

# Simposio Latinoamericano de Física de Altas Energías SILAFEA XII<sup>3/4</sup>

ICTP-SAIFR, São Paulo, Brazil  
November 8-12, 2021



## LA-CoNGA physics: an open science education collaboration between Latin America and Europe for High Energy Physics

Carlos Javier Solano Salinas  
on behalf of LA-CoNGA physics community



Latin American alliance for  
Capacity building in Advanced physics

LA-CoNGA physics



Cofinanciado por el  
programa Erasmus+  
de la Unión Europea





# 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**

Map of COVID 19 scientific collaboration indexed in the Scopus on the 7th of April 2020

Keywords : "COVID-19", "SARS-CoV-2", "2019-nCoV". 519 articles

Created with Netscity (<https://www.irit.fr/netscity/prod/>) by Marion Maisonobe (UMR Géographie-cités - CNRS). JS map by amCharts.



# The importance of virtual research and learning networks

## Internationalization

collaborative international environment

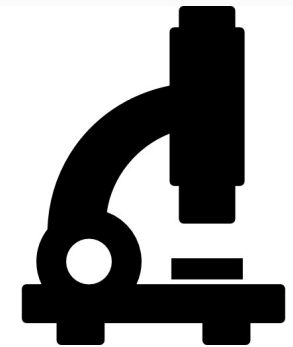
### Accessibility



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



### Modernization

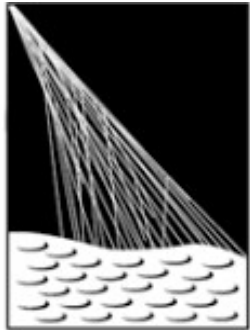


open educational resources, connectivity, acquisition of digital skills, and use/development of new learning methods



# 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**

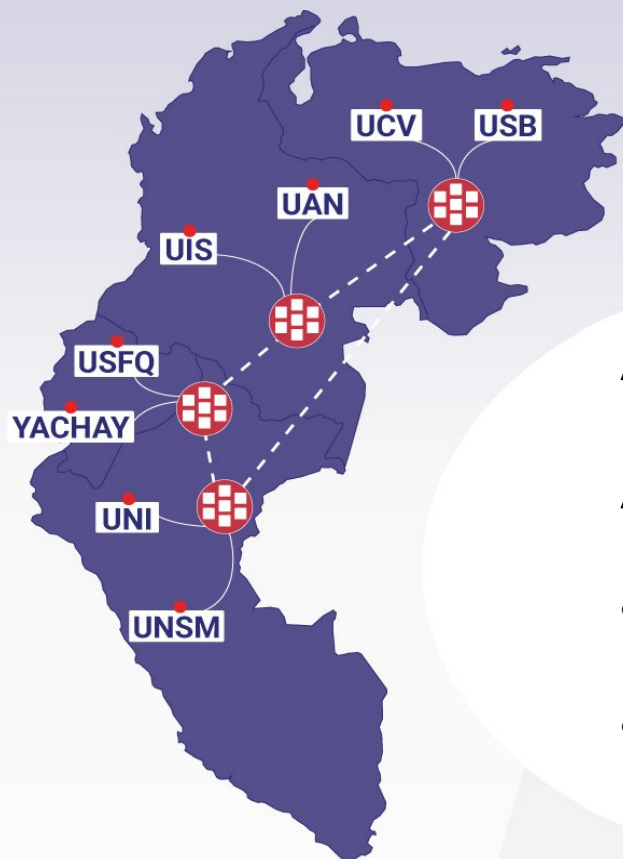
The HECAP development is nuanced and variable country-by-country,  
, but it has huge potential thanks to:

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





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



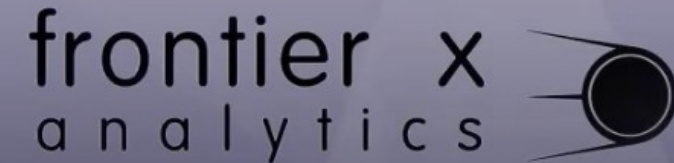
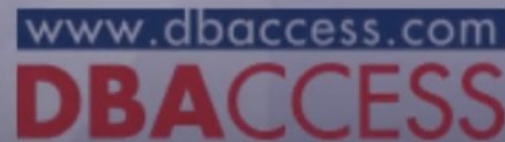
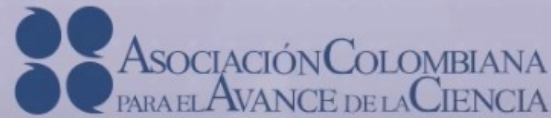
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# Scientific and Industrial partners



