

# 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

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LA-CoNGA physics



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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**





# The importance of virtual research and learning networks

## Internationalization

collaborative international environment

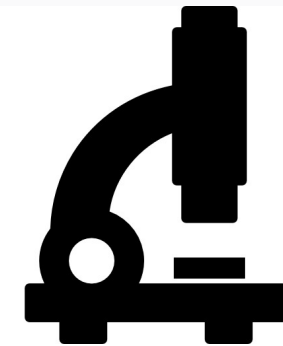
### Accessibility



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



### Modernization

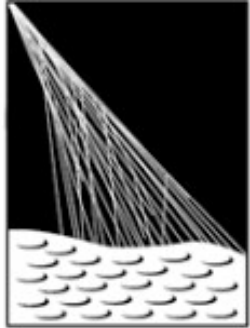


open educational resources, connectivity, acquisition of digital skills, and use/development of new learning methods



# 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  
Latin American European  
Network



Latin American Giant  
Observatory

## LASF4RI

Latin American Strategy  
Forum for Research  
Infrastructure

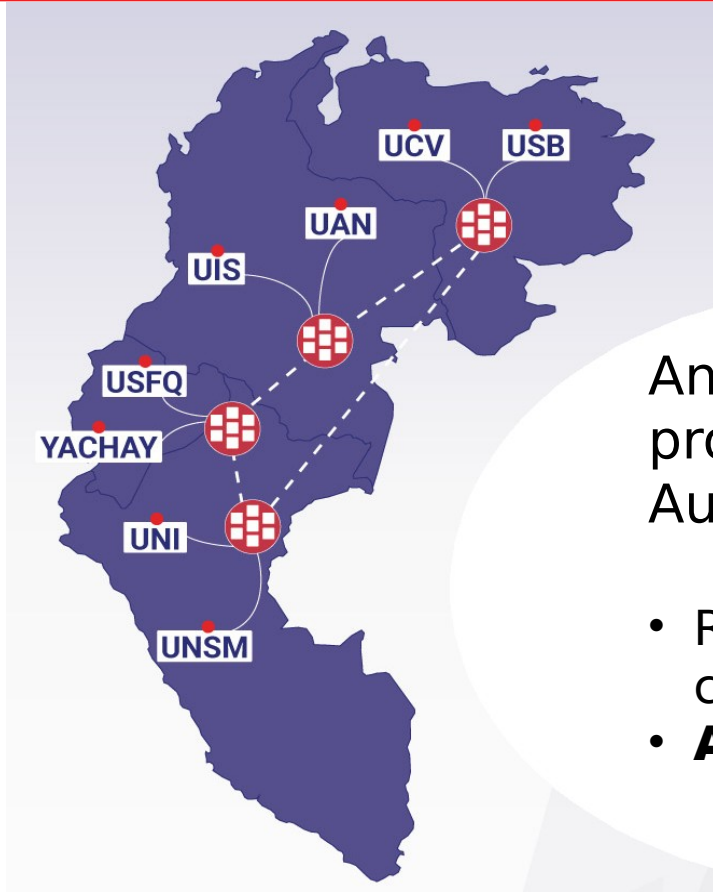


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The HECAP development is nuanced and variable country-by-country, but it has huge potential thanks to:

- 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



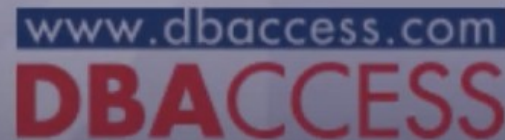
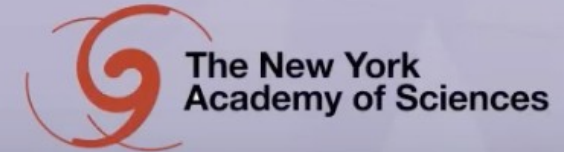
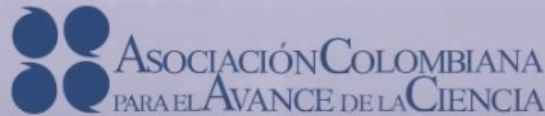
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# Scientific and Industrial partners



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

Un ejercicio sencillo

Un "haz paralelo" está compuesto por pequeñas canicas esféricas, macizas y rígidas, de radio  $r$ . Ese haz incide sobre una esfera igualmente maciza y rígida, de radio  $R \gg r$ .

