

LA-CoNGA physics

an open science education collaboration between
Latin America and Europe for High Energy
Physics

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on behalf of LA-CoNGA physics community

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Latin American alliance for
Capacity building in Advanced physics

LA-CoNGA physics

Scientific collaboration and education at a global scale

Science and higher education
**globally distributed,
collaborative and
multidisciplinary**

University-research-society link
**knowledge generation,
application and transfer**

**Virtual Research and
Learning Networks**
play a key role

A network where **data, software tools,
research facilities, teaching and
information resources
are seamlessly shared**

The importance of virtual research and learning networks

Internationalization

collaborative international environment

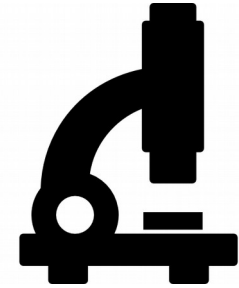
Accessibility



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



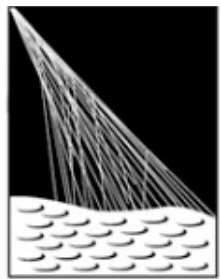
Modernization



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

HECAP context in Latin America

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



PIERRE
AUGER
OBSERVATORY



The European Particle
physics Latin America NETwork



High Energy Physics
Latinamerican European
Network



Latin American Giant
Observatory

LASF4RI

Latin American Strategy
Forum for Research
Infrastructure

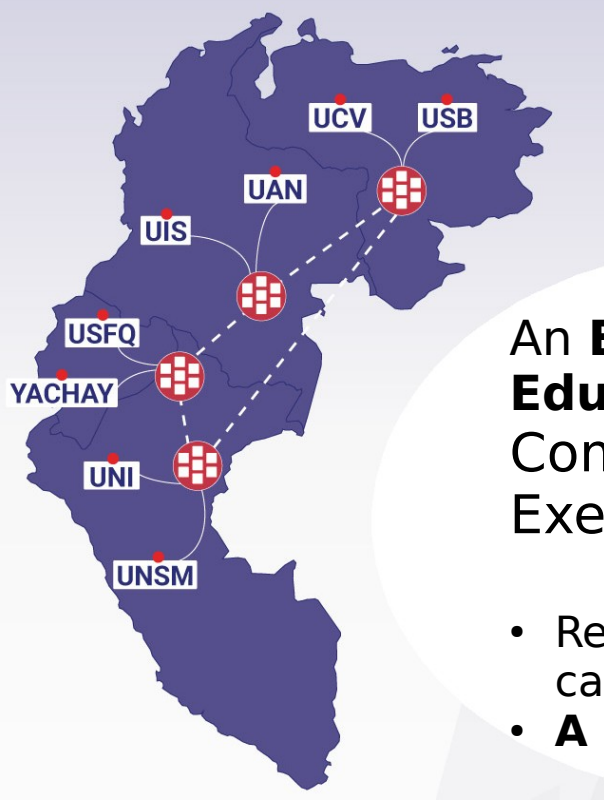


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LA-CoNGA physics

The HECAP development is nuanced and variable country-by-country, , but it has huge potential thanks to:

- Diversity of interests and skills
- A young generation with potential and eagerness to learn
- Collaborative work make us stronger



LA-CoNGA physics

<https://laconga.redclara.net/>



Erasmus+

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
- **A 3-years project. Officially started in January 2020**

11 universities from Latin America and Europe join efforts with other scientific (**CERN, CNRS, DESY, ICTP, IRFU**) and **industrial** partners to contribute to the modernisation, accessibility and **internationalisation of higher education in Colombia, Ecuador, Perú and Venezuela**

Universities



Scientific and Industrial partners



LA-CoNGA physics

A one-year specialization that fulfils the **Bologna Declaration**, with a **homologation** system of courses between the participant university academic programs.

