ROADMAP FOR THE FIRST STRATEGY FOR LATIN AMERICAN PHYSICS

MARÍA TERESA DOVA

UNIVERSIDAD NACIONAL DE LA PLATA

I F L P
CONICET
U N L P

HIGH ENERGY, COSMOLOGY, ASTROPARTICLE PHYSICS

- HECAP research focuses on new phenomena arising from the smallest to the largest scales in the Universe.
- Inspired by the fundamental unknowns in HECAP for the first time LA scientists have come together, to jointly
  - build the landscape of current efforts
  - layout the trajectory for future developments of experimental research in these fields.

2018

- ✓ Iberoamerican Science and Technology Ministerial meeting: mandate declaration, ratified by the Heads of State

2019

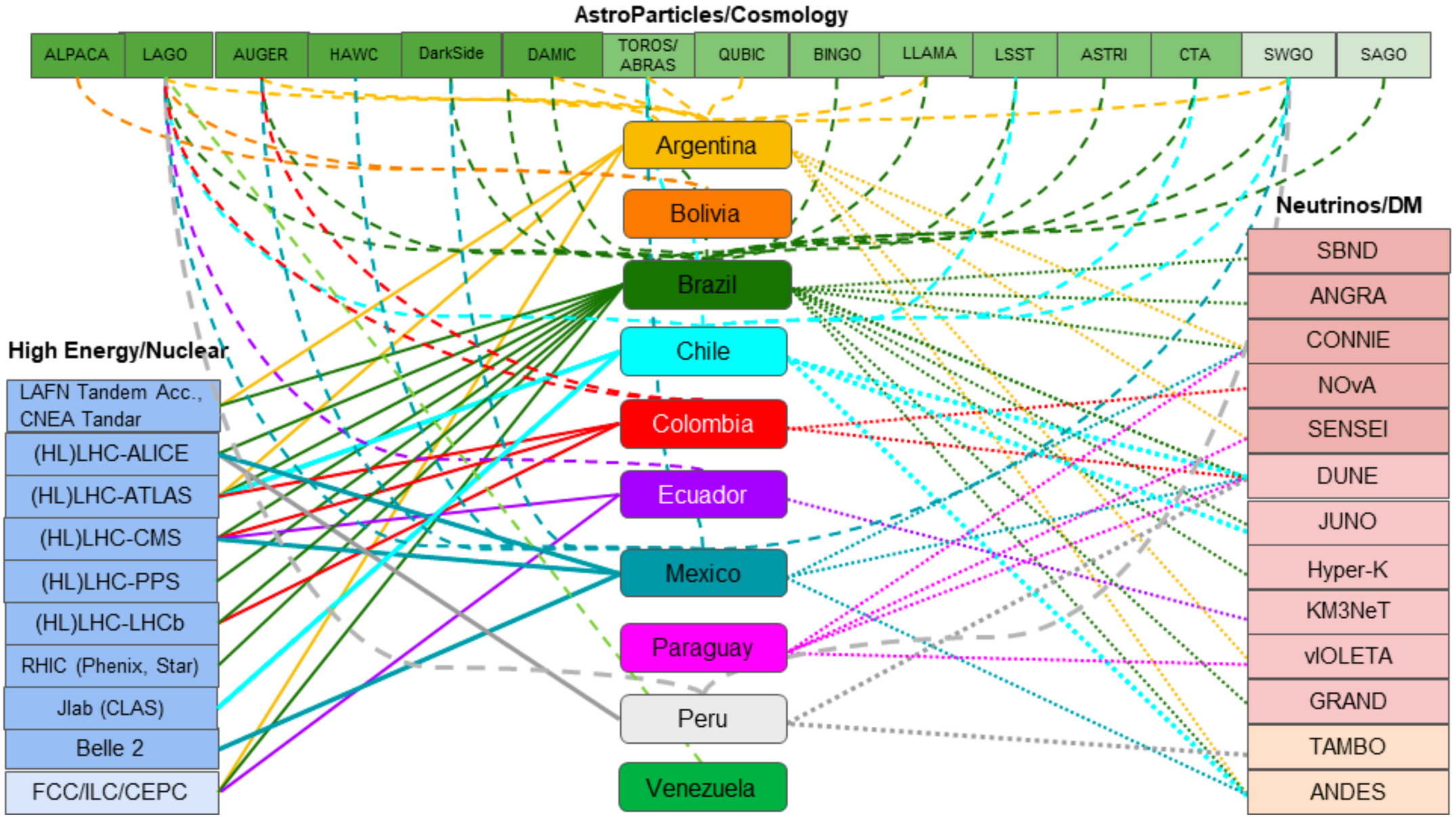
- ✓ The LASF4RI took shape as a result of the first workshop organized at ICTP-SAIFR in Sao Paulo.
- ✓ Decision to move ahead to pioneer the first LASF4RI initiative with HECAP.
- ✓ Preparatory Group (PG) and High Level Strategy Group (HLSG).
- ✓ 40 White Papers submitted by the community.

