Latin-American alliance for Capacity buildiNG in Advanced physics (LA-CoNGA physics)

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LA-CoNGA physics

Cofinanciado por el programa Erasmus+ de la Unión Europea

HECAP context in Latin America

High energy, cosmology and astroparticle physics community has grown in Latin America in the last decades

PIERRE AUGER OBSERVATORY

High Energy Physics Latinamerican European Network

The European Particle physics Latin America NETwork

LAGO

Latin American Giant Observatory

LASF4RI

The HECAP development is variable country-by-country. The potential in the region is huge thanks to:

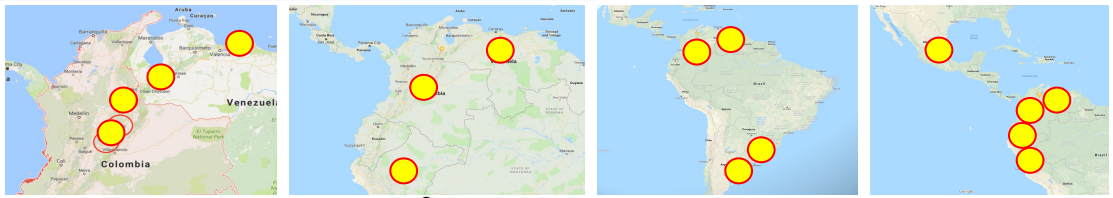
- Critical mass of teachers/researchers in several universities
- Diversity of interests and skills
- A young generation with potential and eagerness to learn
- Collaborative work make us stronger

Several outreach and education activities

cevale2
Centro virtual de altos estudios de altas energías

ICTP
PHYSICS WITHOUT FRONTIERS

- Leading to the creation of a community… Just to name a few
  - Masterclasses IPPOG
  - Virtual course of introduction to particle physics from CEVALE2VE
  - Roadshows with the support of Physics Without Frontiers-ICTP
  - And many others in the region…



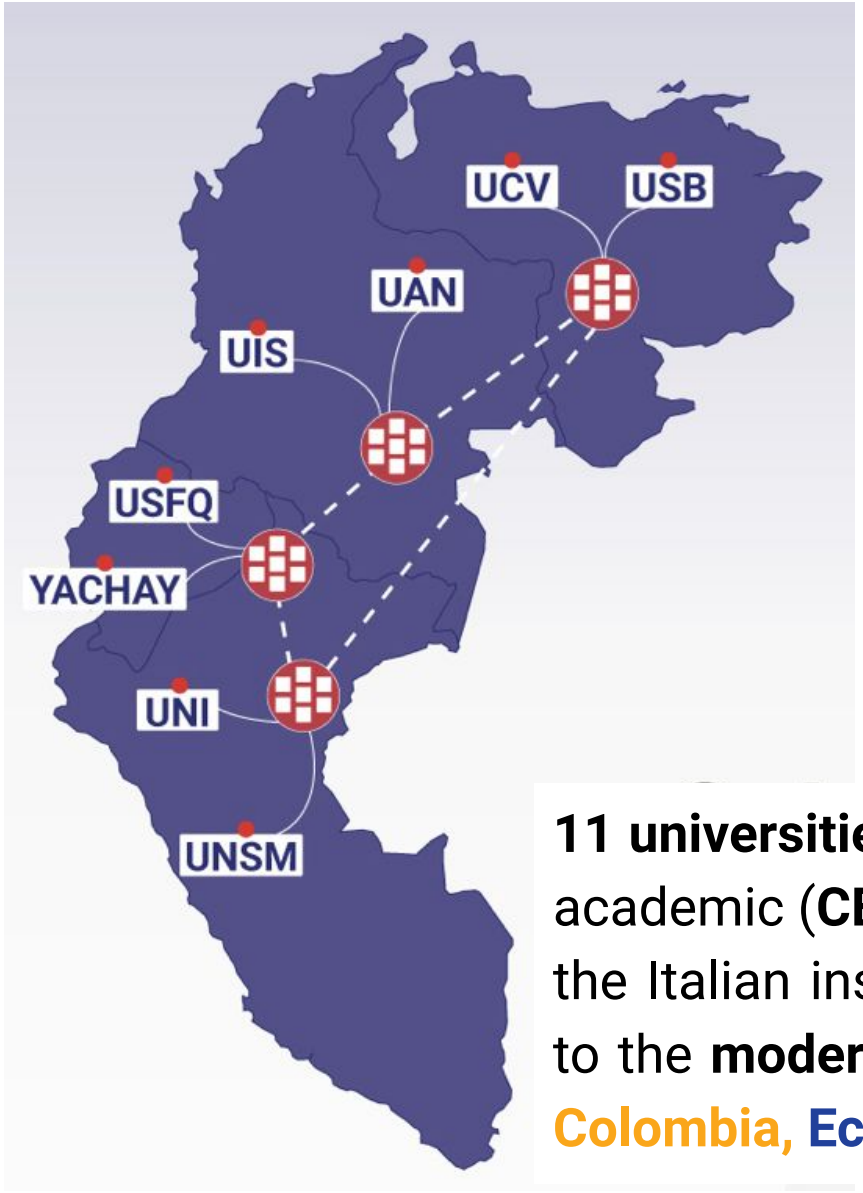
The 1st edition of the PWF-LA
The first edition took place in six institutions in five cities in Colombia and Venezuela

