Agua Negra tunnel between Argentina and Chile
- Tunnel financed by Inter-American Development Bank; construction: 2021-2029
- Horizontal access, size of $\sim 4000 \, m^2$ and $\sim 70,000 \, m^3$ in various halls and pits
- ANDES will be run by an international consortium

Large and deep underground laboratory in the southern hemisphere

>1750 m depth
ANDES: Agua Negra Deep Experiment Site

Underground Facilities – Worldwide

- ANDES
- SNOLAB
- Kimballton
- WIPP
- SURF
- Boulby
- Modane
- LNGS
- Baksan
- LSBB
- Canfranc
- Callio Lab
- Jaret
- Kamioka
- Heise
- Y2L
- CJPL
- Yemilab
- INO
- SUPL

Jaret Heise | XXIX International Conference on Neutrino Physics and Astrophysics, Jun 22 – Jul 2, 2020

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Underground Facilities – Worldwide

- Underground facilities provide infrastructure to support a wide range of efforts (incl rare-process physics topics)
- Rich suite of facility options currently exists
- Many facilities are crowded. While there are exciting developments in the near term, they are largely earmarked for specific projects
  - Important decisions regarding $0\nu\beta\beta$ soon?
- Growing number of networks and good examples of cooperation between UG facilities
- Science programs range from specific to broadly multi-disciplinary
- Strategic planning is active in many jurisdictions (e.g., Snowmass->P5) and include a strong facilities component
ANDES: Agua Negra Deep Experiment Site

**Dark Matter**
- DAMA/LIBRA yearly modulation, to investigate in Southern hemisphere

**Neutrinos**
- Geo-neutrinos (benefit from unique location)
- Build a low energy neutrino flagship experiment
- Host neutrinoless double beta decay experiments

**Ultra low radiation clean lab**
- Environmental measurements, material selection...

**Dedicated biology lab**
- Radiation impact on cells...

**Geology/Geoscience laboratory**
- Local active region, Flat slab region, Seismograph network junction (Argentina + Chile), Magnetic and Gravimetric studies. Dedicated area in the laboratory
ANDES: Agua Negra Deep Experiment Site

- Main hall
  (21 m x 23 m x 50 m)
- Secondary hall
  (16 m x 14 m x 40 m)
- Offices and small labs
- Large single experiment pit
  (~ ø 30 m, 30 m tall)
- Geoscience area
- Vertical depth: 1775 m,
  omnidirectional: 1675 m
- Total: 70 000 m³ laboratory volume
  (+ 35 000 m³ access tunnels)

Rock Studies
(from test samples
~600 m deep)

Preliminary data (Bq/kg)

<table>
<thead>
<tr>
<th></th>
<th>Basalt</th>
<th>Andesite</th>
<th>Rhyolite 1</th>
<th>Rhyolite 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>$^{238}$U</td>
<td>2.6 ± 0.5</td>
<td>9.2 ± 0.9</td>
<td>14.7 ± 2.0</td>
<td>11.5 ± 1.3</td>
</tr>
<tr>
<td>$^{232}$Th</td>
<td>0.94 ± 0.09</td>
<td>5.2 ± 0.5</td>
<td>4.5 ± 0.4</td>
<td>4.8 ± 0.5</td>
</tr>
<tr>
<td>$^{40}$K</td>
<td>50 ± 3</td>
<td>47 ± 3</td>
<td>57 ± 3</td>
<td>52 ± 3</td>
</tr>
</tbody>
</table>

- Final exact location to be determined once geology is better known
- Proposed as an Internationally run laboratory
- Conceptual study finished by Lombardi in January 2015
- Detailed engineering design (0.5 M$) finished May 2019

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More than 70 documents to support ANDES:
- EBITAN (Entidad BI-nacional Túnel Agua Negra)
- CONICET/CNEA/Gob San Juan/MinCyT in Argentina
- CONICYT/CCHEN/Gob Coquimbo/MinRel in Chile
- Many underground lab directors, experiments, 2 Nobel laureates
- List at [http://andeslab.org/support.php](http://andeslab.org/support.php)

ANDES exists as a CLAF Unit since 2014
- Legal existence as part of a class II UNESCO Institute
- Contractor for ANDES IBA to Lombardi
- Bases for future ANDES Consortium
- Plus complementary structures in countries

ANDES foreseen as a structure similar to SESAME
- Strong Latin-American membership but not only
- Host to international experiments but also international laboratory

Could be a flagship for Latin-American HEP research infrastructure
Political green light for ANDES but depends on Agua Negra tunnel status