2020

- ✓ Open Symposium (videoconference) organized by ICTP-SAIFR. www.ictp-saifr.org/lasf4ri2020/.

  Topics: Astronomy, Astrophysics and Astroparticle Physics, Cosmology, Dark Matter, Neutrinos, Electroweak and Strong Interactions, Higgs physics, Flavour and CP Physics and Beyond the Standard Model Physics, Instrumentation and Computing

- ✓ Physics Briefing Book written by the PG.
- ✓ Preparation of the LASF4RI-HECAP Strategy Document endorsed in a letter by the HLSG.
- ✓ Recognition of advances LASF4RI-HECAP process at the 2020 Iberoamerican Science and Technology Ministerial Meeting.


AstroParticles/Cosmology
ALPACA
LAGO
AUGER
HAWC
DarkSide
DAMIC
TOROS/ ABRAS
QUBIC
BINGO
LLAMA
LSST
ASTRI
CTA
SWGO
SAGO
Argentina
Bolivia
Brazil
Chile
Colombia
Ecuador
Mexico
Paraguay
Peru
Venezuela
High Energy/Nuclear
LAFN Tandem Acc., CNEA Tandar
(HL)LHC-ALICE
(HL)LHC-ATLAS
(HL)LHC-CMS
(HL)LHC-PPS
(HL)LHC-LHCb
RHIC (Phenix, Star)
Jlab (CLAS)
Belle 2
FCC/ILC/CEPC
Neutrinos/DM
SBND
ANGRA
CONNIE
NOvA
SENSEI
DUNE
JUNO
Hyper-K
KM3NeT
vIOLETA
GRAND
TAMBO
ANDES

Useful reference for the community
~ 1000 researchers in HECAP

Latin American Strategy Forum for Research Infrastructure - LASF4RI

Latin American Strategy for Research Infrastructures for High Energy, Cosmology, Astroparticle Physics LASF4RI for HECAP

LATIN AMERICAN HECAP PHYSICS BRIEFING BOOK

Preparatory Group

Hiroaki Aihara - University of Tokyo
Reina Camacho Toro- LPNHE/CNRS
Marcela Carena - Fermilab/U. of Chicago
Juan Carlos D'Olivo - UNAM
Thiago Goncalves - Valongo Observatory
Diana López Nacir - DF/IFIBA UBA-CONICET
Jorge Molina - Universidad Nacional de Asunción
Diego Restrepo - Universidad de Antioquia,
Arturo Sánchez- ICTP/INFN/ U. of Udine
Marcelle Soares-Santos - U. Michigan
Hernán Wahlberg - U. Nacional de la Plata
Alfonso Zerwekh - U. Técnica Federico Santa María
Alfredo Aranda - University of Colima
Mauro Cambiaso - Universidad Andrés Bello
Edgar Carrera - Universidad San Francisco de Quito
Alberto Gago - Pontifica Universidad Católica del Perú
Gerardo Herrera - CINVESTAV
Marta Losada - NYUAD
Martijn Mulders - CERN
Rogerio Rosenfeld - IFT-UNESP & ICTP-SAIFR
Federico Sánchez - U. Nacional de San Martín
Martin Subieta - U. Mayor de San Andrés
Harold Yepes Ramirez - YTU

