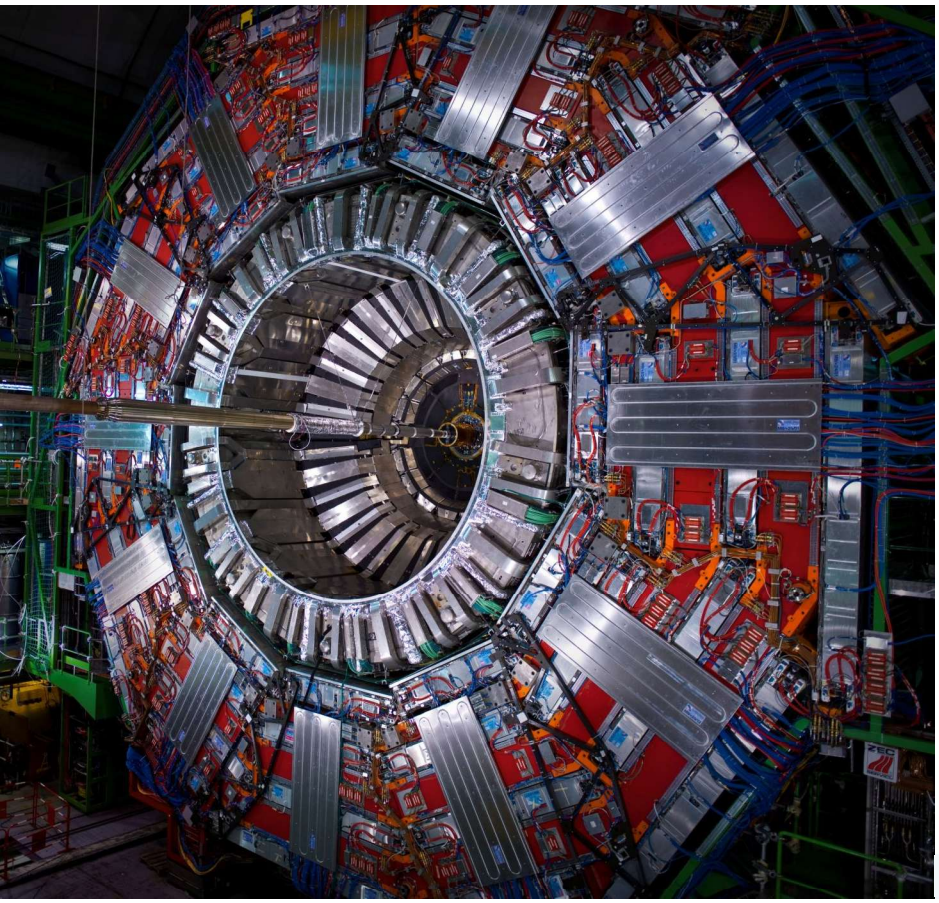
minciencia.gob.cl

Perspectives on Science Cooperation in Latin America

From National Efforts to International Colaboration

División de Tecnologías Emergentes
Ministerio de Ciencia, Tecnología, Conocimiento e Innovación



Chile at the Frontier of Knowledge

How does a country of our size become a Regional leader in physics and scientific productivity?

How do we now transform our new Associate Membership at CERN into a bold leap toward Chile's technological future?

A virtuous Cooperation

More than **three decades** of growth, commitment and continuous collaboration

1991

Signing of the First Cooperation Agreement

CONICYT (Chile) and CERN, establishing the foundations of a long-lasting relationship. Exponential growth of the National Scientific Community.

