

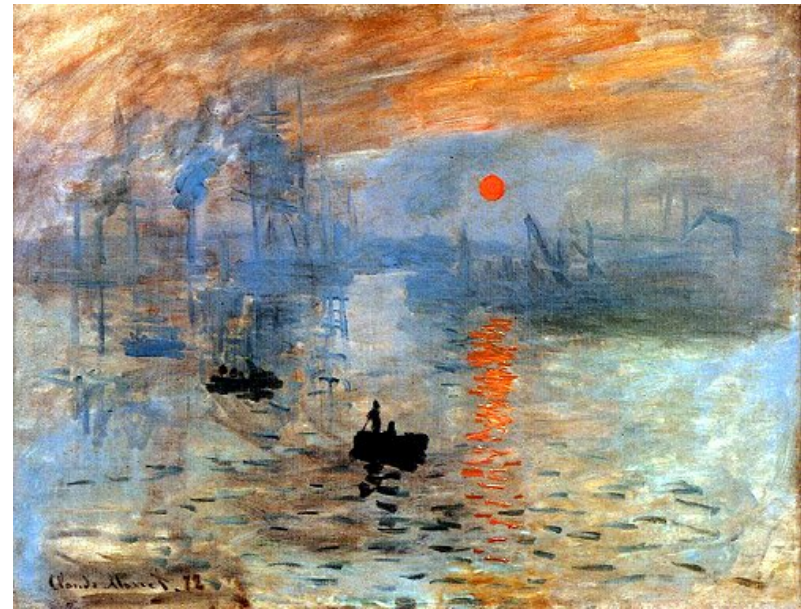
Driving from Chicago to Buenos Aires: instrumentation schools during a road trip across the Americas