The laptop screen shows a physics exercise titled "Un ejercicio sencillo" from the University of Paris. The text describes a problem involving a "haz paralelo" (parallel beam) of small spherical particles of radius r incident on a larger sphere of radius R . The exercise asks to determine the differential and total effective cross-section as a function of the deflection angle θ .

The diagram shows a beam of particles incident on a sphere of radius R at an angle $\theta/2$. The deflection angle is θ .

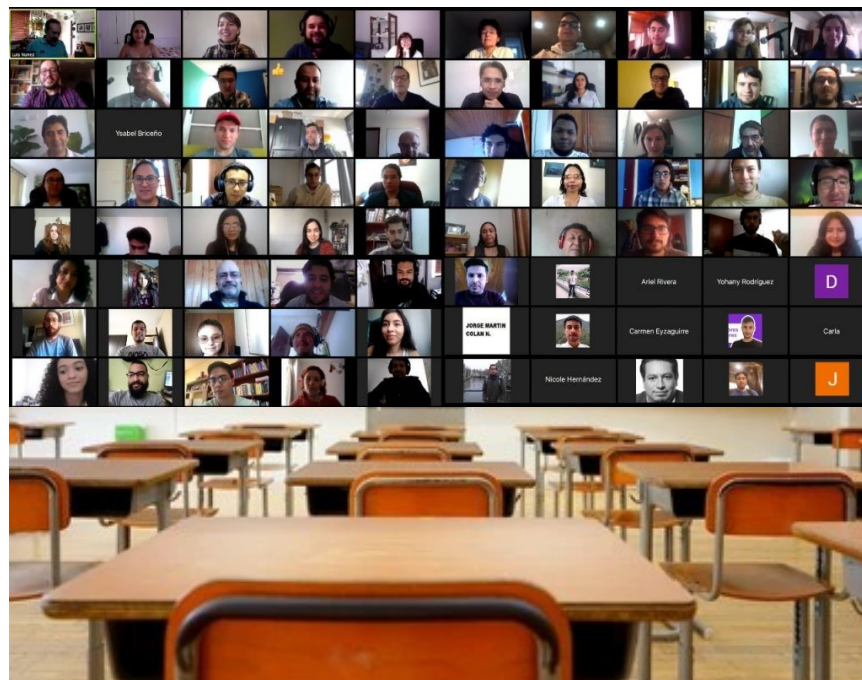
The equations provided are:

$$b = R \cos \frac{\theta}{2}$$
$$\frac{db}{d\theta} = \frac{R}{4} \sin \frac{\theta}{2}$$
$$\sigma = 4\pi \frac{R^2}{4} = \pi R^2$$

The exercise also includes a list of bullet points:

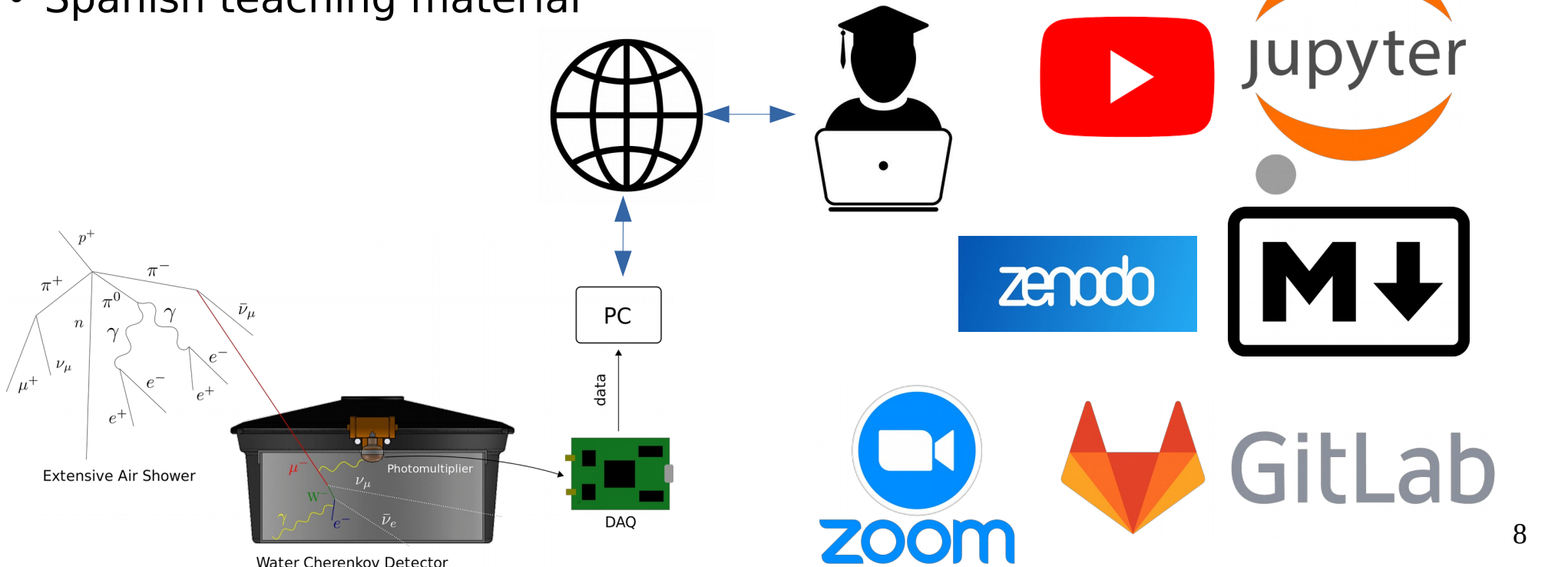
- La sección eficaz diferencial es constante
- La sección eficaz total es igual a la sección geométrica (n.b. aquí la interacción por supuesto no es Coulomb, es el contacto por colisión entre objetos rígidos. Por ello el resultado es muy diferente al de Rutherford)

Below the exercise, a Jupyter Notebook titled "Trabajando con Datos" is open, showing a scatter plot of data points over time.



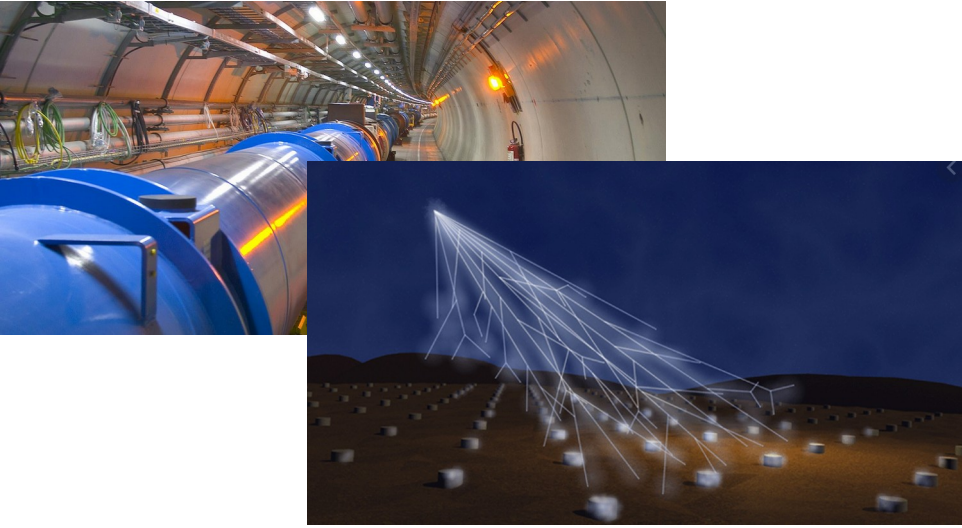
Methodology and platform

- An e-learning open-access platform
- Good practices of scientific reproducibility
- Remote-access experimental facilities
- Spanish teaching material