The 2nd edition of the PWF-LA
Three countries visited: Peru, Colombia and Venezuela. Peruvian students started to follow the CEVALE2VE course

The 3rd edition of the PWF-LA
Four countries visited: Argentina, Uruguay, Colombia and Venezuela.

The 4th edition of the PWF-LA
Five countries visited: Ecuador, Peru, Colombia, Venezuela and Mexico.

What is LA-CoNGA physics?



An **Erasmus+CBHE (Capacity Building in Higher Education)** project co-funded by the European Commission's Education, Audiovisual and Culture Executive Agency:

- Responding to the strategy of the participating institutions and the capacity building in higher education strategy promoted by the EU
- **Initially a 3-years project, 900 k€ budget. Officially started in January 2020**

Erasmus+

11 universities from Latin America and Europe join efforts with other scientific and academic (**CERN, CNRS, DESY, ICTP, IRFU, RedCLARA**) and **industrial** partners (like the Italian instrumentation company CAEN & data science start-ups) to contribute to the **modernisation, accessibility** and **internationalisation of higher education in Colombia, Ecuador, Perú and Venezuela**

LA-CoNGA consortium

Program Partners in Europe:

- Université Paris Cité (UPC), France (Coordinator)
- Université Paul Sabatier Toulouse, France (UPS)
- Technische Universität Dresden (TUD), Germany

Program Partners in Latin America:

- Colombia : UIS (Bucaramanga), UAN (Bogotá)
- Ecuador : Yachay Tech (Ibarra), USFQ (Quito)
- Peru : UNI, UNMSM (Lima)
- Venezuela : UCV, USB (Caracas)

Associated Partners:

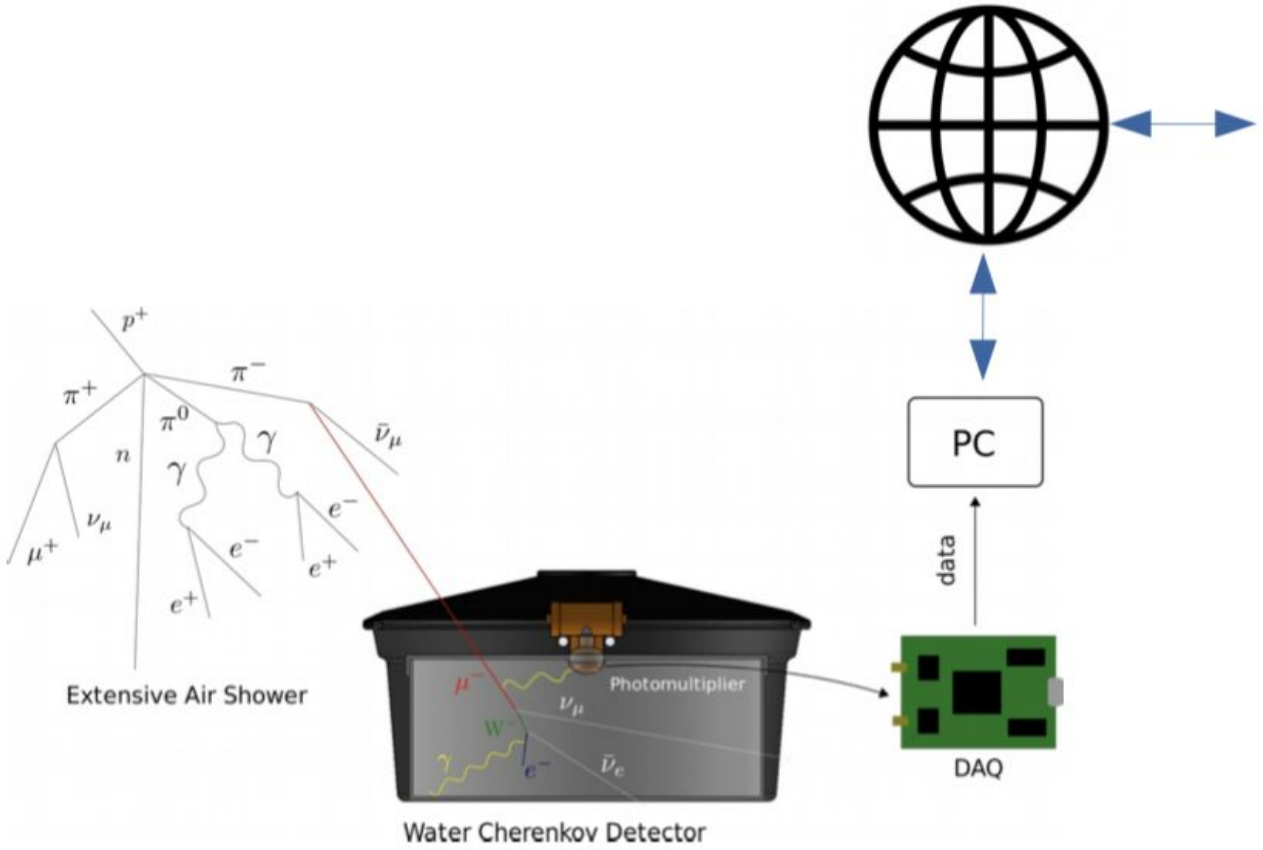
- International research centers: CERN and ICTP
- National research centers: CNRS (FR), CEA (FR) DESY (GE)
- Industrial partners in Latin America and Europe
- Other academic partners in the Americas