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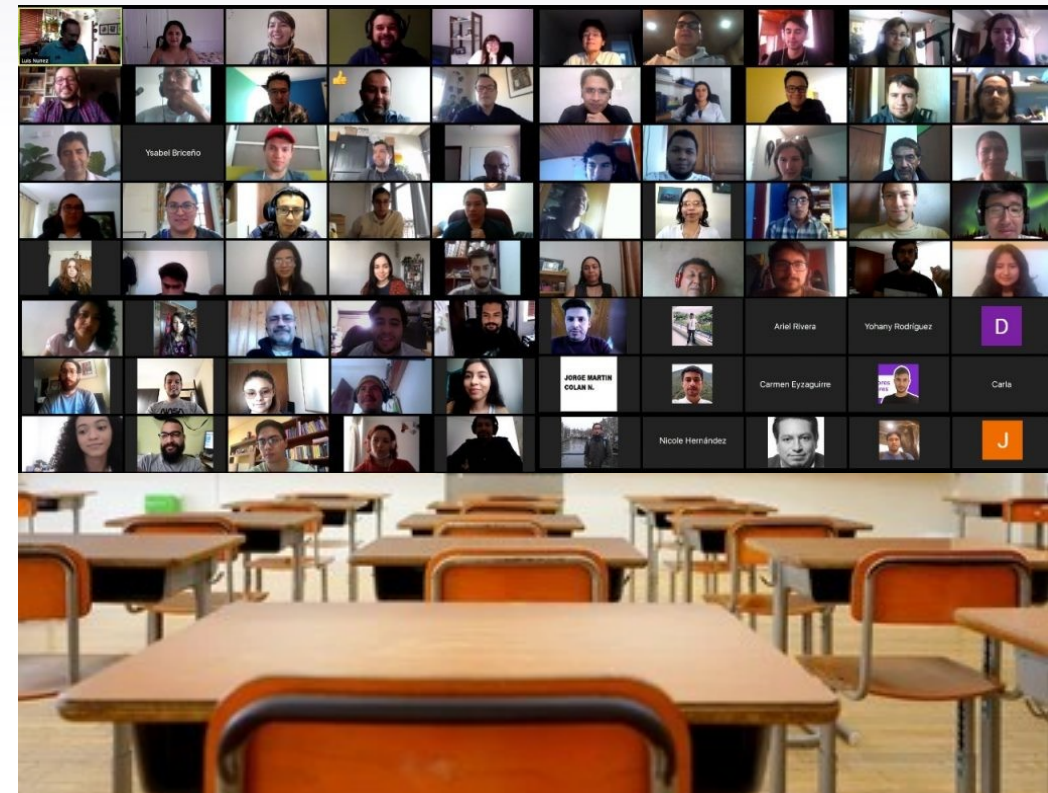


# LA-CoNGA physics

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

The screenshot displays a virtual classroom interface. On the left, a slide titled "Un ejercicio sencillo" from Université de Paris presents a physics problem about a "haz paralelo" (parallel beam) incident on a sphere. It includes a diagram of a sphere of radius  $R$  with an incident beam at an angle  $\theta$ . The problem asks to determine the differential and total effective section, comparing them with the geometric section of the sphere. The slide also lists two bullet points: "La sección eficaz diferencial es constante" and "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)".

On the right, a Jupyter notebook titled "Trabajando con Datos" is open, showing a scatter plot of data points over time. The plot has "ReadingDate" on the x-axis and "value" on the y-axis. The data points are blue dots scattered across the plot area.