Determinar:

- la sección eficaz diferencial, en función del ángulo de desviación de las canicas,
- la sección eficaz total.

Comparar con la sección geométrica de la esfera, y comentar.

$$b = R \cos \frac{\theta}{2};$$

$$\frac{d\sigma}{d\Omega}(\theta) = \frac{bdb}{\sin \theta d\theta} = \frac{R^2}{4};$$

$$\sigma = 4\pi \frac{R^2}{4} = \pi R^2.$$

- 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)

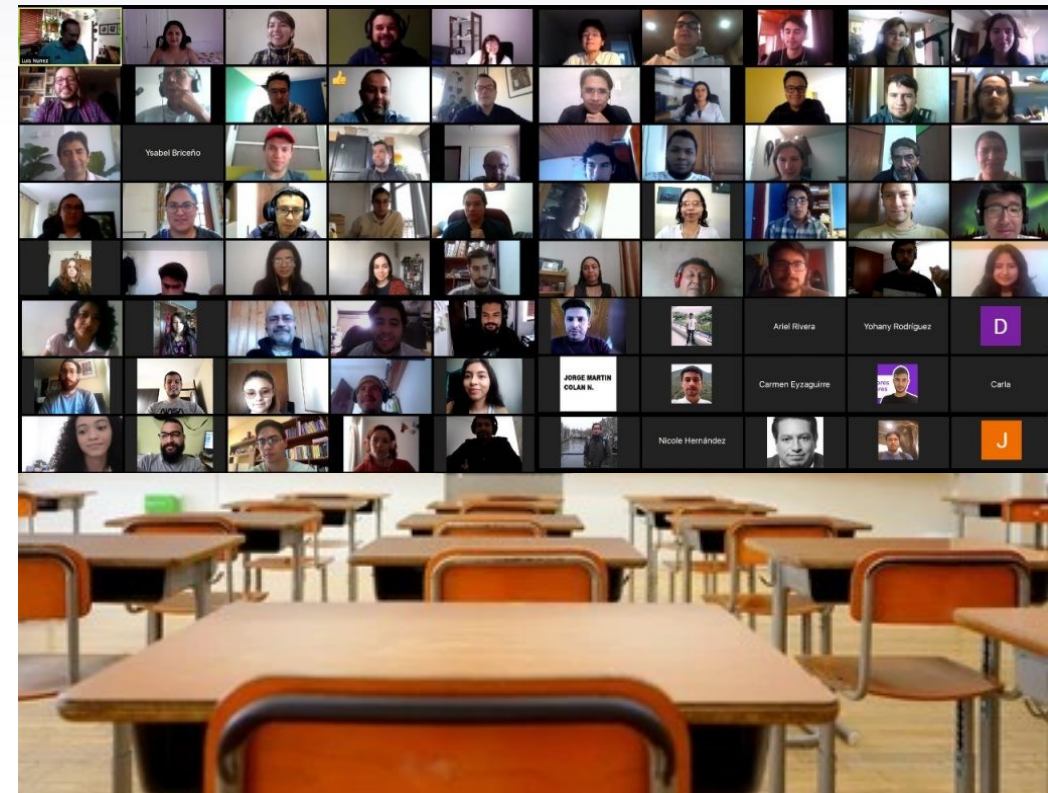
Trabajando\_con\_Datos (autosaved)

```

In [28]: #RD
RD = dd[de['spesies'] == '100']
RD.plot(x = 'ReadingTime', y = 'Value', kind = 'scatter', figsize = (15, 5))

Out[28]: <AxesSubplot:Label='ReadingTime', yLabel='Value'>