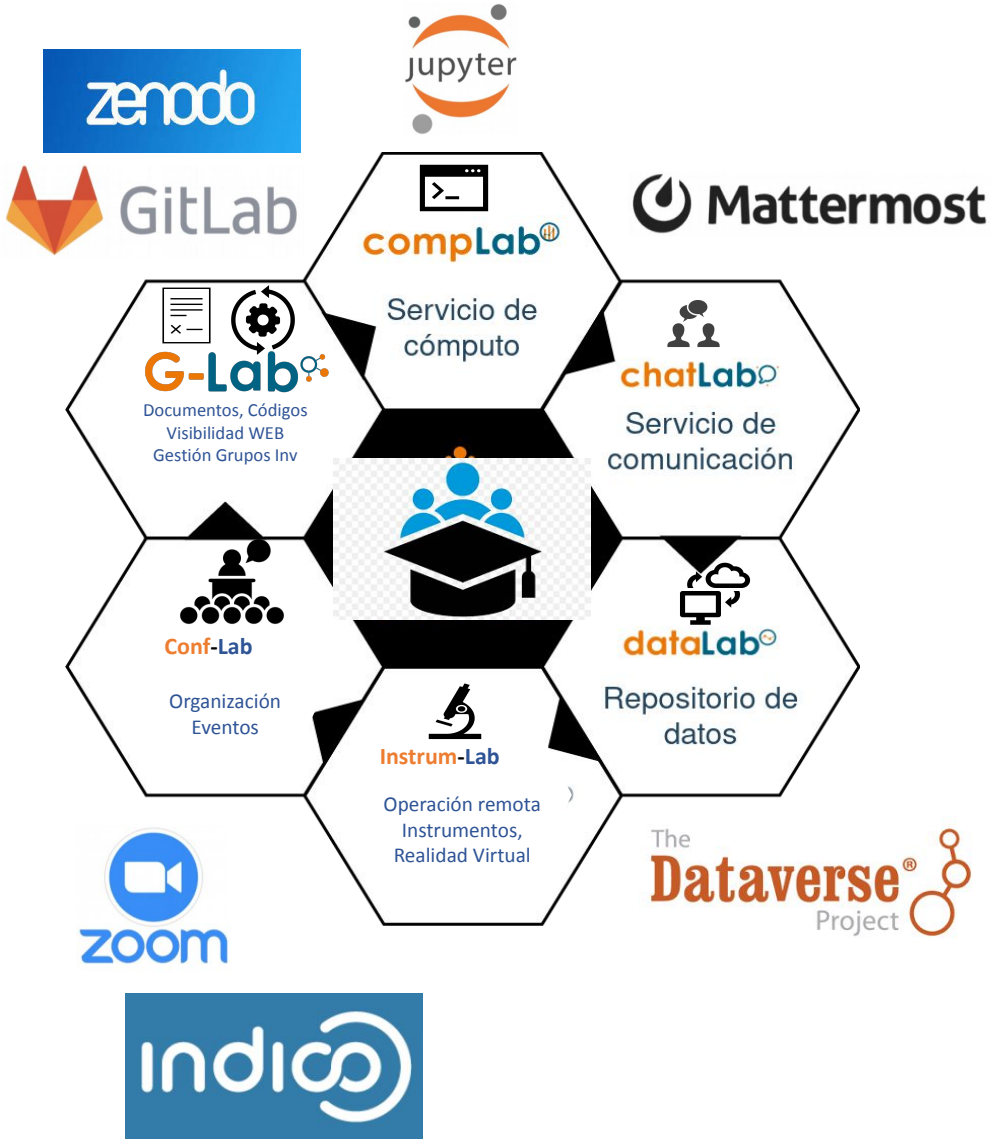
Proof of concept: methodology and tools (1/2)

- A one year specialization common/cross-institutional for 8 institutions in Latin America
- Worked with the participating universities to have credits recognised for the course(s) followed by students
- **Key subjects of study**, skills highly in demand inside and outside academia:
  - **Data Science**
  - **Instrumentation**
  - **Advanced Physics**, two streams: High Energy Physics and Complex Systems

Proof of concept: methodology and tools (2/2)