Thematic areas

High Energy Physics



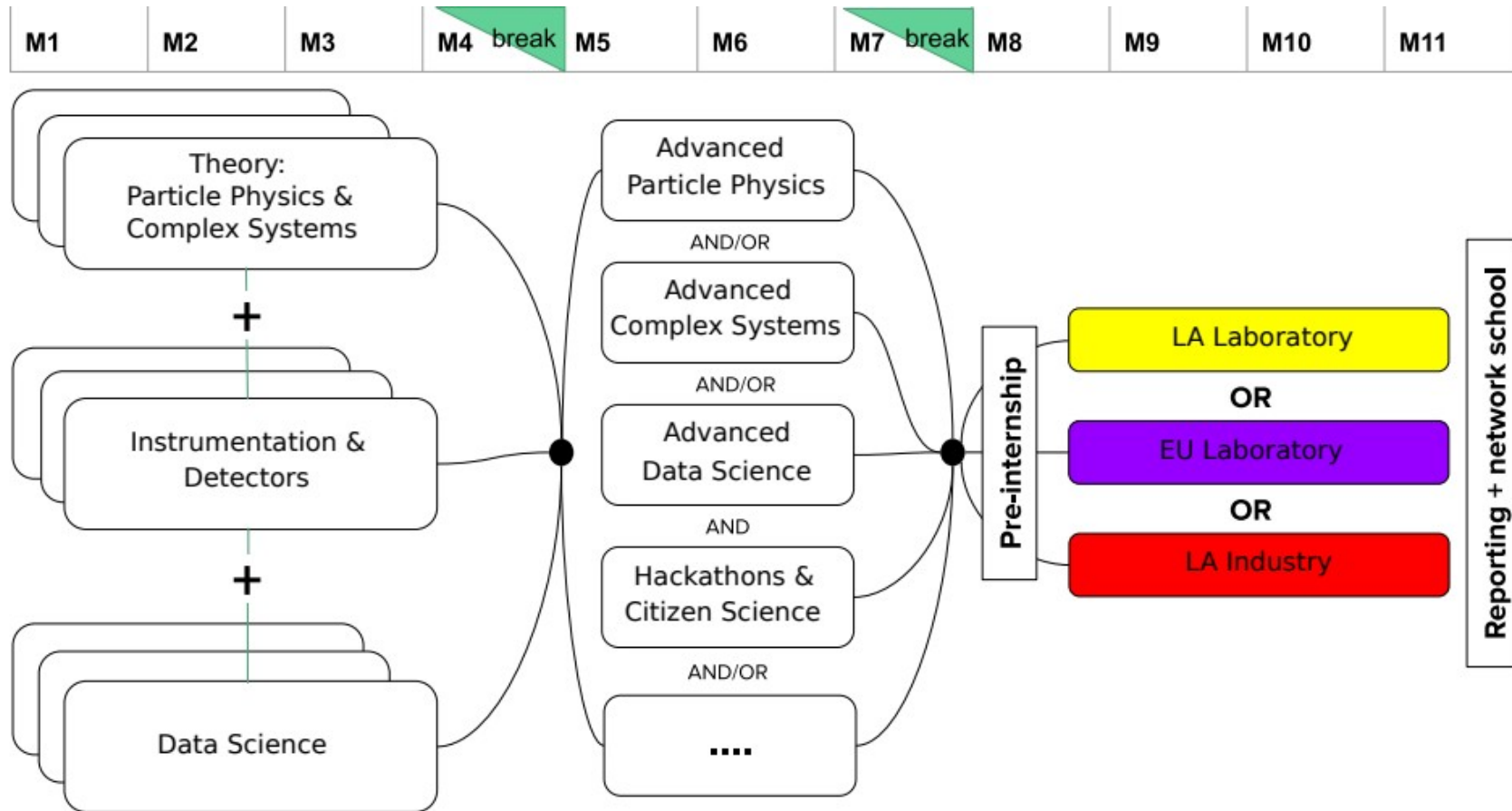
Complex Systems



<https://laconga.redclara.net/courses/>

- Theoretical fundamentals and experimentation
 - International collaborations
 - Knowledge transfer
- Study of matter states
 - Ubiquity of studied models
 - Networks and collective behaviour
 - Highly interdisciplinary field

