Driving from Chicago to Buenos Aires: instrumentation schools during a road trip across the Americas

Federico Izraelevitch
Fermilab - University of Buenos Aires
38th ICHEP
05-Aug-2016
The Escaramujo Project

- Series of eight Instrumentation courses
  - Latinamerican Institutions
  - Graduates and advanced undergraduates

- Cosmic rays detector: common thread for covered topic
  - Assembled by students
  - One functional by the end of each session
  - Donated to the institution

- Topics
  - Particle physics
  - Interaction of radiation with matter
  - Front-end electronics
  - Data analysis (C++/ROOT)
The Escaramujo Project
The Escaramujo Project

Aug-2015, Fermilab Dog Area
The Escaramujo Project

- Hardware budget ~ 15000 $
  - Donated by companies and Fermilab

- Visited institutions covered lodging expenses
  - For the five of us

- A local organizer at each site
  - Classrooms, labs
  - Student selection
  - Prepared a minimum of equipment (oscilloscope, gloves, ethanol)

- Five intensive days
  - Construction, characterization, data taking, analysis.
Fermilab and diplomatic support

At the Argentinian consulate in Chicago, along with consular representatives.
The courses

Lectures in the classroom

Chiapas, Mexico
The courses

Laboratory explanations

Quito, Ecuador
The detector

Plastic scintillators → Donated by Eljen Technology

Bucaramanga, Colombia
The detector

Silicon Photomultipliers → Donated by SensL

Pasto, Colombia
The detector

DAQ electronics → Donated by Fermilab

Chiapas, Mexico
The courses

Data analysis sessions (C++/ROOT)

Chiapas, Mexico
The courses

Extra activities: having fun doing science
→ muon telescope to study volcanoes

Pasto, Colombia
The courses

Pasto, Colombia
The courses

Extra activities: having fun doing science
→ cosmic rays rate versus altitude

La Paz, Bolivia
The courses

From La Paz (3700 m.a.s.l.) to top of Chacaltaya mount (5200 m.a.s.l.)
Visiting a visiting teacher

Álvaro Chavarría (KICP at UChicago posdoc, left) and Pablo Moisteiro (INFN at Sapienza posdoc, on a knee).

Funds from UChicago allowed a larger course at Universidad de Costa Rica

San José, Costa Rica
Use of new technology in the laboratory: cell phone as a goniometer

Pasto, Colombia
Larger impact after the courses: high schools

International Cosmic Day at Chiapas

Cultural and science fair at Chiapas
Outlook

- Three more workshops planned
  - Universidad Federal de Goias (Brazil)
  - Universidad Nacional de Asuncion (Paraguay)
  - Universidad Nacional de Tucuman (Argentina)

- Sites not visited building their own Escaramujo detector
  - Benemerita Universidad Autonoma de Puebla (Mexico)
  - Universidad del Atlantico (Colombia)

- Organizing groups and a collaboration around the detectors
  - Regular meetings by video/phone
  - Task groups: calibrate and compare detectors at each site
  - Writing documentation