Federico Izraelevitch

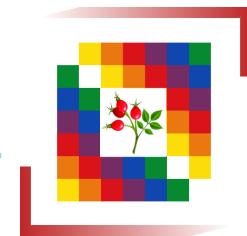
Fermilab - University of Buenos Aires

38th ICHEP

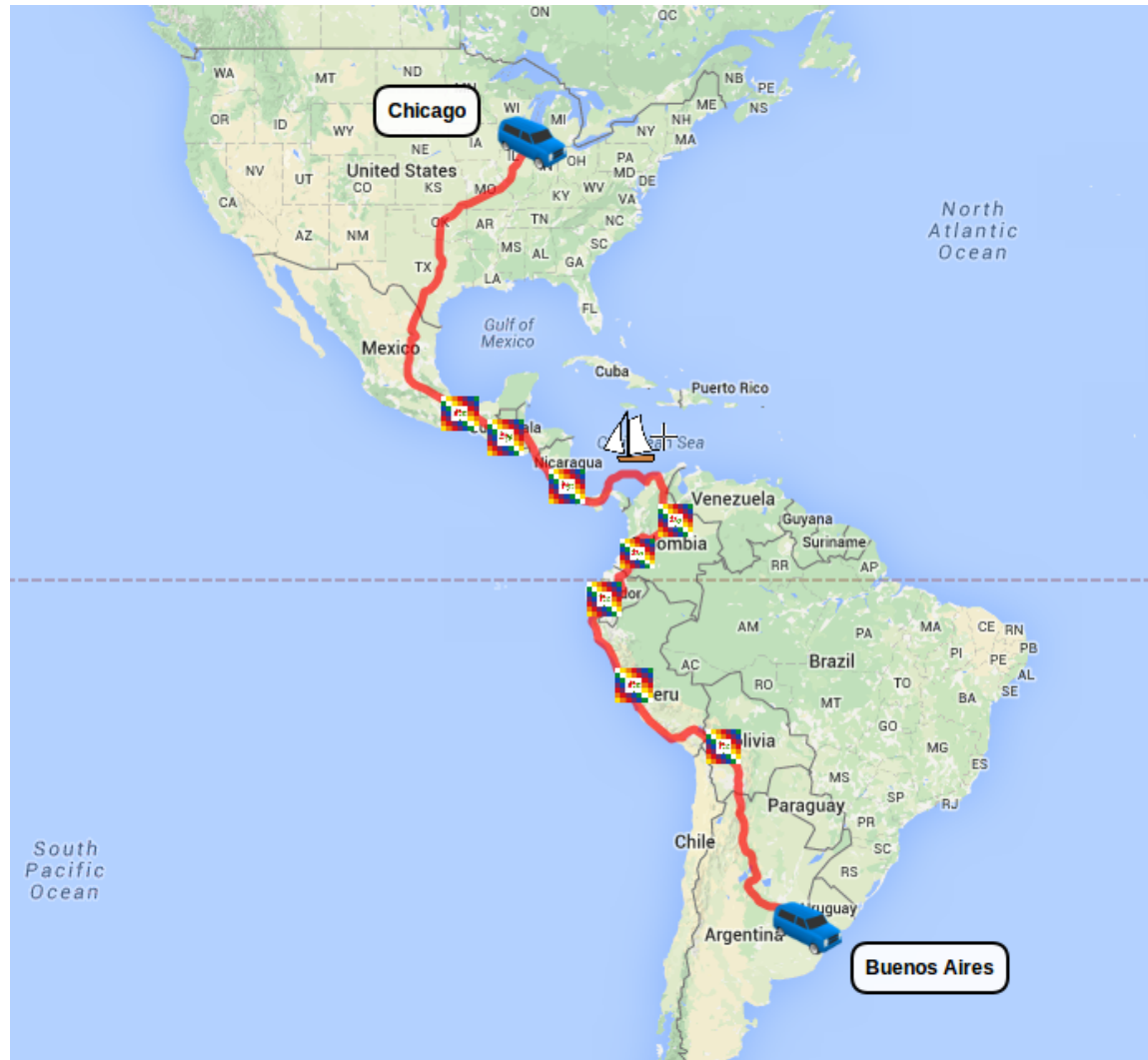
05-Aug-2016



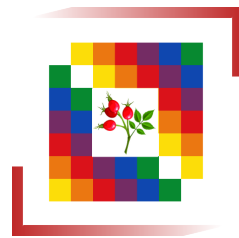
The Escaramujo Project



- 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)



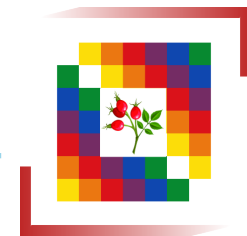
The Escaramujo Project



Aug-2015, Fermilab Dog Area

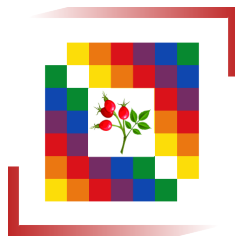


The Escaramujo Project



- 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.

Sponsors



Consulado General de la
República Argentina
Chicago - Estados Unidos de América
Ministerio de Relaciones Exteriores y Culto

