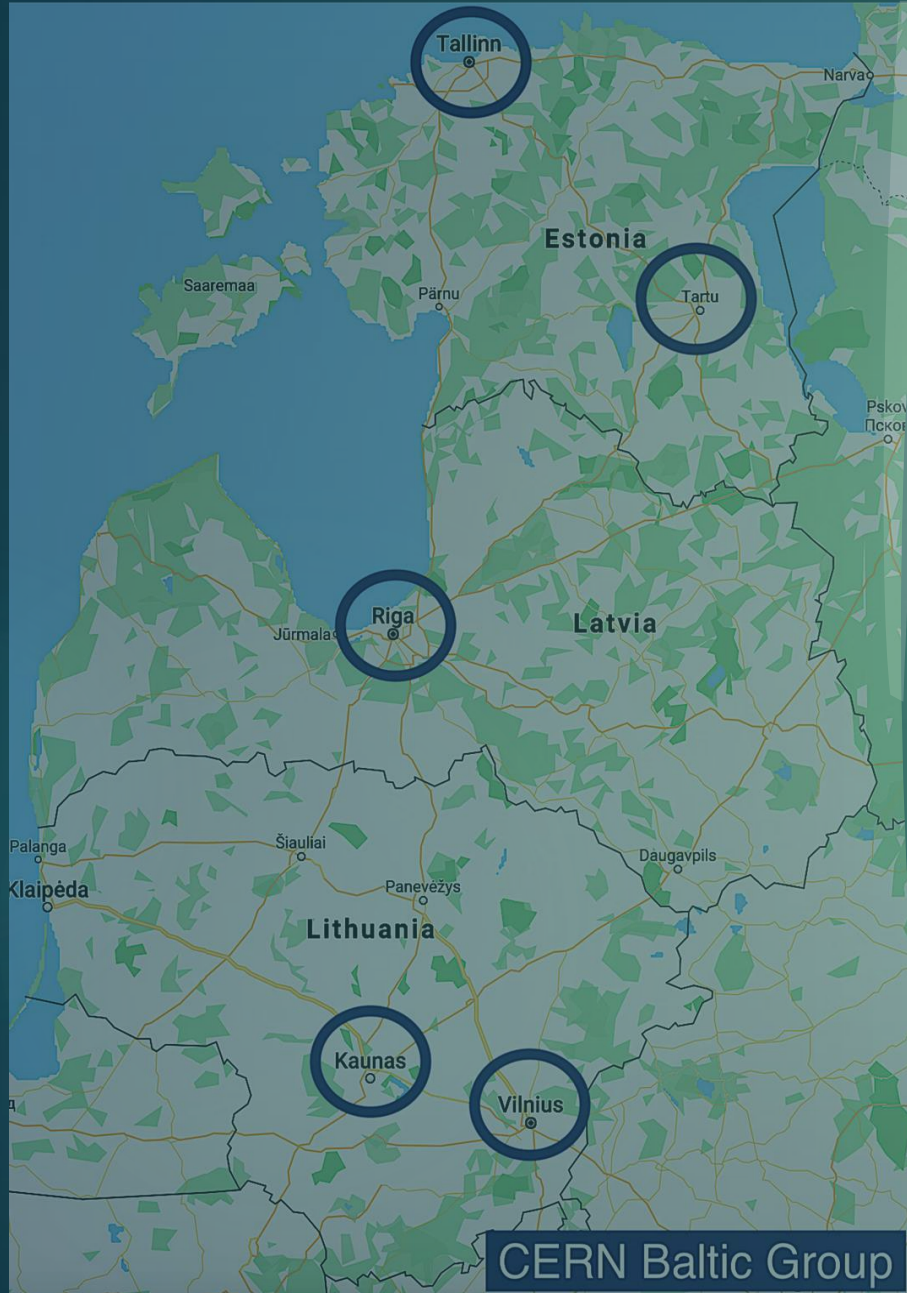
Project financing



Share of the costs

Site selection criteria

- ▶ Clear and undivided support to the project from the national medical community at large (oncologists, radiologists, etc)
- ▶ Strong and continuous political support: from the parliament, government, relevant ministries, and governmental agencies
- ▶ Sustained Stakeholder engagement and participation in the project
- ▶ The main site shall be integral part of the major oncology hospital. Physical proximity and access to the existing infrastructure is critical
- ▶ Proximity to the international airport – max 50 km distance
- ▶ Accessibility and servicing patients from all Baltic countries and beyond – accessible from the RailBaltica, its inter connections and major roads
- ▶ Direct hosting facilities for the patients and their families
- ▶ EC support for the chosen site

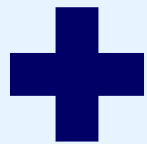
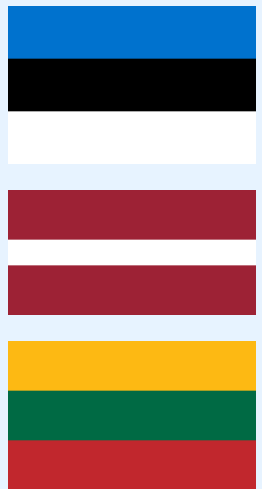




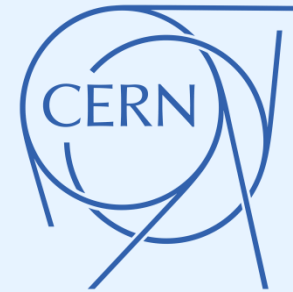
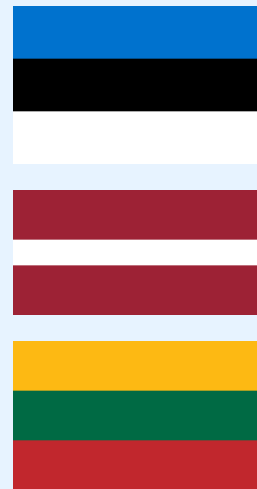
In order to proceed:

A full-scale feasibility study of the project

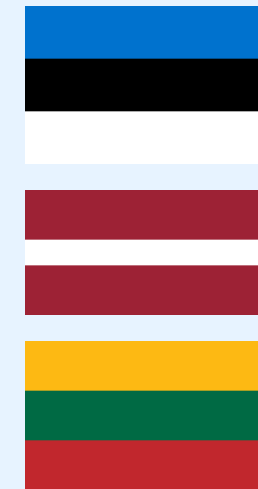
Clinical case and epidemiology



Technical aspects



Business case



Within the framework of CERN

Take away

- ▶ Visionary and long-term goals
- ▶ Exciting and uniting
- ▶ Flagship project for Baltics
- ▶ Supported by CERN
- ▶ Preventing brain-drain
- ▶ Commercially viable
- ▶ Goes hand in hand with development strategies of the Baltic States and overall EU priorities
- ▶ Opportunity not to be missed...