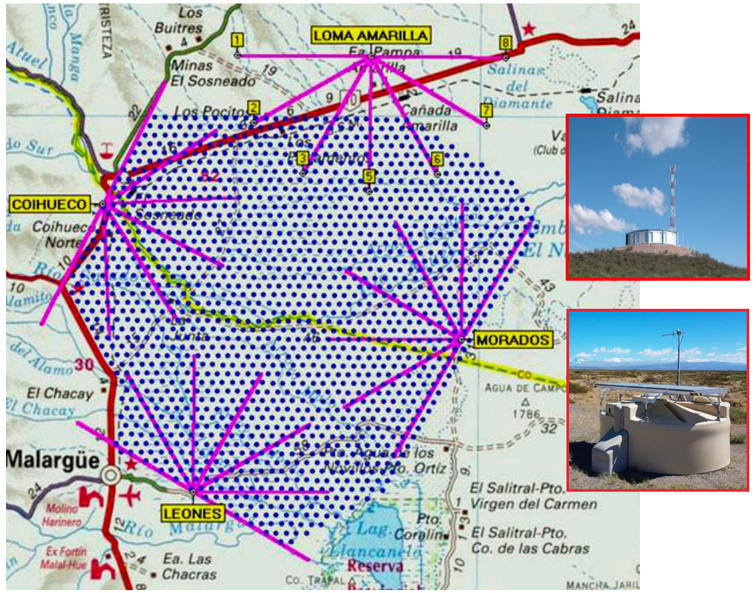
Contents

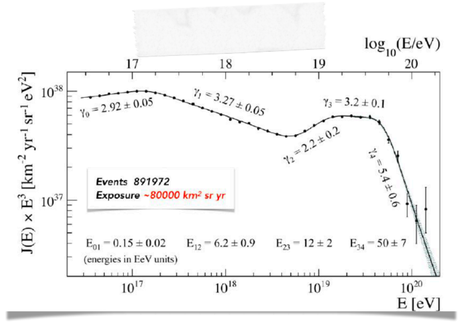
Four major recommendations with regard to research infrastructures: High Energy, Cosmology, Astroparticle Physics

1. Ensure a rich program of astroparticle/cosmo experiments in the region with enhanced participation of LA.
2. Develop on >10 year scale new facilities/areas of expertise in the region (underground physics, neutrino astronomy).
3. Continue strong links and participation in major international projects in collider and neutrino physics via a more focused, coordinated and impactful approach.
4. Maintain a balanced approach including smaller scale regional projects to drive new ideas and technological developments.

Ongoing experiments

Pierre AUGER observatory





Short term (<3 years)

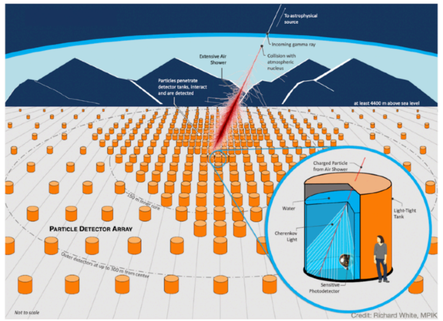
QUBIC & LLAMA

Q&U Bolometric Interferometer for Cosmology

Mid term (3-10 years)

SWGO

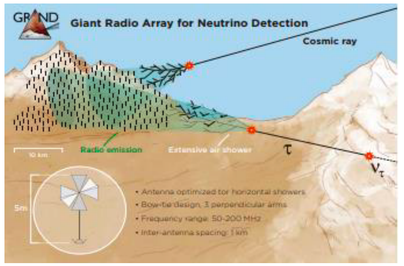
Southern Wide-field-of-view Gamma-Ray Observatory



Long term (>10 years)