Implementation

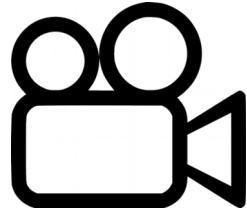


Remote labs

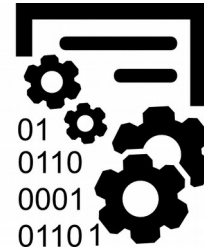
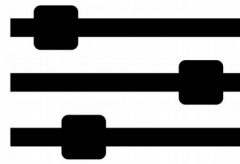
Biblio.



Demo



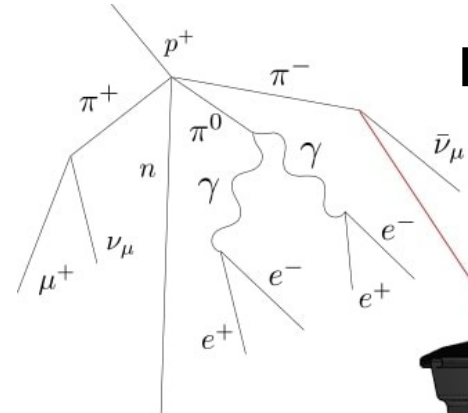
Control and data taking



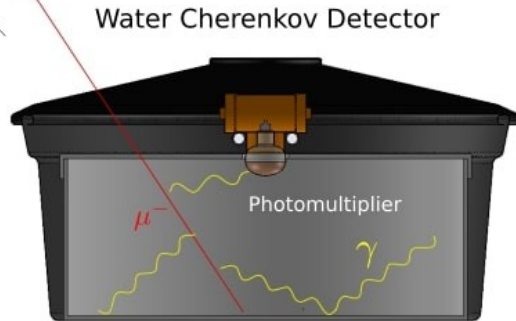
Communication



Remote detectors and instruments



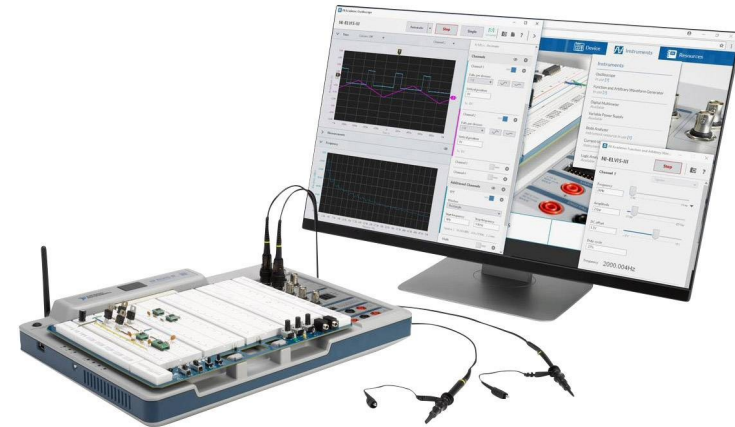
Extensive Air Shower



Water Cherenkov Detector



CAEN

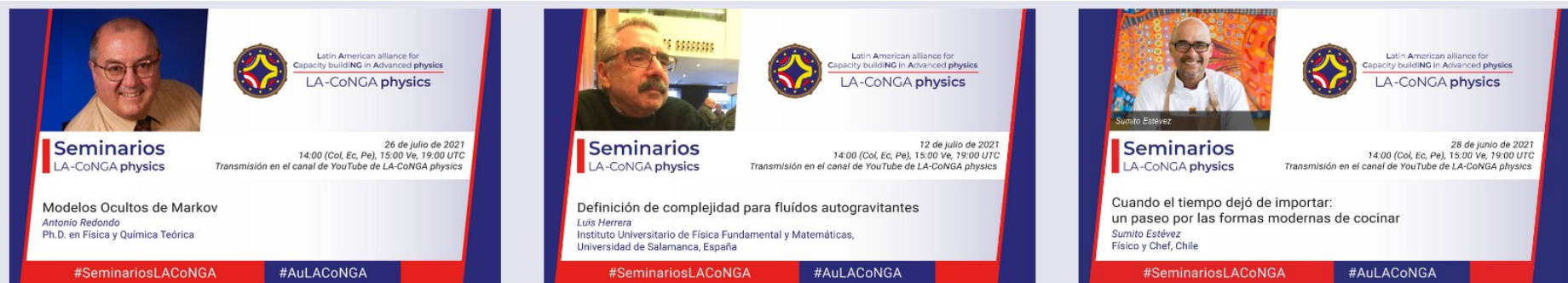


National Instruments

Seminars

- **Open-access** virtual seminars taking place twice a month
- Knowledge and expertise sharing from people working on **industry** and **academy**

<https://www.youtube.com/hashtag/seminarioslaconga>



26/07/21 Seminario:
Modelos ocultos de