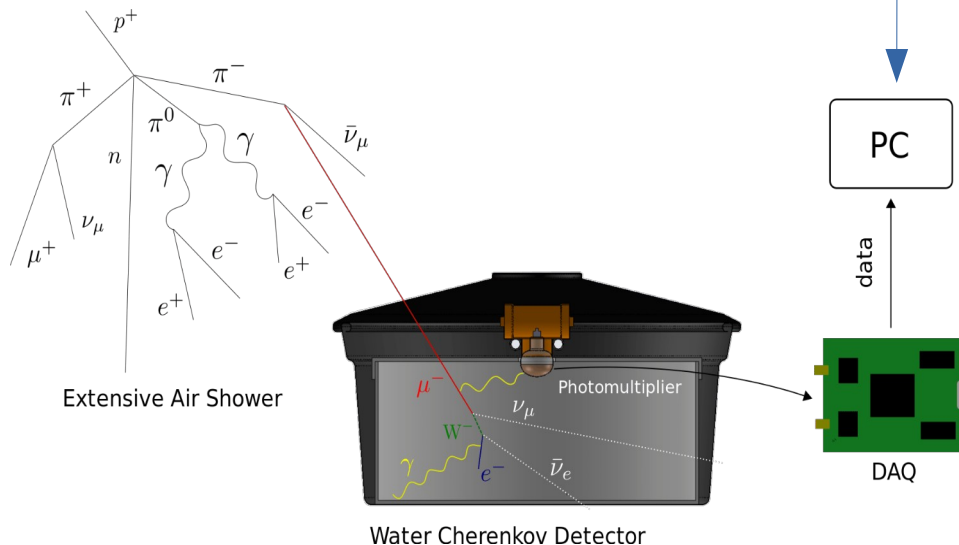
# Methodology and platform

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

 **Mattermost**



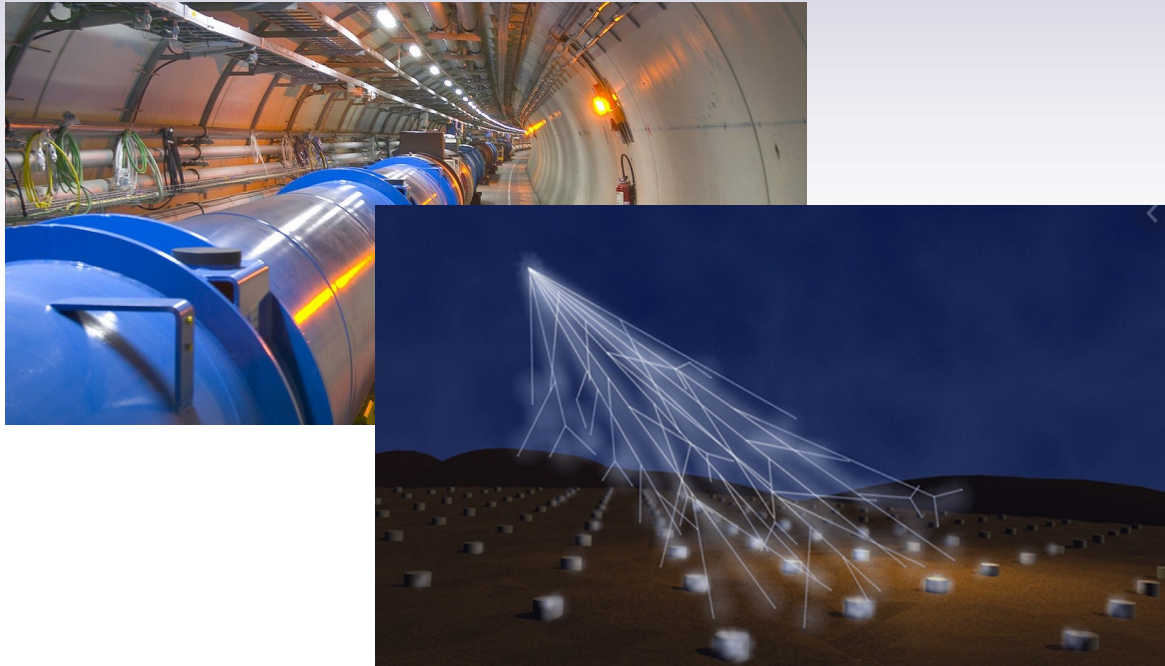
**GitLab**





# Thematic areas

## High Energy Physics



## Complex Systems



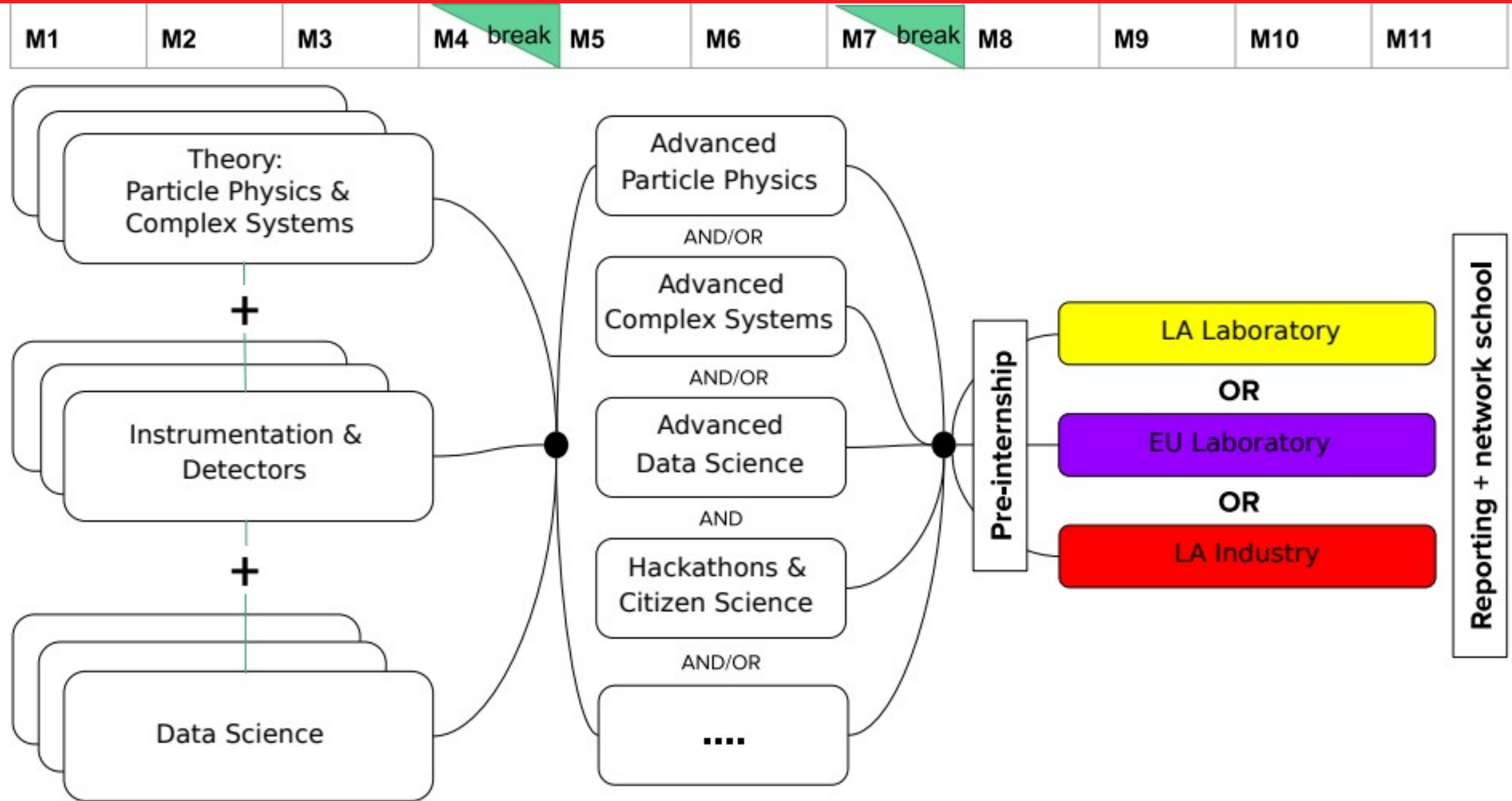
<https://laconga.redclara.net/courses/>

- Theoretical fundamentals and experimentation
- International collaborations
- Knowledge transfer

- Study of matter states
- Ubiquity of studied models
- Networks and collective behaviour
- Highly interdisciplinary field



# Implementation





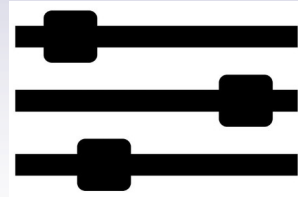
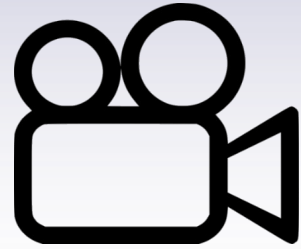