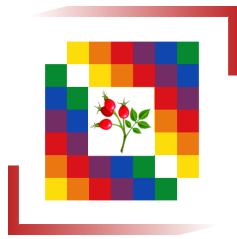


Kavli Institute
for Cosmological Physics
at The University of Chicago



*Red de Científicos
Argentinos del
Medio Oeste de los
EE.UU.
(RE.C.AR.M.O.)*

Fermilab and diplomatic support



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

La Paz 



Quito 



Lima 



Pasto 



Bucaramanga 

San José 



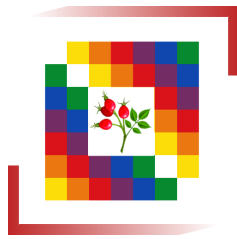
Chiapas 



Guatemala 



The courses

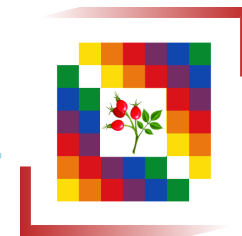


Lectures in the classroom



Chiapas, Mexico

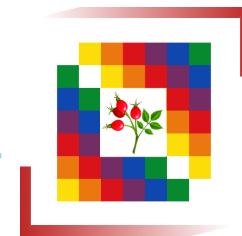
The courses



Laboratory explanations



The detector



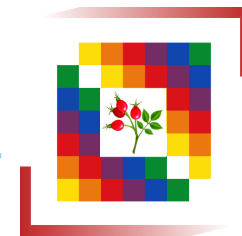
Plastic scintillators → Donated by Eljen Technology



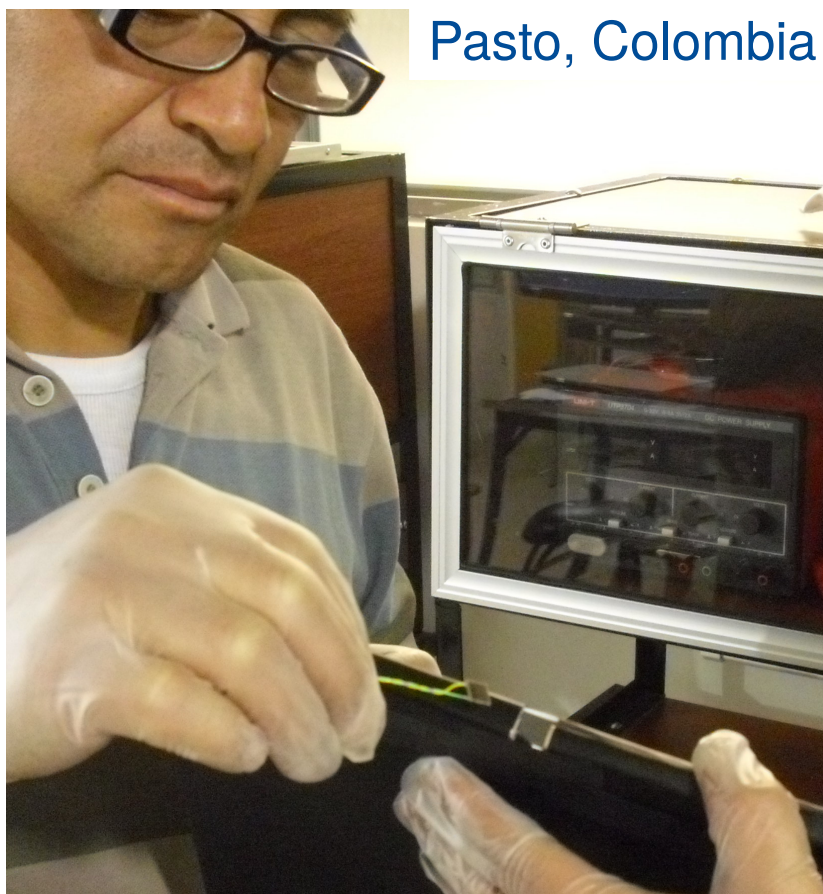
Bucaramanga, Colombia



The detector

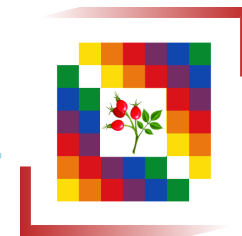


Silicon Photomultipliers → Donated by SensL



sensL
sense light

The detector



DAQ electronics → Donated by Fermilab

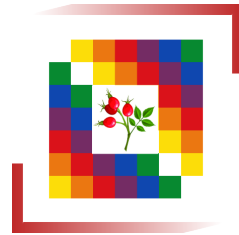


Chiapas, Mexico

 **Fermilab**

 **Fermilab**

The courses

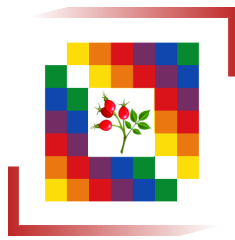


Data analysis sessions (C++/ROOT)