Markov

12/07/21 Seminario:
Definición de complejidad
para flúidos
autogravitantes

28/06/21 Seminario:
Cuando el tiempo dejó de
importar. Un paseo por
las formas modernas de
cocinar

How is it going on?

First Semester

Particle Physics &
Complex Systems

Instrumentation &
Detectors

Data Analysis &
Statistics

30 instructors

from Latin America and Europe

more than **50 students**
from 4 countries

more than **100 classes**

<https://laconga.redclara.net/terminamos-el-primer-semester/>

Second Semester

Statistical Mechanics

Astroparticles &
Cosmology

Reproducibility in
Science

Medical Physics



Our values and vision

- 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

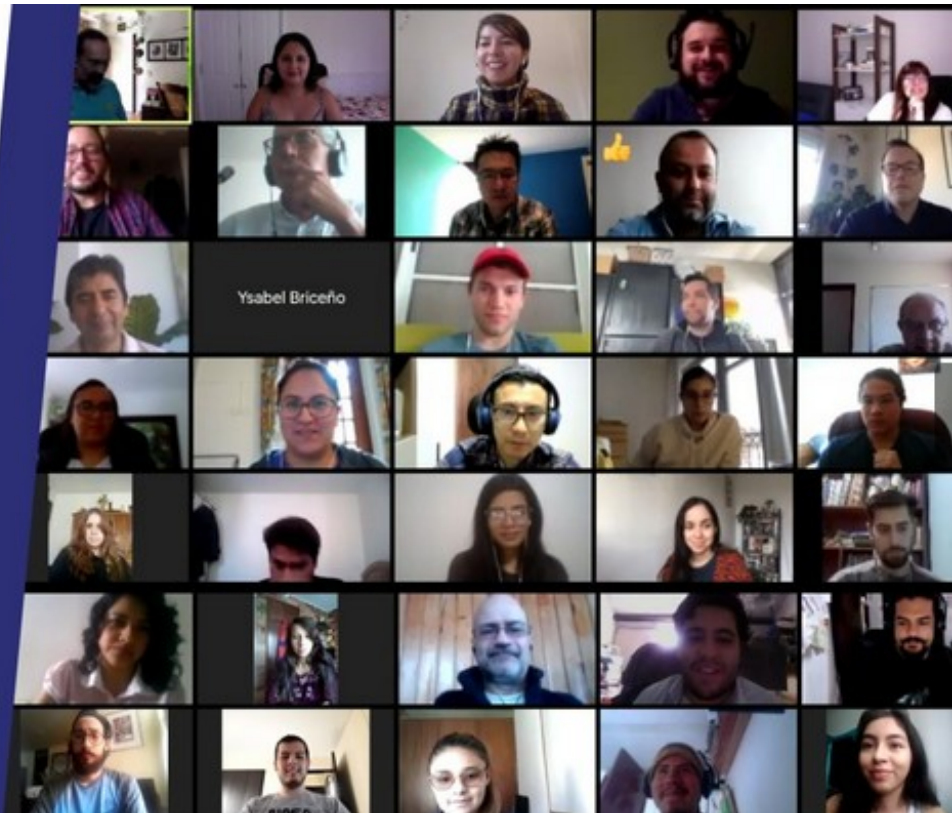
Thanks!