# Remote labs

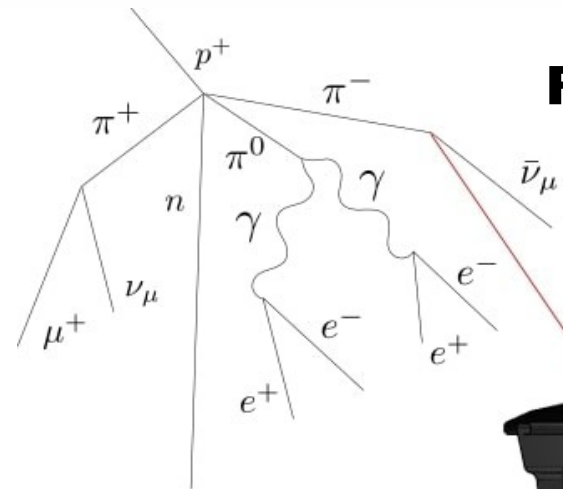
**Biblio.**



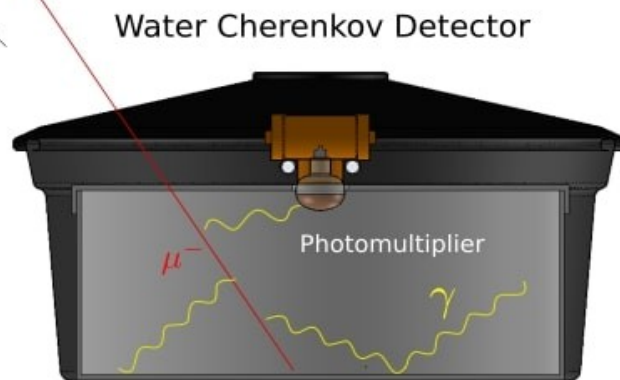
**Demo**



## Remote detectors and instruments



Extensive Air Shower

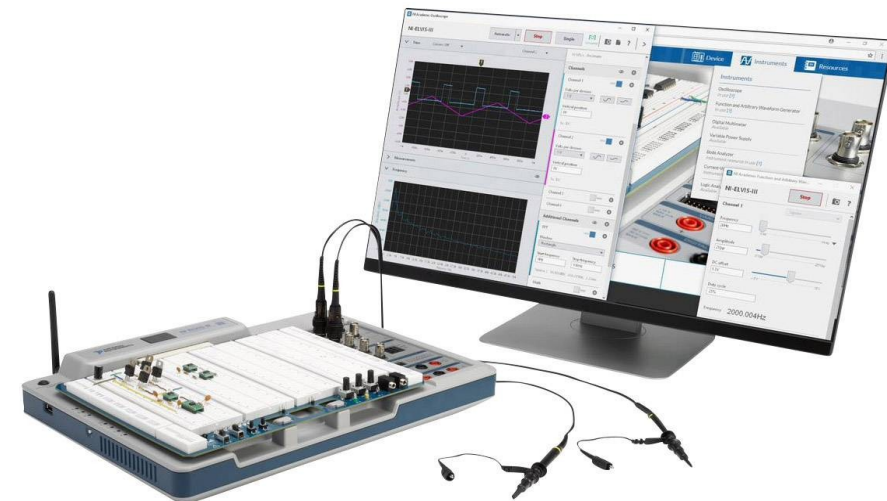


Water Cherenkov Detector

Photomultiplier



CAEN





National Instruments



# Seminars

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



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**Seminarios**  
LA-CoNGA physics

26 de julio de 2021  
14:00 (Col, Ec, Pe), 15:00 Ve, 19:00 UTC  
Transmisión en el canal de YouTube de LA-CoNGA physics

Modelos Ocultos de Markov  
Antonio Redondo  
Ph.D. en Física y Química Teórica

#SeminariosLACoNGA #AuLACoNGA

26/07/21 Seminario:  
Modelos ocultos de  
Markov



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**Seminarios**  
LA-CoNGA physics

12 de julio de 2021  
14:00 (Col, Ec, Pe), 15:00 Ve, 19:00 UTC  
Transmisión en el canal de YouTube de LA-CoNGA physics

Definición de complejidad para flúidos autogravitantes  
Luis Herrera  
Instituto Universitario de Física Fundamental y Matemáticas,  
Universidad de Salamanca, España

#SeminariosLACoNGA #AuLACoNGA

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



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**Seminarios**  
LA-CoNGA physics

