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on behalf of the LA-CoNGA physics community



Latin American alliance for
Capacity building in Advanced physics

LA-CoNGA physics

LA-CoNGA physics : a Latin American Alliance

LA-CoNGA physics is an **Erasmus+** project, **CBHE** category
(Capacity Building in Higher Education)

Main objectives :

- **build a network of common capacities** in advanced training
 - for 8 Universities in 4 Andean countries
 - Colombia, Ecuador, Perú, Venezuela
- strengthen collaboration between **Latin America** and **Europe** in Higher Education

Proof-of-concept : set up a **Master-level** complete year in **Advanced Physics**

- **common, cross-institutional** program
 - **inserted** in the already-existing **local Master** programs
- modern, **interconnected** instrumentation laboratories
- **innovative e-learning platform**, fully based on open-access contents and tools
- problem-solving pedagogical approach, structured in mini-modules
- **3-month internships** in research labs or industrial partners (in Europe or LA)
- Syllabuses calibrated on the EU **Bologna process** (i.e. 60 ECTS = 1 complete year)



Cofinanciado por el programa Erasmus+ de la Unión Europea

A multinational consortium

Program Partners in Europe

- Université Paris Cité (**UPCité**), 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** (Geneva)
 - **ICTP** (Trieste)
- international research centers: **CNRS**, **CEA** (FR) **DESY** (GE)
- industrial partners in Latin America and Europe
- other academic partners in the Americas



Methodology and tools

- LA-CoNGA physics reproduces a **modern, cross-institutional, international**, working environment
- MiLAB : our **e-learning** platform, inventively based on **open-access** tools
- module-structured courses, taught in **"semi-presencial"** mode
 - partly remotely from Europe
 - partly from Latin America
- Academic support: individual mentorships, discussion forums, office hours, discussion sessions...
- **interconnected** instrumentation labs in **remote access**
- teaching material in Spanish
 - **all available online** : videos, courses, docs, notebooks...



LA-CoNGA physics : three years of courses!

- Three LA-CoNGA physics cohorts so far: 2021, 2022, 2023
- 30 instructors from Latin America and Europe
- More than 50 students from 4 countries completed at least one full course in each cohort
- Between 10-15 students in internships each year
- More than 200 classes available open access (videos, documents, notebooks, datasets...)
- But also challenges like COVID, difficulties in accessing universities (instrumentation from home), internet connection bandwidth and postgraduate time dedication conditions in the region

