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Building the Next Generation of Latin American Scientists: Research-Based Training through LA-CoNGA and EL-BONGÓ Physics

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Training the next generation of researchers in high-energy and astroparticle physics requires more than advanced coursework. Students must develop expertise in theory, scientific computing, detector instrumentation, and the collaborative practices of large experiments, alongside transferable skills relevant to careers beyond academia. In Latin America, however, unequal access to fellowships, modern laboratories, research infrastructure, and stable early-career opportunities limits this training, particularly where local instrumentation facilities and international mobility are scarce.

We present two ERASMUS+ capacity-building initiatives, LA-CoNGA physics and EL-BONGÓ physics, designed to address these disparities through scalable, cross-border, research-based education. Their approach combines open online learning resources, shared software and data repositories, and remotely accessible laboratories that can be operated through low-bandwidth SSH connections. A three-month research apprenticeship, hosted by a regional laboratory or conducted remotely, connects coursework to authentic projects while developing research practices, teamwork, and technical autonomy.

Building on LA-CoNGA physics, which concluded in January 2024, EL-BONGÓ physics began in January 2025 and extends the collaboration to three Central American countries. It organises training around four research-and-learning communities: high-energy physics, multimessenger astronomy, seismology and Earth hazards, and artificial intelligence and computational tools. Two additional features reinforce its research-oriented model: courses structured around concrete scientific problems that let students learn through active research participation; and a network of fabrication laboratories (FABLabs) that provides practical training in digital fabrication, low-cost instrumentation, and local maintenance.

Together, these initiatives illustrate how shared digital infrastructure, project-based learning, and regional cooperation can broaden access to advanced scientific training, strengthen institutional capacity, and improve graduates' readiness for academic and non-academic careers.

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