```



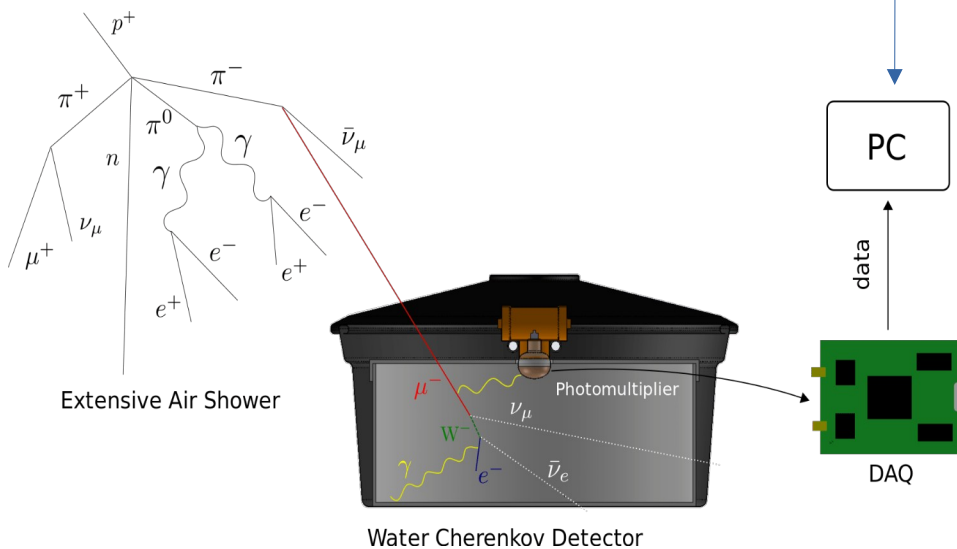


# Methodology and platform

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



GitLab







# Thematic areas (<https://laconga.redclara.net/courses/>)

## High Energy Physics



- Theoretical fundamentals and experimentation
- Strong international collaborations
- High knowledge transfer

## Complex Systems



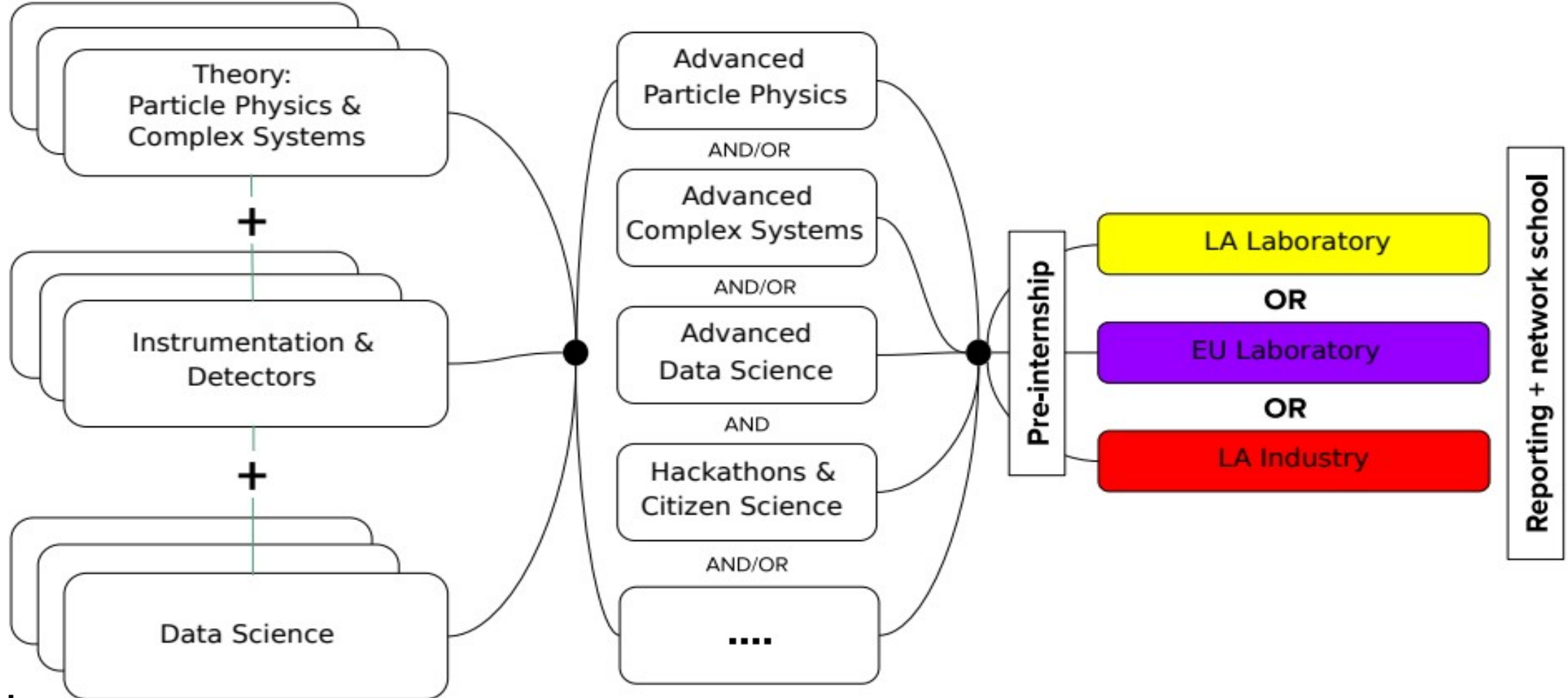
- Study of matter states
- Ubiquity of studied models
- Networks and collective behaviour
- Highly interdisciplinary field