28 de junio de 2021  
14:00 (Col, Ec, Pe), 15:00 Ve, 19:00 UTC  
Transmisión en el canal de YouTube de LA-CoNGA physics

Cuando el tiempo dejó de importar:  
un paseo por las formas modernas de cocinar  
Sumito Estévez  
Físico y Chef, Chile

#SeminariosLACoNGA #AuLACoNGA

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 modernisation, accessibility and internationalisation 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



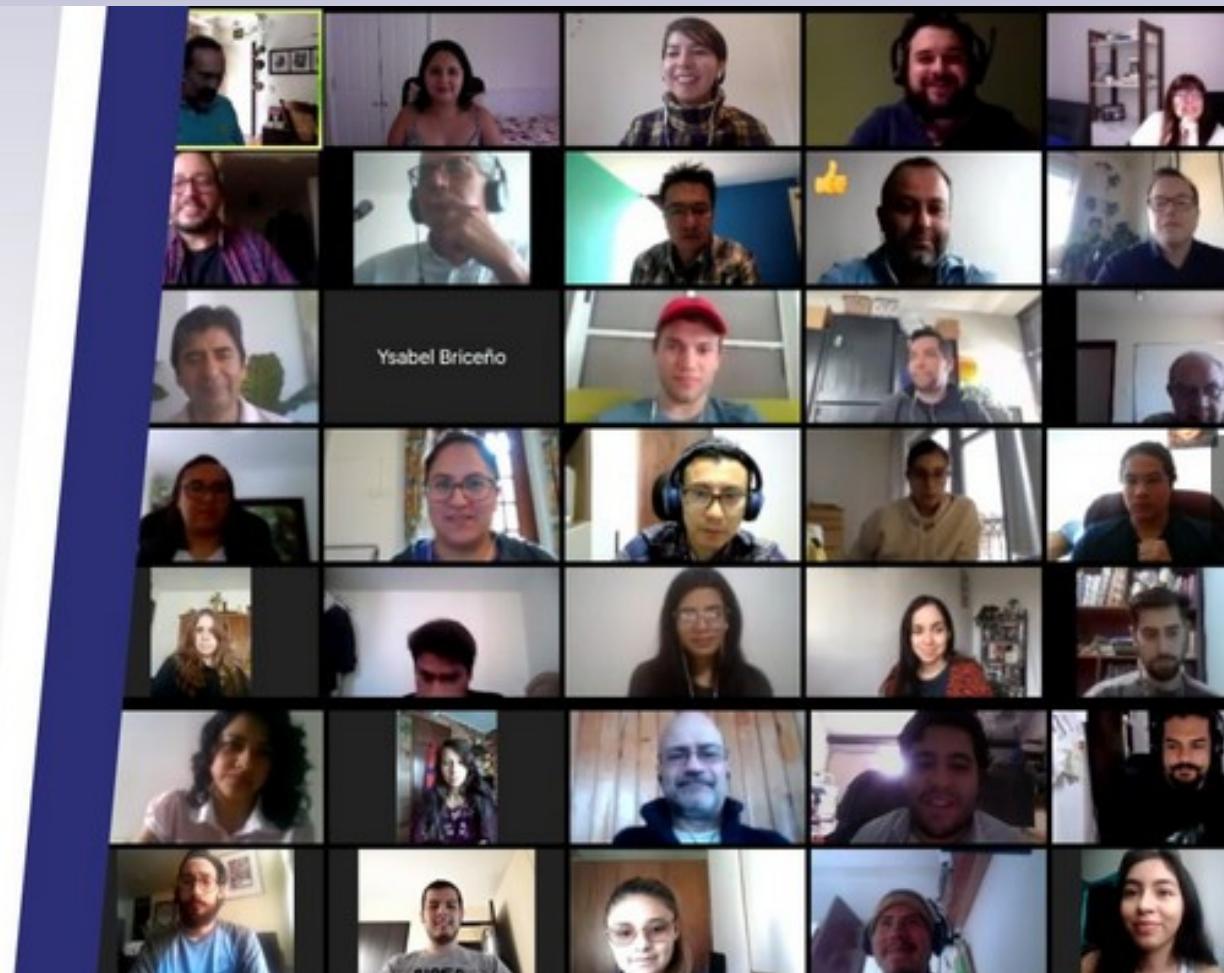
# Thanks!



Latin American alliance for  
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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](mailto:contacto@laconga.redclara.net)



lacongaphysics



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