2004

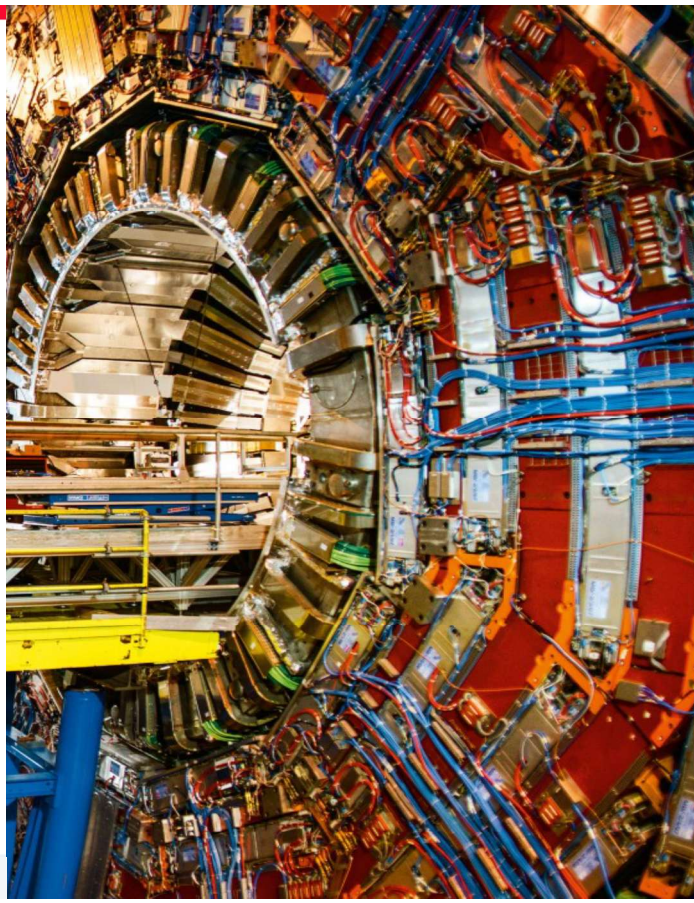
Renewal of the Bilateral Agreement

Appointment of Chile's first Official Representative to CERN, consolidating institutional ties. Chilean Scientific Communities begin to creat R&D Centers in Valparaiso and Santiago de Chile

2007

Visit of President Michelle Bachelet to CERN

Signing of the "Large Hadron Collider" Protocol and Chile's formal participation in the ATLAS experiment (a giant detector that observes and measures particles created inside the accelerator).



Three decades of growth, commitment and continuous collaboration

2009

Creation of the Valparaíso Science and Technology Center (**CCTVal**), a basal center at the Universidad Técnica Federico Santa María (UTFSM), dedicated to **experimental research in particle physics.**

2012

Chile, through CCTVal, created its **first supercomputing center** to collaborate with CERN's ATLAS experiment, the first of its kind in all of Latin America.

2013 - 2021

CCTVal demonstrates its ability to manufacture cutting-edge instrumentation meeting international standards by building **15%** of the particle detectors for the ATLAS experiment upgrade.

Chilean Science with Global Impact

10x

Growth in publications

Increase in physics publications between 1990 and the period 2010–2023, demonstrating the dynamism of the national scientific community.

3

Publications per researcher

Productivity exceeding OECD country averages, demonstrating efficiency and quality in research.

10%

Top most cited

Percentage of Chilean publications in the world's top 10% most cited, an indicator of high scientific impact.

73%

International Articles Colaboration

Articles published with international co-authorship, reflecting Chile's integration into global scientific networks.

500

Specialized professionals

Linked to CERN projects, and more than 32 PhDs trained in particle physics since 2006.

This critical mass of advanced talent, positions Chile to address challenges in frontier science and technology, with the capacity to transfer knowledge to strategic productive sectors.

From Collaborator to Member

2022

Expansion of Chilean participation at CERN by joining additional experiments, enabling more Chilean scientists to collaborate in the major projects of the Large Hadron Collider.

2023

Visit of President Gabriel Boric to CERN and the official announcement of Chile's application for Associate Membership.

2024

Approval and signing of the Associate Membership Agreement by the CERN Council, crowning decades of continuous cooperation.

The Value of International Scientific Projects

International Cooperation:

CERN stands as the world's largest scientific infrastructure and a globally recognized model of international cooperation. Its framework, uniting 23 Member States and over 100 collaborating nations, demonstrates how science can build durable, non-political bridges between countries.

Science Booster:

For Latin America, this highlights several strategic principles:

- **Scientific cooperation reinforces multilateral trust**, especially when countries collaborate on shared infrastructures rather than bilateral competition.

- **Mega-project governance frameworks**, budgeting, long-term planning, technological roadmaps, improve national capacity to manage complex initiatives.

- **Large scientific infrastructures create diplomatic capital**, allowing emerging economies to position themselves as reliable partners in high-technology sectors.

Return on Investment of CERN: The Benefits of International Scientific Projects

CERN-related externalities:

International assessments consistently show that CERN delivers **positive, measurable and long-lasting returns on investment**:

- **LHC (global):** B/C = 1.2 → ROI ≈ 20%.
- **United Kingdom:** 1.5–2.0:1 → ROI 50–100%.
- **Czech Republic:** 3.5–4.0:1 → ROI 250–300%.