# Implementation

M1	M2	M3	M4 break	M5	M6	M7 break	M8	M9	M10	M11
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Training  
Blocks:

Introductory

Improvement

Inclusion

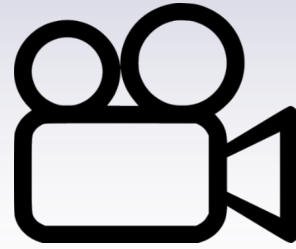


# Remote labs

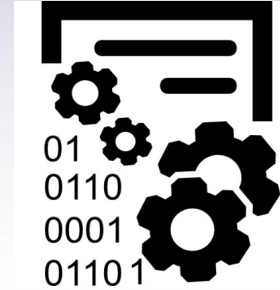
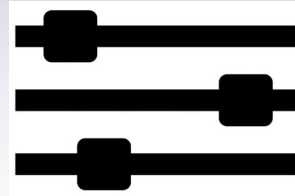
**Biblio.**



**Demo**



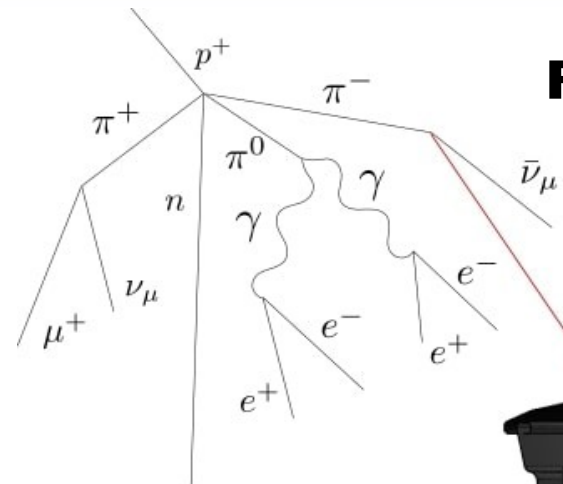
**Control and data taking**



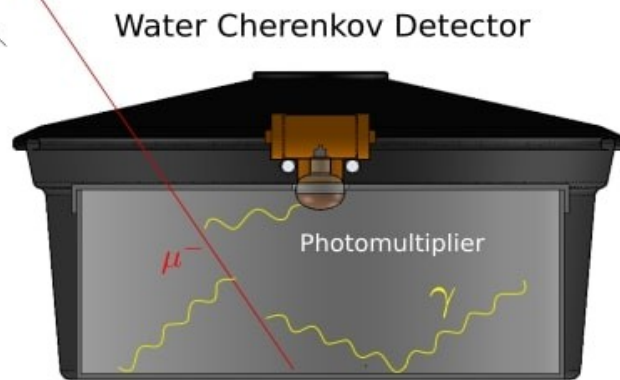
**Communication**



## Remote detectors and instruments



Extensive Air Shower

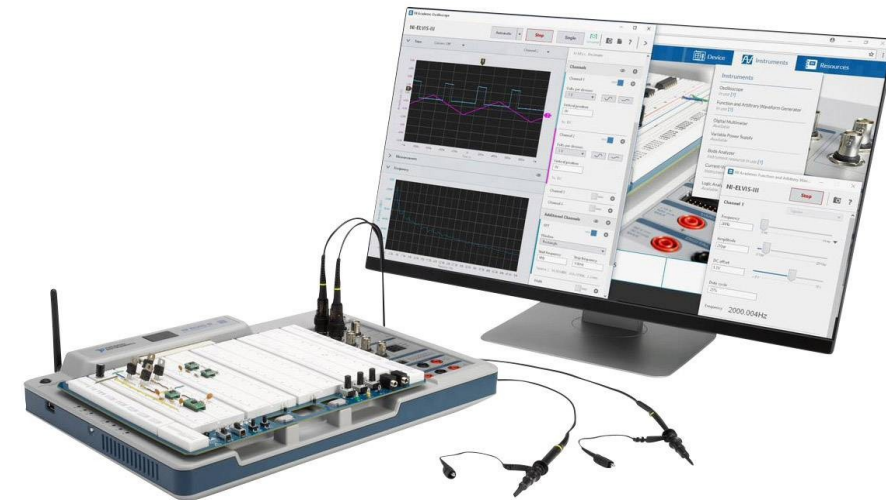


Water Cherenkov Detector

Photomultiplier



**CAEN**



**National Instruments**



# Seminars (<https://www.youtube.com/hashtag/seminarioslaconga>)



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## Seminarios LA-CoNGA physics

Lunes 18 de octubre de 2021  
14:00 (Col, Ec, Pe), 15:00 Ve, 19:00 UTC  
Transmisión en el canal de YouTube de LA-CoNGA physics

Buscando la materia oscura en el Gran Colisionador de Hadrones  
*Dilia María Portillo Quintero*  
Postdoctoral researcher TRIUMF (CA)

#SeminariosLACoNGA

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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 fluidos autogravitantes  
*Diego Herrera*  