GRAND

Giant Radio Array for Neutrino Detection

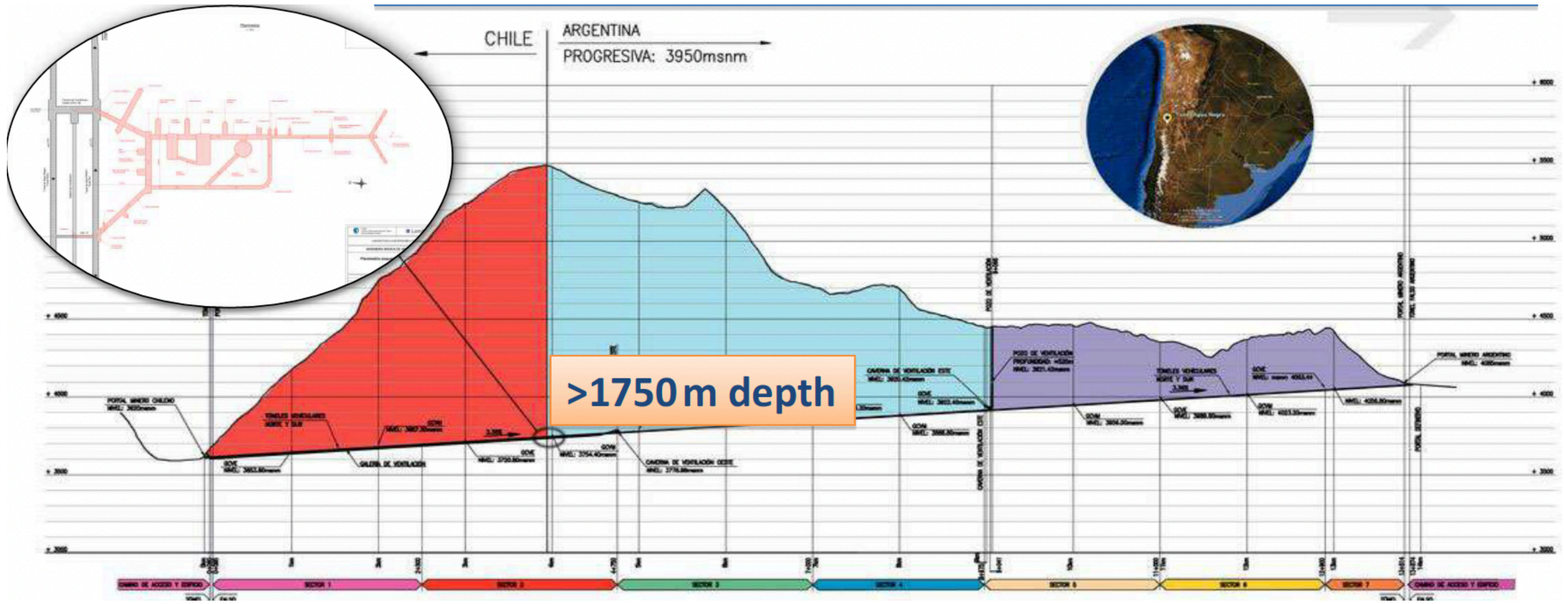


SAGO

The South American Gravitational wave Observatory

ANDES (AGUA NEGRA DEEP EXPERIMENT SITE)