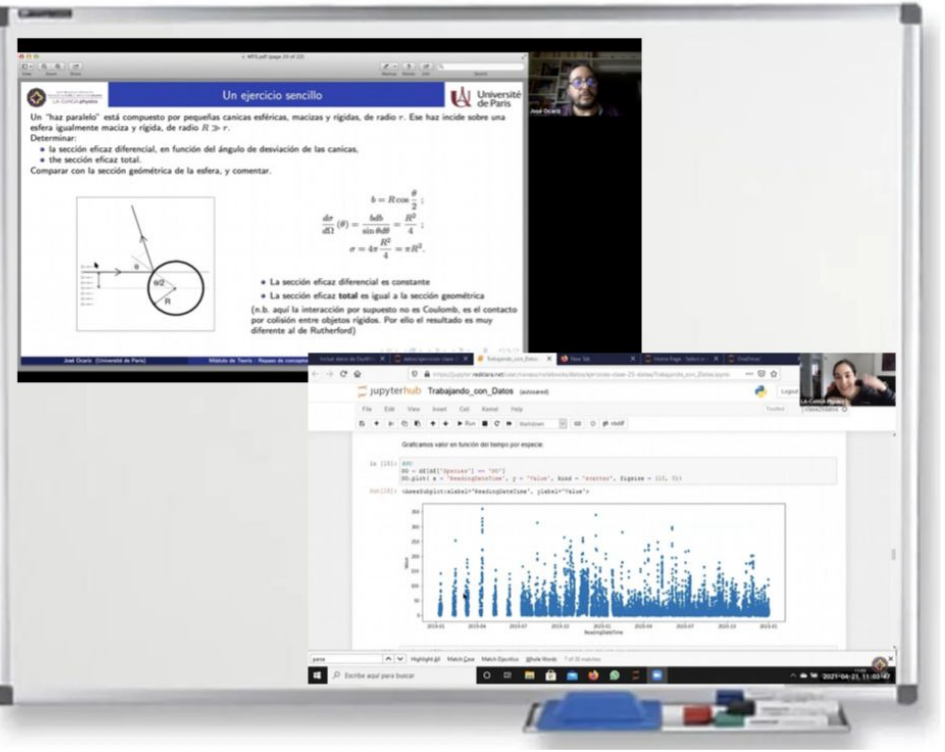
- An e-learning open-access platform
- Courses are thought partly remotely from Latin America, partly from Europe
- Good practices of science reproducibility
- Remote access interconnected instrumentation labs
- Teaching material in Spanish
- 3-months research and/or industrial internships

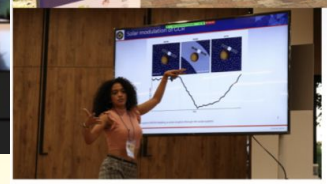


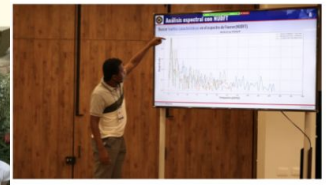


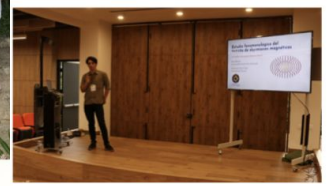
LA-CoNGA physics in 2021

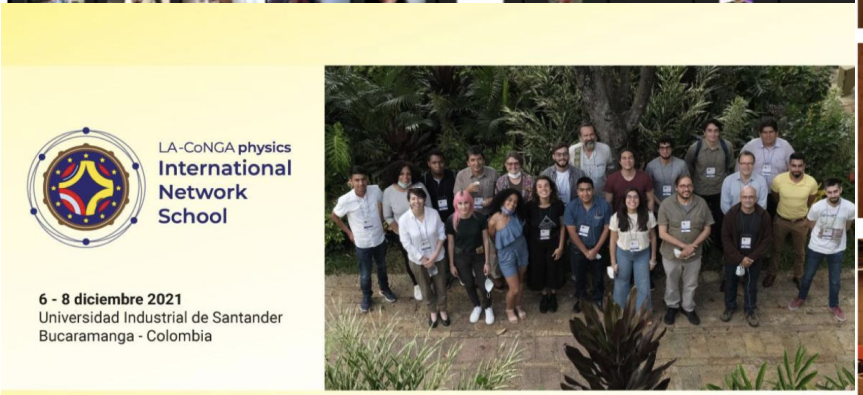
- **30 instructors** from Latin America and Europe
- More than **50 students** from 4 countries completed at least one full course
  - 9 students validated their internships
- More than **100 classes** available open access (videos, documents, notebooks, datasets…)
- But also challenges like COVID, difficulties in accessing universities (instrumentation from home) and internet connection from home