Indirect but highly impactful gains:

- **Advanced technical training worth USD 10k–25k per participant per year.**
- **Long-term salary uplift of 8–15% for CERN-trained professionals, strengthening national talent pools.**

Chile's Expected Returns from CERN:

Chile's projected ROI from CERN participation (USD):

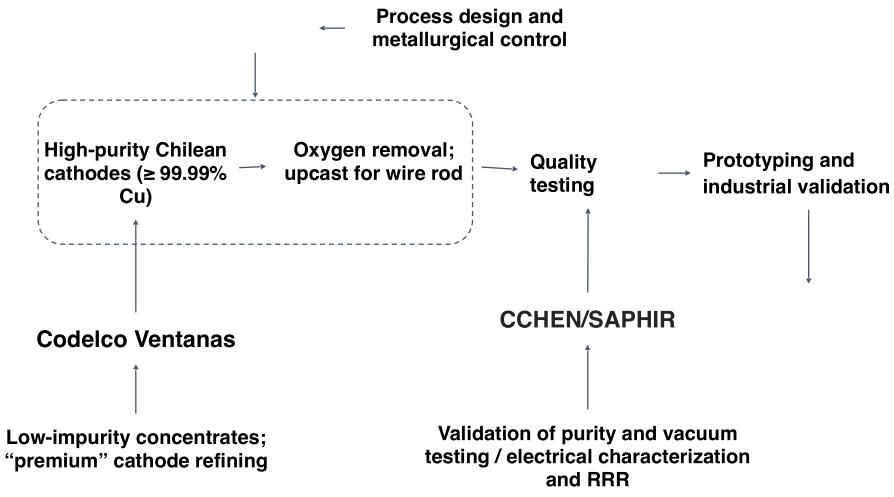
Opportunities: Structural Strengths for International Cooperation

Stability and Commitment	Regional Leadership in Innovation	Experience in Mega-Science
A consolidated democracy, a stable economy (**global exporter, US$100B in 2024**), and an OECD member. Chile ensures the fulfillment of international commitments with a long-term vision.	Chile ranks **#1 in Latin America** in innovation (WIPO) since 2007. Start-Up Chile has attracted more than 2,000 startups from 85 countries, generating over **US$1B in sales.** Four tech unicorns have emerged in the past decade.	**Sixty years** hosting global observatories (ESO, ALMA) under robust legal frameworks. This successful trajectory in astronomy will be replicated in particle physics, leveraging lessons learned.

Opportunities: Public Investment in R&D Centers in Particle Physics

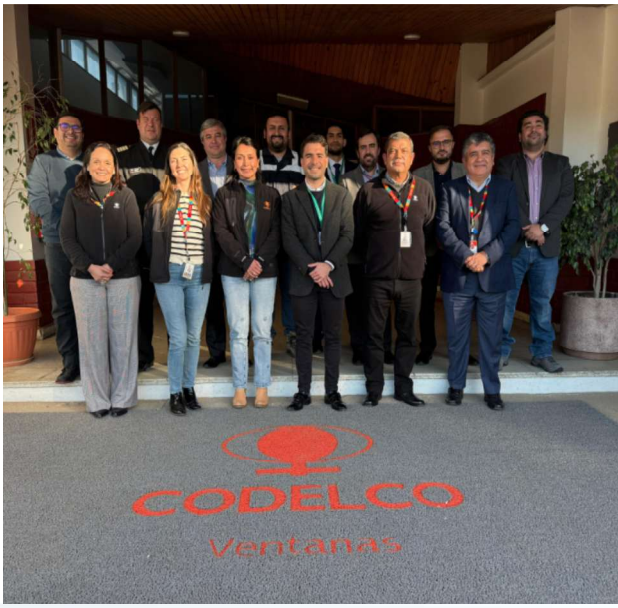
CCHEN	CCTVal - Basal Center	SAPHIR - Millennium Institute
The Chilean Nuclear Energy Commission (CCHEN) is the country's principal national laboratory in applied nuclear science. -Radiation technologies for medicine, agriculture, and industrial nondestructive testing. -Production of medical isotopes and development of radiopharmaceuticals. -Capabilities in neutron activation analysis, materials characterization, and nuclear metrology.	**The Valparaíso Science and Technology Center (CCTVal) has received initial funding exceeding US$18 million from ANID, becoming a regional leader in scientific infrastructure.** -High-precision computing center and laboratories that enable the processing of CERN data. -Manufacture components with micrometric accuracy and train specialists.	**The Millennium Institute for Subatomic Physics at the High Frontier (SAPHIR) has received funding exceeding US$3 million from ANID.** -It strengthens cooperation with CERN, consolidating Chile's scientific presence. -It trains new PhD candidates and postdoctoral researchers, boosting leadership in research.

New frontiers in Chile: OFE Copper



Ministerio de Ciencia y Codelco exploran uso de cobre chileno en la vanguardia científica y tecnológica mundial

En una visita a la División Ventanas, representantes de la Secretaría de Estado explicaron que el metal rojo de alta pureza es un factor clave en el diseño de la Estrategia Nacional de Tecnologías Cuánticas.



minciencia.gob.cl

Ministerio de Ciencia, Tecnología, Conocimiento e Innovación

Gobierno de Chile

MINCIENCIA.GOB.CL | @tw @instagram @facebook @youtube

CHILE AVANZA CONTIGO

GOBIERNO DE CHILE