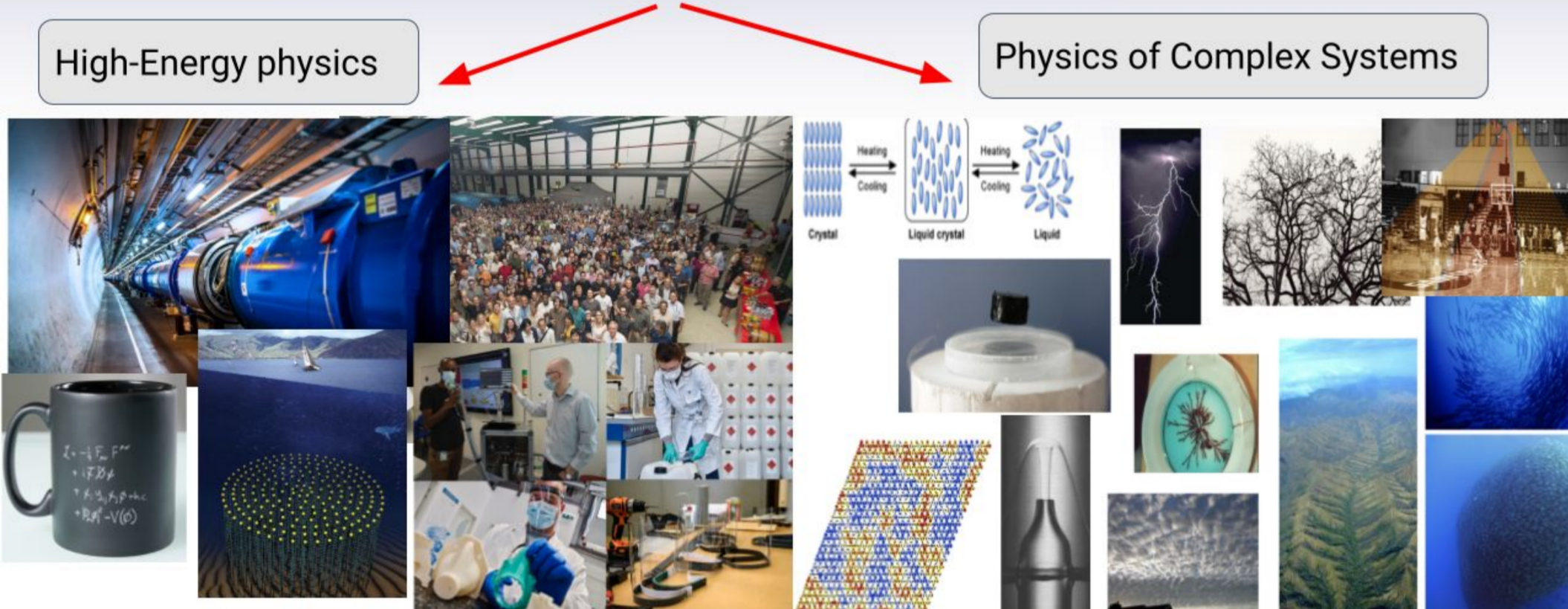


The two LA-CoNGA physics Theory streams

Data science in LA-CoNGA physics

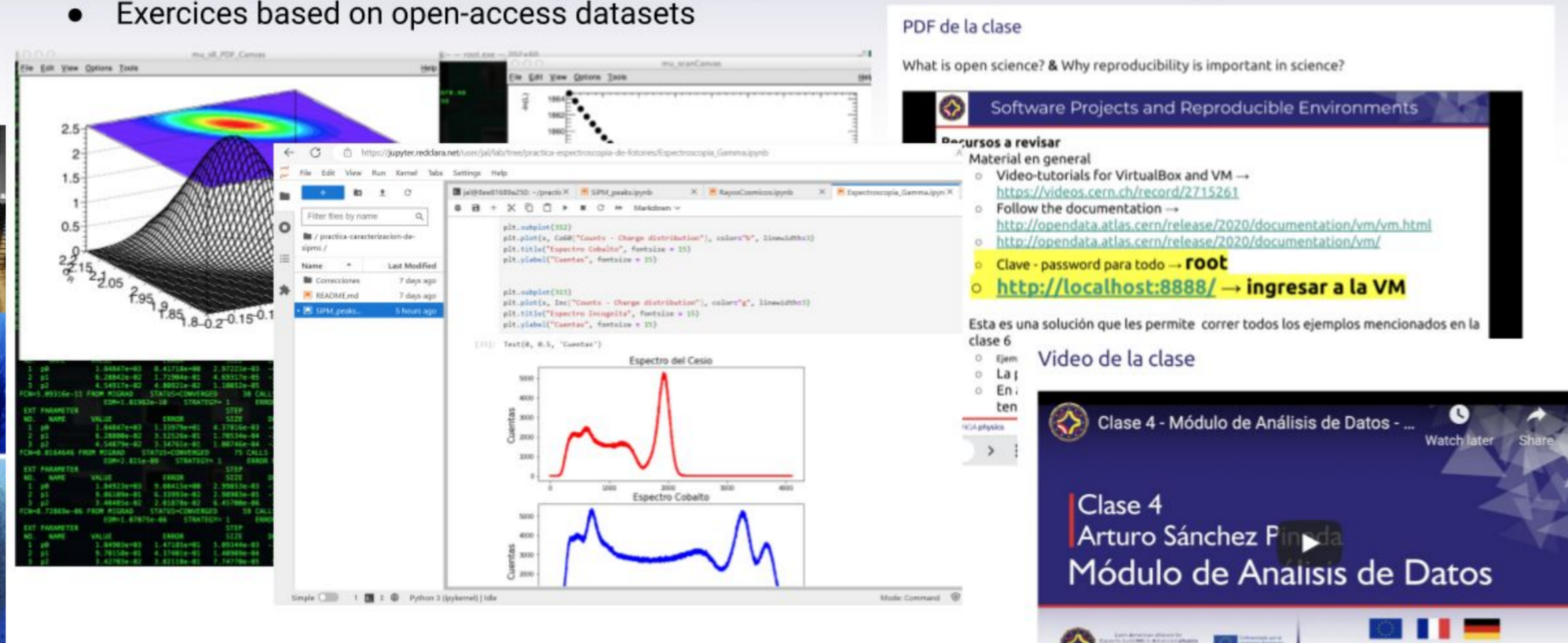
LA-CoNGA physics : tools and instruments