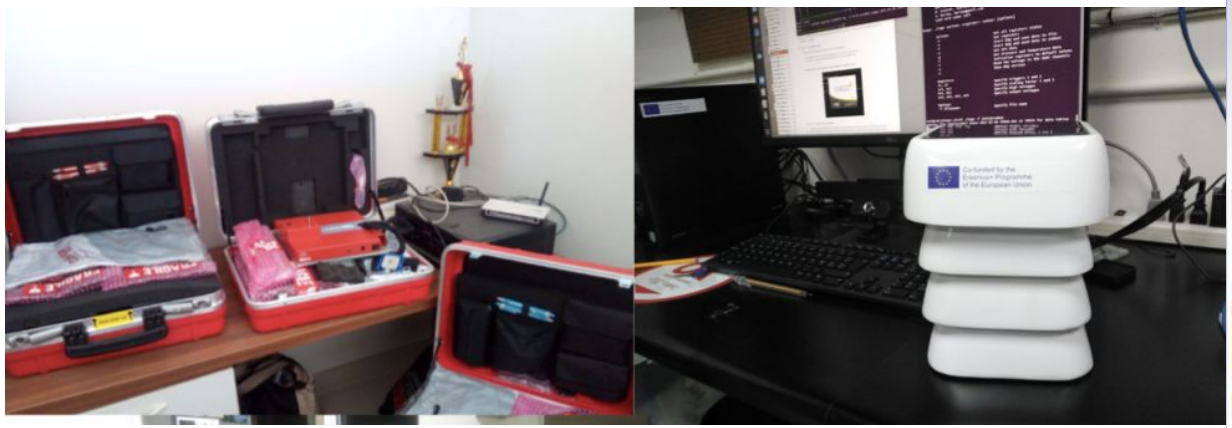






LA-CoNGA physics in 2022

- **Around the same number of students** during the first part of the year
- **Instrumentation labs installed** in 6 out of 8 universities:
  - **Unique interconnected network of instruments** including CAEN kits for Nuclear Physics experiments, National Instruments laboratory toolkits, air-quality monitoring stations for high-school science labs and computing stations
  - First on-site laboratory practices
- 12 internships started in September 2022. In-person mobility for the first time!
- The 2022 cohort will meet next week in Santa Marta for the second LA-CoNGA physics Network School



LA-CoNGA physics: beyond the courses

- Capacity is built beyond the zoom and lab rooms
  - **Other academic activities:** cycle of seminars, mentorships
  - **Scientific outreach:** workshops about science communication
  - **Transversal to other communities:** hackaton co-Afina 2022, discussion tables about capacity building in HECAP in different events and contexts

- A community with values:
  - Collaboration
  - Diversity
  - Open access
  - Responsibility
  - Innovation
  - Respect

LA-CoNGA physics: next steps

- After a very positive mid-term report **a one year extension has been approved**
  - Consolidate the training of technical staff for new instrumentation remote labs
  - Working with CAEN and e-pysteme to improve the front-end of our remote instrumentation labs
  - Put in place citizen science projects with high-schools
  - Establish new bilateral and multilateral agreements between th network's institutions

- **Beyond 2023:**
  - Exploring funding possibilities and new alliances with others institutions interested
  - Consolidation of our e-learning platform to scale-up. Work in collaboration with RedCLARA

http://laconga.redclara.net

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lacongaphysics

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LA-CoNGA physics: a virtual research and learning network

