

## **Summary: Astroparticle projects in South America**

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(One could add to this list the HAWC project (mainly US – Mexico) to get the projects in Latin America, but I have no precise data on it, as I am not a member of HAWC.

About the US-Mexico link, as was mentioned in the meeting, consider the LMT, Large Millimeter Telescope, between the Univ. Massachusetts in the US and INAO in Mexico), <http://www.lmtgtm.org/intro.html>

### **Pierre Auger Observatory**

18 countries, 59 institutions, +400 physicists worldwide

4 countries in America: Argentina, Brazil, Mexico, USA

The observatory is in Malargüe, Argentina, south of Mendoza province.

Construction started in 2001, data acquisition in 2004, and the observatory was completed in 2008.

It is connected to Red Clara via Auger Access.

The bandwidth is about 4Mb/s to the observatory, and 30Mb/s from the observatory to the outside world, used mainly to push data to the main data center, in Lyon, France (CCIN2P3).

The current used average bandwidth is 4Mb/s out, and 700kB/s in.

The used bandwidth is foreseen to increase as detector operation is moved from onsite shifts to remote online operation.

The observatory is also opening as an interdisciplinary observatory where new instruments could be installed, requiring eventually more bandwidth.

### **LAGO (Large Aperture GRB Observatory)**

7 Latin American countries, about 70 physicists

It is a small project with detectors in remote areas in all 7 Latin American countries (high mountain site), where most of the issue is getting the data from a remote site to a connected lab and not really a backbone issue. I would not focus on it given its “small” size. It is more than anything a way to develop experimental astroparticle physics in countries without experience in the topic.

### **Future projects:**

#### **CTA (Cherenkov Telescope Array)**

More than 1000 members in 27 countries, 4 of them in America (Argentina, Brazil, Mexico, USA).

The site has not yet been elected and could be in Argentina (close to El Leoncito in San Juan, or close to San Antonio de los Cobres, in Salta), or in Africa (Namibia or South Africa). If in Argentina, it would be connected with fiber by the local government.

The plan is to operate it as a virtual observatory, with observation requests from outsiders of the collaboration, as an open observatory. There is no official number I know of for its bandwidth (I am not part of the CTA collaboration), but it is stated that a typical observation raw data is at the level of 10TB, and will therefore have to be massively processed to read manageable levels of tens of Mb. It is not clear to me how much of the processing will be done on site.

### **ANDES (Agua Negra Deep Experiment Site)**

Planned as the first deep underground laboratory in the Southern hemisphere. Of specific interest as it would be an international laboratory (with strong presence of Argentina, Brazil, Chile and Mexico). Furthermore it would be in a tunnel between Argentina and Chile, where fiber would naturally improve the backbone between Argentina and Chile. Worthwhile also that the Chilean side is the Elqui vale, where there are many major telescopes.

The laboratory would therefore be in the middle of a loop providing a second Argentina-Chile connection complementary of the Mendoza-Santiago one.

It is difficult to evaluate what will be the typical bandwidth needs for a laboratory in 2020, when the opening is foreseen (if the tunnel is built according to the plans), but one can consider 50Mb/s as a minimum requirement. Given the remoteness of the tunnel, a higher bandwidth to allow remote operation will likely be planned.