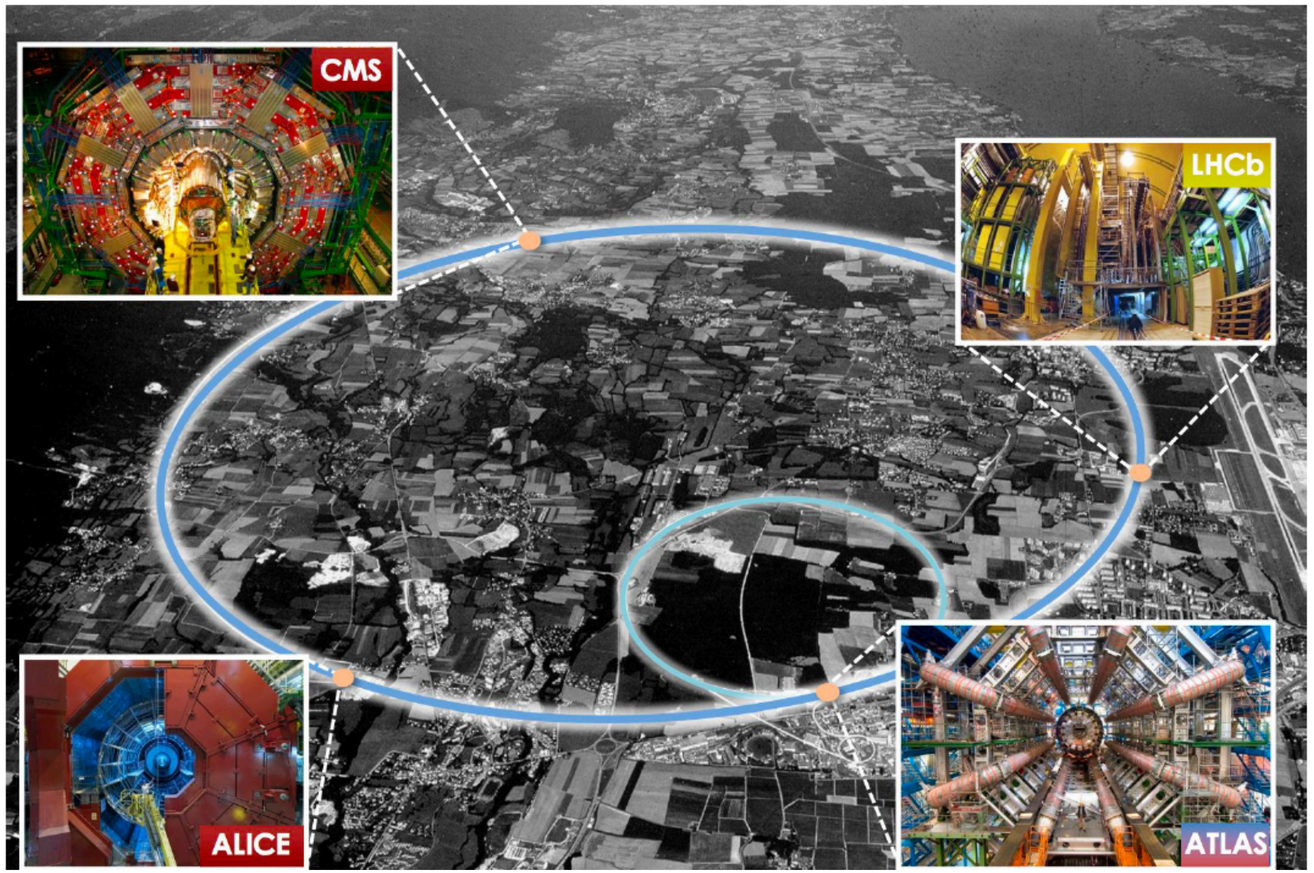
- Multi-purpose flagship international underground laboratory located in Latin America.
- Recommended with a high priority for the region.



(But of course the tunnel has to be built!)

- Ideal for competitive neutrino and dark matter experiments for which there is tech expertise.
- Also relevant for geological and biological sciences.

Brazil
Colombia
Ecuador
Mexico



Brazil
Colombia

Brazil
Cuba
Mexico
Peru

Argentina
Brazil
Chile
Colombia

- ✓ Strong involvement in all LHC experiments.
- ✓ Significant contributions made and capacity building over the past 15 years.

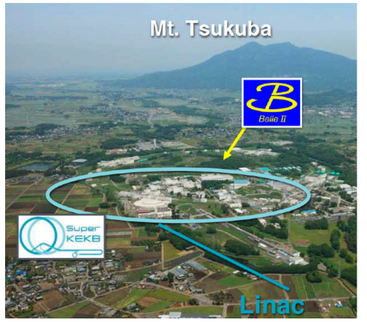
LA Region	ALICE	108
	ATLAS	167
	CMS	141
	LHCB	42
	OTHER	103
	TOTAL	**561**