Internationalization

collaborative international environment

Accessibility

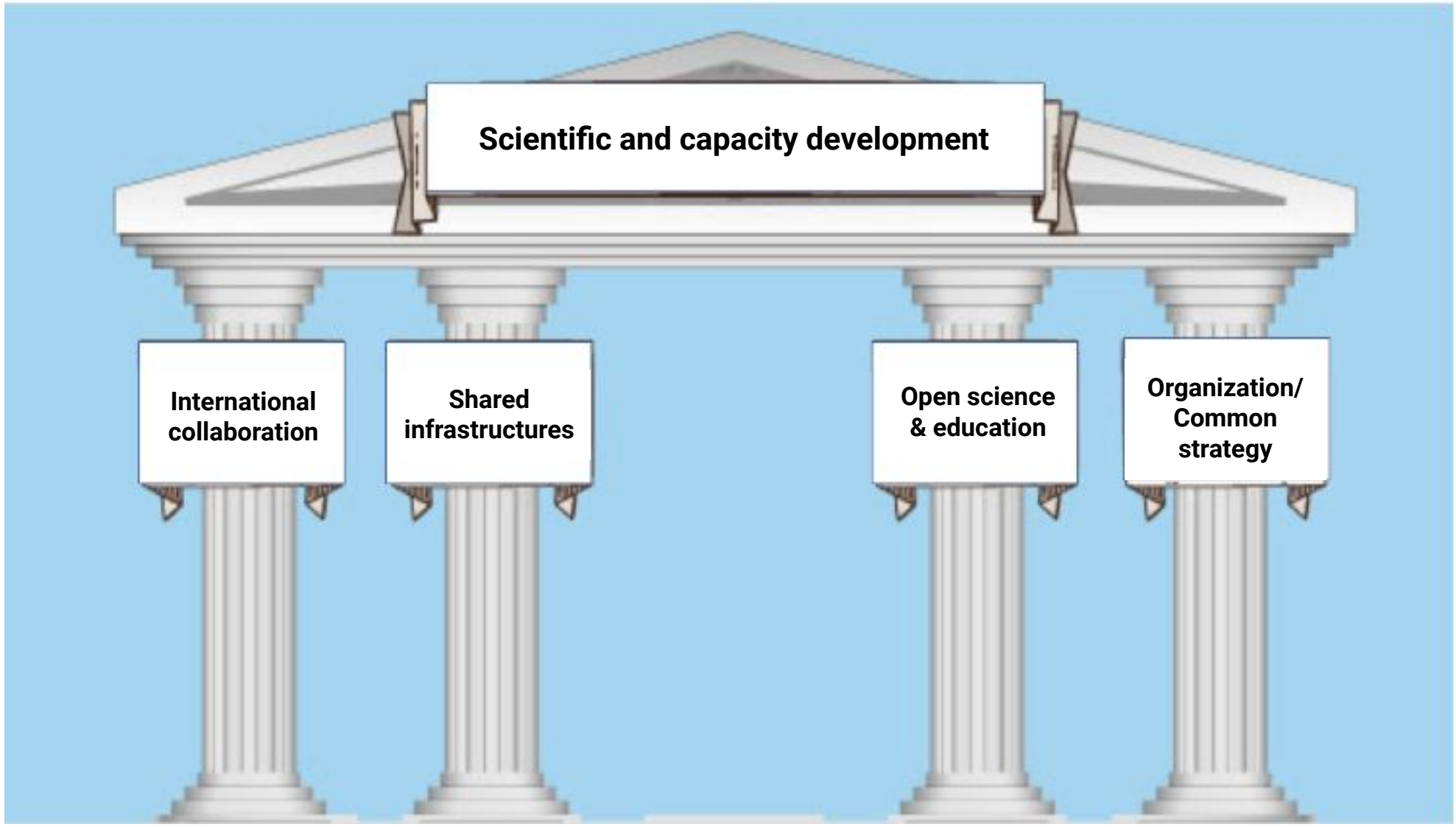
Each institution/group might not have all the resources/staff

Modernization

open educational resources, connectivity, acquisition of digital skills, and use/development of new learning methods

Sánchez, A., and Atlas Collaboration. "The CEVALE2VE case." PoS ICHEP2016 (2016) 322
Caicedo, M., et al. "Virtual research and learning communities in Latin America: The CEVALE2VE case." Interciencia 42.11 (2017): 733-738