Chiapas, Mexico



The courses



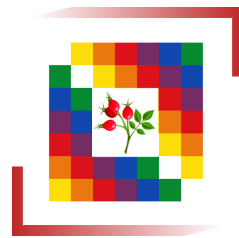
Extra activities: having fun doing science
→ muon telescope to study volcanoes



Pasto, Colombia

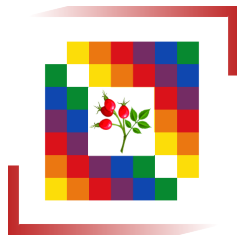


The courses



Pasto, Colombia

The courses

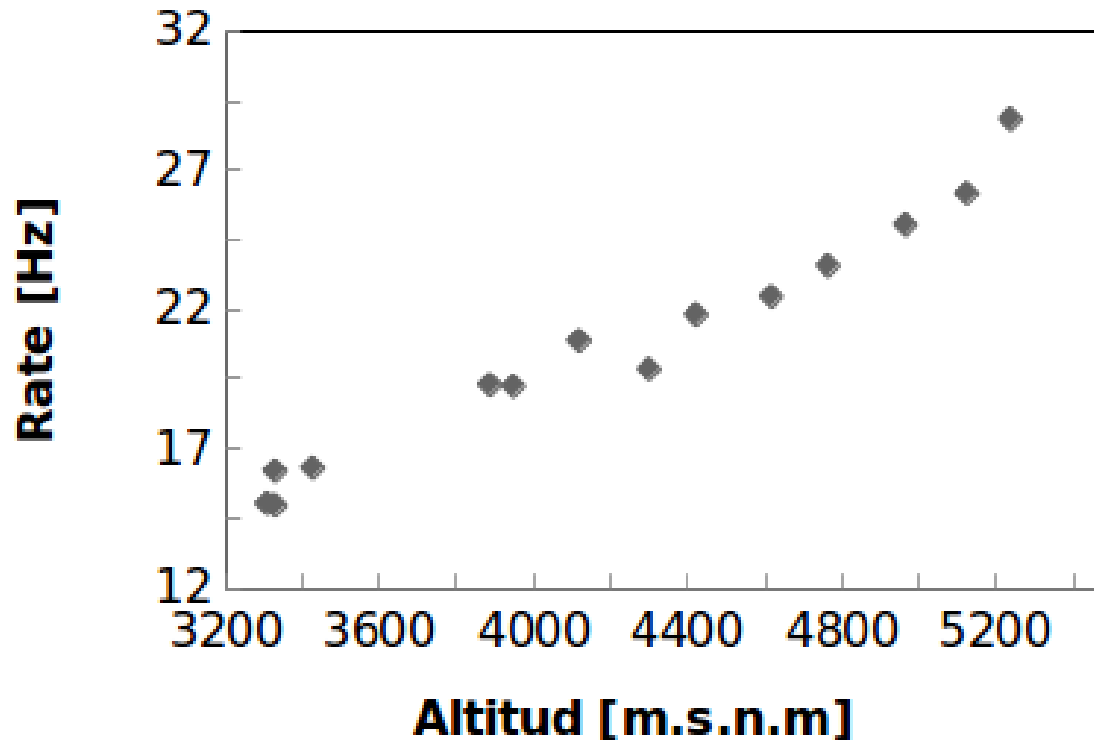
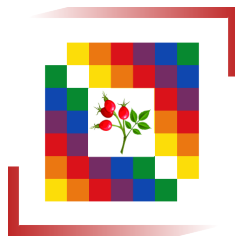