Source: CERN Greybook, 2020

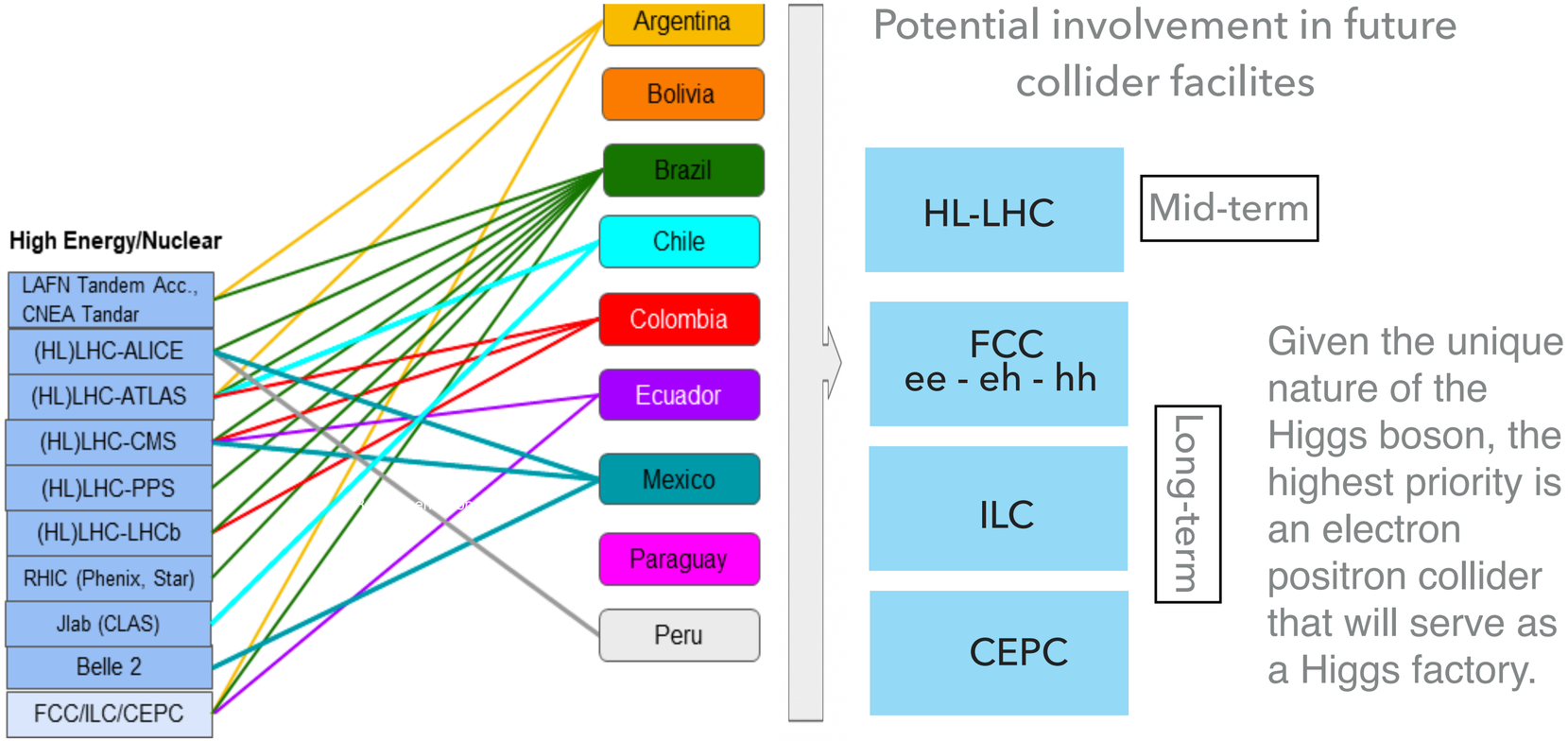
Nuclear physics experiments at accelerator facilities in the LA region (BR and AR)

LAFN (SP)

Involvement in Belle 2, experiments at RHIC and Jefferson Lab



- Latin America has a leading role in several aspects in all HEP experiments, including impactful contributions to detector design and construction.
- Synergies with other activities in HECAP were identified.



- Support the groups that are already heavily involved with the LHC program.
- Encourage coordination among the LA groups to reach a larger impact.
- Focus LA contribution to a unique effort in a future collider to enhance impact and relevance of LA groups.

NEUTRINOS

Ongoing

νANGRA,CONNIE, KM3NeT (Phase-I), SBND, NOvA.

Short term (<3 y)