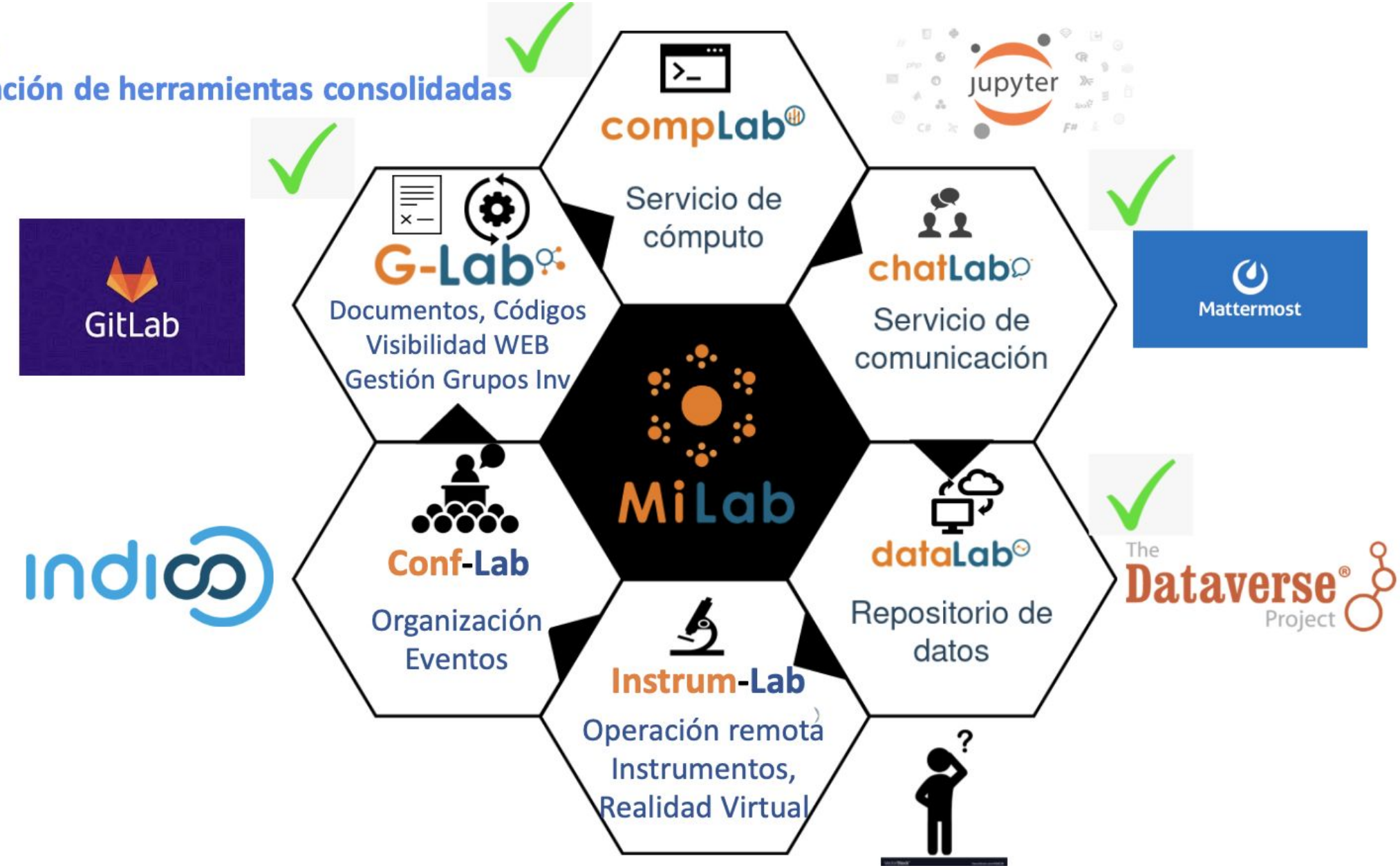
What do we need to advance scientific and capacity development



**Applies to current scientific challenges in general, not only particle physics, cosmology and astrophysics! e.g. COVID, climate change, etc*

Next steps: miLAB

MiLAB
Integración de herramientas consolidadas



Our vision and values

- We strengthen a **sustainable**, **dynamic**, **collaborative**,**interconnected**, and **diverse** virtual research and learning network of Latin American and European researchers in advanced physics
- With close ties to the **productive sector**, which leads the development of science and technology in the region
- Contributing to the modernization, accessibility, and internationalization of higher education systems in the region
- Using of technology in educational environments to enhance learning
- Applying **good scientific practices** and **gender equality**
- We envision similar experiences in other disciplines