Extra activities: having fun doing science
→ cosmic rays rate versus altitude



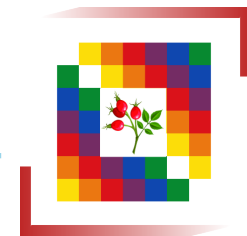
La Paz, Bolivia

The courses



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

Visiting a visiting teacher

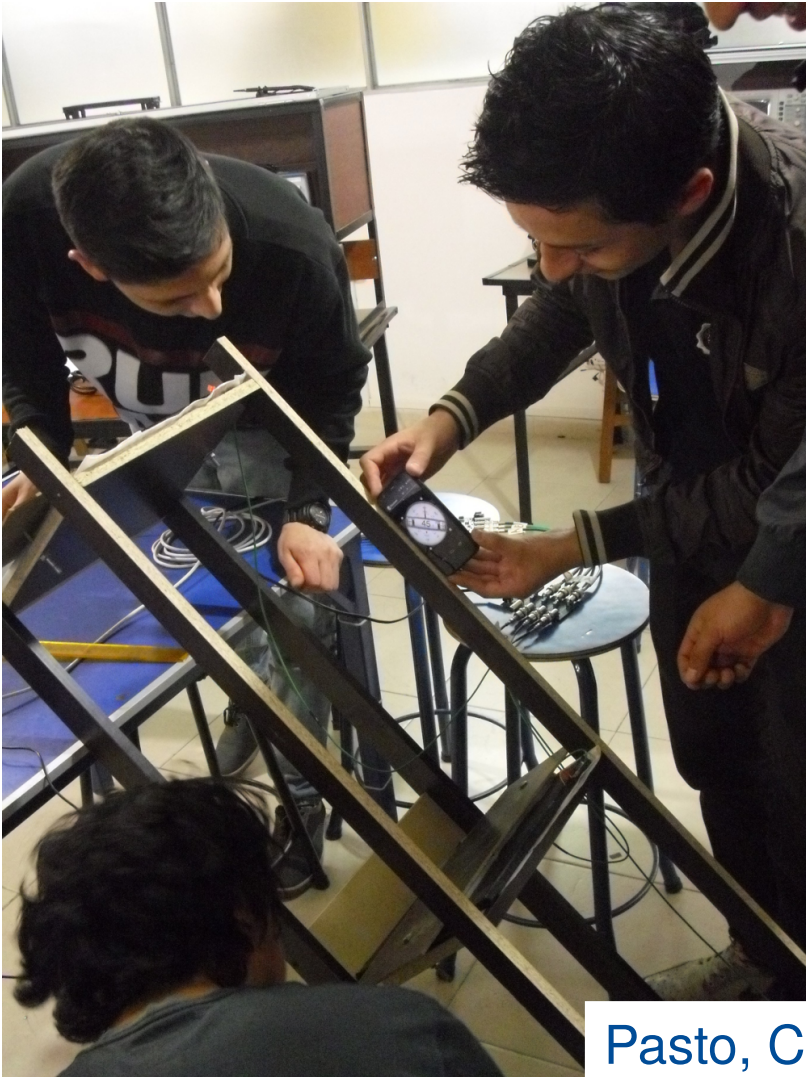
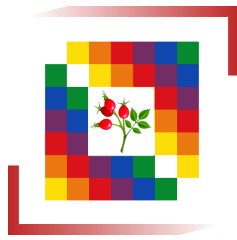


Álvaro Chavarría (KICP at UChicago posdoc, left) and Pablo Moisteiro (INFN at Sapienza posdoc, on a knee).

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

San José, Costa Rica

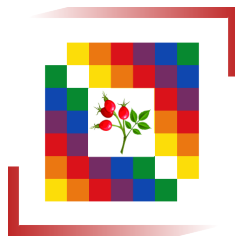
The Escaramujo Project



Use of new technology in the laboratory: cell phone as a goniometer

Pasto, Colombia

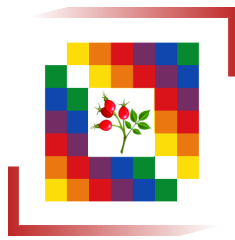
Larger impact after the courses: high schools



International Cosmic Day at Chiapas



Cultural and science fair at Chiapas



- 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

www.escaramujo.net

