
Roundtable Discussion

How to Increase Collaboration Across the Americas

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Collaboration Across the Americas

with Emphasis on Latin America

◆ Goals of Collaboration

- ▼ Bring together a range of experiences, expertise and resources from across the Americas toward a common goal.
- ▼ Spread knowledge, expertise and technology across the Americas.
- ▼ Expand and increase the potential of the relevant educational facilities in areas of science and technology
- ▼ Train a new generation of scientists, engineers and technicians.
- ▼ Initiate collaborative efforts between educational facilities and local industry stimulating technology-oriented industrial growth.

Types of Collaboration Across the Americas

1. Individual to individual collaborations across the Americas
 1. Juan Estrada (Fermilab) with Jeronimo Blostein from Bariloche, Argentina invented a high resolution neutron imager and built a prototype at FNAL. The DOE submitted a patent application for this technology with co-inventors in Fermilab and Argentina.
 2. Certainly such one-on-one collaborations are happening in many universities and industries as well.
2. Country-State/institution to individual collaborations across the Americas
 1. Brasil and Mexico and.... have programs to invite individuals from other countries to visit and lecture at Universities across their respective countries.
3. Sponsored scientific/technological workshops and schools across the Americas
 1. Attract the expertise locally where the schools/workshops are held to lecture
 2. Inspire the next generation of scientists.
 3. CERN has been very successful in this direction, energizing Latin America and steering them toward the LHC

Types of Collaboration Across the Americas

4. Multi-institutional collaboration across the Americas
 1. ANDES, CLEF, MCTP US Neutrino Community: MINERvA, MINOS, LBNE
5. Experimental Collaboration-to-Institution
 1. Initiated by direct contact between individuals across the Americas.
 2. Becomes contact between established/establishing collaborations and potential member institutions.
 3. Can be accomplished with minimal formal paperwork (MOU outlining individual and/or group responsibilities within a collaboration).
6. Accords Between an Experimental Facility and Institutions
 1. Usually starts with type 4 collaboration and requires more formal interaction with lawyers – can proceed in parallel with type 4 collaboration
 2. Extremely useful for groups across the Americas to secure support from home institutions and from state and national funding agencies.
7. Agreements between collaboration and institutions across the Americas with funding agency involvement – large Experiment/Projects (LBNE)
 1. Can start with type 4 and 5 collaborative efforts and then expand.
 2. May need approval at the highest level before any collaboration can start...

Fermilab Latin American Initiative – Leon Lederman

- ◆ The relationship between Fermilab and Latin American HEP physicists was profoundly influenced by Leon.
- ◆ In his own words: As Director of Fermilab, starting in 1979, I began a series of meetings with scientists in Latin America. The motivation was to stir collaboration in the field of high energy particle physics, the central focus of Fermilab.
 - ▼ In the next 13 years, these Pan American Symposia stirred much discussion of the use of modern physics, created several groups to do collaborative research at Fermilab, and often centralized facilities and, today, still provides the possibility for much more productive North-South collaboration in research and education.
- ◆ These initial meetings led to a series of Pan American Symposium on Elementary Particles and Technology with the first in Mexico that touched much more than the formation of teams from Brazil, Mexico and Colombia participating in research at the Fermilab.
- ◆ Workshops on accelerator technology, on science education, and other topics in scientific research stimulated by the collaboration, were held in Mexico, Brazil, Costa Rica, Bolivia, Honduras, and Peru.

Latin American Participation in Fermilab Neutrino Experiments

NEUTRINO EXPERIMENTS

◆ MINOS / MINOS+

- ▼ Universidade Estadual de Campinas, Brasil Brasil 1 PhD, 2 MS
- ▼ Universidade de Sao Paulo, Brasil
- ▼ Universidade de Goias, Brasil

◆ MINERvA (E938)

- ▼ Centro Brasileiro de Pesquisas Fisicas (CBPF), Brasil 1 (+1) PhD
- ▼ Universidad Tecnica Federico Santa Maria, Valparaiso, Chile
- ▼ Universidad de Guanajuato, Mexico (1 PhD)
- ▼ Pontifica Universidad Catolica de Lima, Peru
- ▼ Universidad Nacional de Ingenieria, Lima, Peru

◆ LBNE

- ▼ 5 Brazilian Universities

MINERvA Latin American Program

Initiated in late 2005

- ◆ CBPF - 1 professor – Brasil (Accord)
 - ▼ 4 Masters Students
 - ▼ 5 Doctoral Students
 - ▼ 2(3) PostDoctoral
- ◆ Univ. Santa Maria – 2 professors - Chile
 - ▼ 2 Masters students
- ◆ Univ. of Guanajuato (Accord) /
(U Guadalajara) – 3 professors - Mexico
 - ▼ 5 Masters Students
 - ▼ 2 Mechanical Engineers
 - ▼ 3 Doctoral Students
- ◆ PUCP – 1 professor– Peru
 - ▼ 7 Masters Students
 - ▼ Just initiating a Doctoral Program
- ◆ UNI – 1 professor – Peru
 - ▼ 4 Masters students

8 Professors: 26 trips to
Fermilab for 1.5 to 6 week.

1 Sabbatical

22 Masters students

8 Doctoral students

3 PostDocs

First MINERvA PRLs

Measurement of Muon Neutrino Quasi-Elastic Scattering on a Hydrocarbon Target at $E_\nu \sim 3.5$ GeV

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Status of the Fermilab Latin American Initiative

- ◆ **Since the late 70' s Fermilab has played a proactive role in encouraging Latin American participation in the Theory and Experimental life at the lab.**
- ◆ **Already a strong Latin American – Argentina, Brasil, Chile, Colombia, Mexico & Peru – presence in Fermilab Experiments.**
- ◆ **Need to schedule more Workshops and Schools in Latin America.**
- ◆ **There are several working models (MINERvA) of how to encourage Latin American physicists collaborating at Fermilab.**
- ◆ **Important next step in the Latin American Initiative is formalized agreements between Fermilab and all collaborating institutions that can then be taken to national research and funding agencies.**
- ◆ **With LBNE beginning collaboration across the Americas, the Fermilab Latin American initiative is taking a more formal turn with direct involvement of funding agencies.**

Carlos Escobar - Brazil

Some numbers about the Brazilian Particle & Fields Community

The Brazilian Physical Society – SBF – has a Division of Particle and Fields – DPF –, which has an annual meeting, making it easy to arrive at estimates about the size and profile of the community.

In 2008 the Brazilian Ministry of Science, Technology and Innovation (MCTI) created the National Network for High Energy Physics (RENAFAE) with the objective, among others, of

Coordinating the activities of those groups working in High Energy Physics and, in particular, the activities associated with the large international collaborations.

From the 2013 DPF meeting the following profile emerges:

50% of the P&F physicists work in **theoretical subjects** (Cosmology and Gravitation, QFT and Strings)

25% work on **Particle Phenomenology**

25% work on **Experimental High Energy and Astroparticle Physics**

RENAFAE numbers for 2014:

All 4 LHC experiments, Alpha, Auger, Double Chooz, Minos/Minos+, Nova and Minerva: 106 physicists (faculty, senior researchers, postdocs). There is a small amount of multiple counts.

ALPHA: 2; ALICE: 8; ATLAS: 11; CMS: 31; LHCb: 20; Auger: 23; Double Chooz: 7; Minos/Minos+: 4

It is a young community: 2014 marks the 35th anniversary of the 1st DPF meeting and the 30th anniversary of the beginning of the Brazil-Fermilab collaboration.