A common conceptual framework : **Field Theory**



Objectives:

- Train on tools and concepts for data analysis, aiming at scientific inference
- Strong emphasis on scientific reproducibility, open science and collaborative approach
- Exercises based on open-access datasets



- Advanced teaching lab in **Nuclear Physics**:
 - **CAEN** Premium Kit and **CAEN EasyPET**
 - scintillators, SiPMs, spectrometers...
 - Laboratory toolkits: **Multi-purpose, interconnected and remote-accessible**
 - **National Instruments** Virtual Instrumentation Suite ELVIS III
 - **Keysight** EDU Series for Ecuador
 - oscilloscopes, function generators, protoboards...
 - Air-quality monitoring stations for **high-school science labs**
 - Made in Colombia by **MakeSens** startup
 - Computing stations (**DELL Optiplex**)
 - Kits on non-linear physics by **e-systeme**, a Spain-based educational start-up
 - Working with **e-systeme** on improving the front-end of our remote instrumentation labs: <https://grupohalley.gitlab.io/labs/>

Material deployed in all 8 Latin American partner Universities



LA-CoNGA physics internships

Courses and beyond

- Two flavours of internships to strengthen the collaborations:
 - towards Europe or intraregional
- Some published outputs:
 - Fernández, N., et al. *Eur. Phys. J. B* **96**, 68 (2023)
 - Suarez-Urango, D. et al. *Eur. Phys. J. C* **83**, 1018 (2023)



- **transversal activities** towards other communities :
 - **hackathons**
 - **citizen science** projects with high-schools in the region
- **scientific outreach** in Latin America:
 - workshop **"Comunicando la ciencia"**
 - joint activity with **communication offices** in our partners
 - presentations in international conferences
 - LA-CoNGA physics celebrates the **Higgs boson 10th birthday** (July 15, 2022)

#SeminariosLACoNGA every two weeks
international guests
all available in [our YouTube channel](#)



LA-CoNGA physics and the longer-term future

- Expand the LA-CoNGA model to other **Fields**
 - Astrophysics
 - High Performance Computing
 - Geophysics
 - Nuclear Physics
- Expand **Geographically** (Central America)
- **Training model** highly in demand inside and outside academia:
 - Data Science, (64h)
 - Field-oriented Instrumentation (64h)
 - Field-oriented Basic Theory (64h)
 - Field-oriented Advanced Course (64h)
 - Hackaton & Citizen Science
 - Internship (12 weeks)

Scientific and academic capacity building based on:

- International collaboration
- Shared infrastructures
- Open resources
- Organization/common strategies

But without forgetting to adapt to (different) local realities !

Current objective: **ensure the sustainability** beyond the initial funding period and **continue cooperation**

- **intraregional**
- **between Europe and Latin America**



<http://laconga.redclara.net>

¡Gracias!



@lacongapysics



¡SUENA BIEN!



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Université Paris Cité