Instituto Universitario de Física Fundamental y Matemáticas,  
Universidad de Salamanca, España

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## Seminario especial LA-CoNGA physics

Lunes 13 de septiembre de 2021  
14:00 (Col, Ec, Pe), 15:00 Ve, 19:00 UTC  
Transmisión en el canal de YouTube de LA-CoNGA physics

Steven Weinberg: El Modelo Estándar  
*Fernando Quevedo*  
Department of Applied Mathematics and Theoretical Physics (DAMTP)  
University of Cambridge

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## Seminarios LA-CoNGA physics

Lunes 6 de septiembre de 2021  
14:00 (Col, Ec, Pe), 15:00 Ve, 19:00 UTC  
Transmisión en el canal de YouTube de LA-CoNGA physics

La física en medicina  
*Blas J. Caroprese*  
Ph.D. UT Health Cancer Institute. EEUU

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## Seminarios LA-CoNGA physics

Lunes 25 de octubre de 2021  
14:00 (Col, Ec, Pe), 15:00 Ve, 19:00 UTC  
Transmisión en el canal de YouTube de LA-CoNGA physics

La tormenta desde arriba: detección por satélite de nubes de convección profunda y zonas de penetración de la tropopausa  
*Lorenzo Labrador*  
Oficial científico de la Organización Meteorológica Mundial

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# 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