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LA-CoNGA physics

- ✓ Colaboración internacional
- ✓ Comunidad interconectada
- ✓ Presencialidad remota
- ✓ Impacto social
- ✓ Conocimiento abierto





<http://laconga.redclara.net>



contacto@laconga.redclara.net



lacongaphysics



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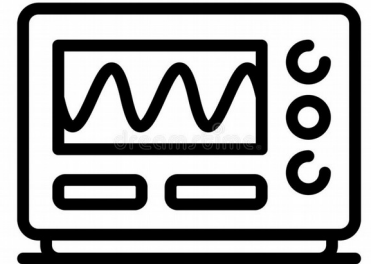
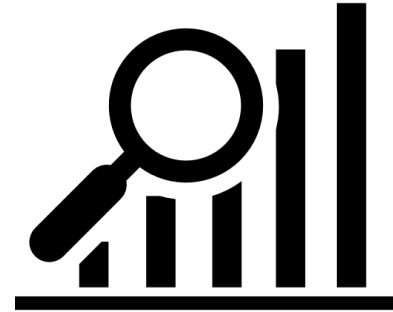
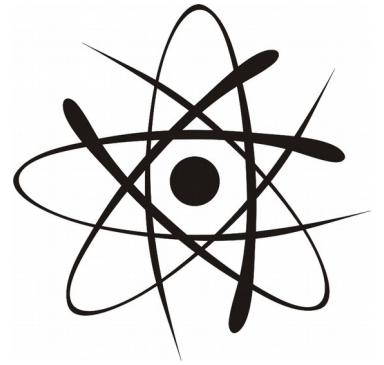
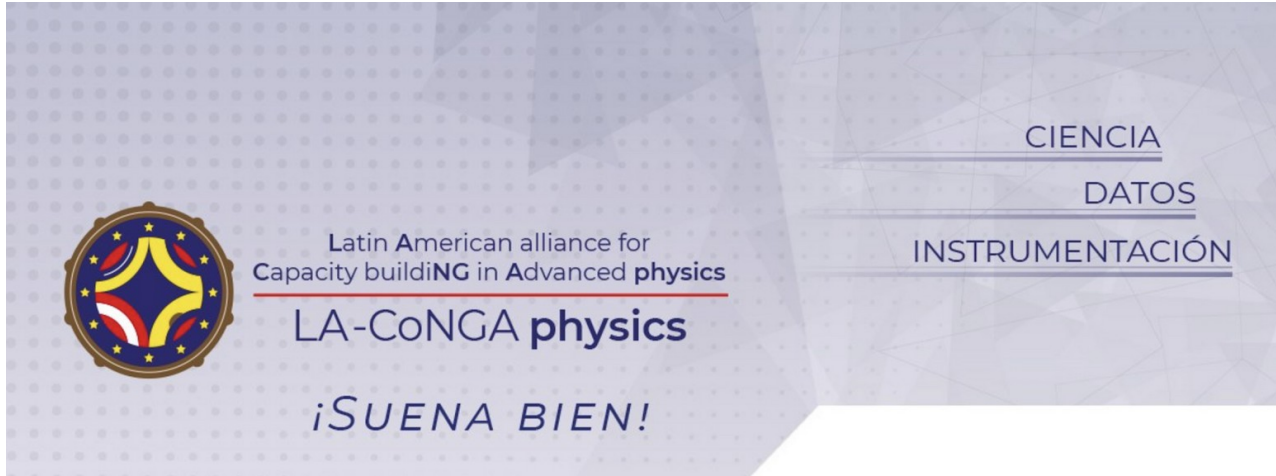
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Competences



Methodology and platform

- An e-learning open-access platform
- Remote-access experimental facilities
- Good practices of scientific reproducibility
- Mobility program in Latin America and Europe for internships