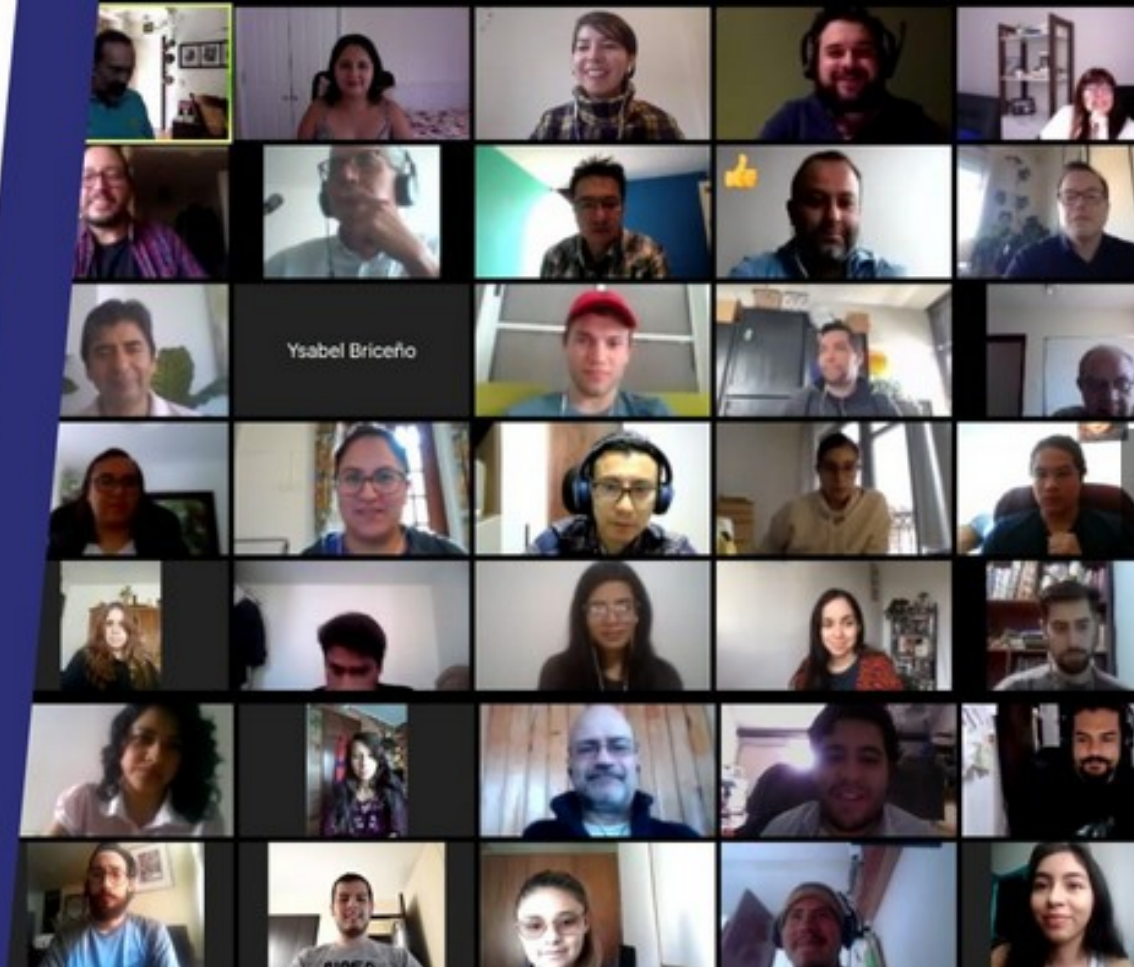
# We wait for you! :)



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







# Thanks



Missing some of the community members in the picture!

Invite you to check [our launching video](#) and our website (<https://laconga.redclara.net/>) to get more info about the project and the team!





<http://laconga.redclara.net>



[contacto@laconga.redclara.net](mailto:contacto@laconga.redclara.net)



lacongaphysics



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El apoyo de la Comisión Europea para la producción de esta publicación no constituye una aprobación del contenido, el cual refleja únicamente las opiniones de los autores, y la Comisión no se hace responsable del uso que pueda hacerse de la información contenida en la misma.

# 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