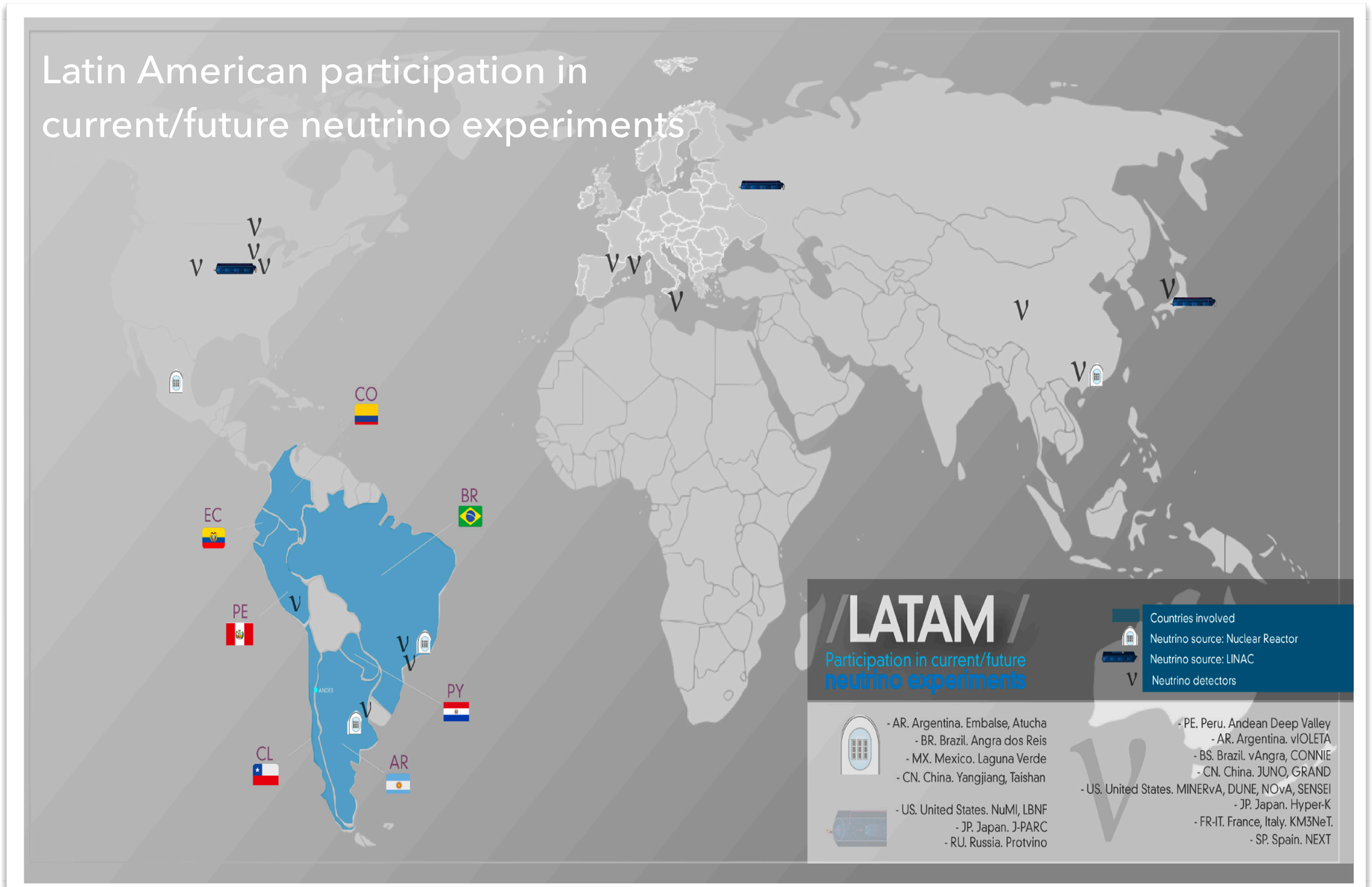
νIOLETA, JUNO

Mid term (3-10 y)

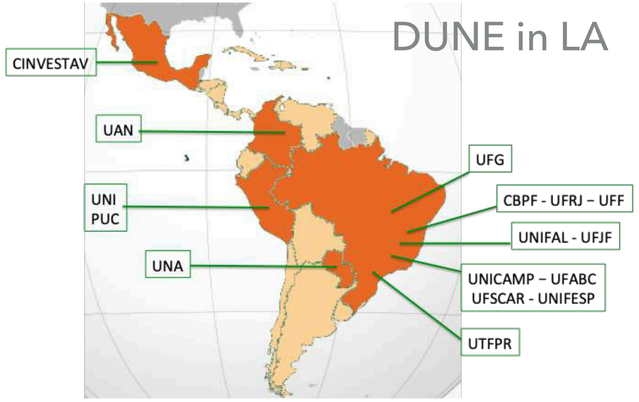
DUNE, Hyper-K, KM3NeT (Phase-II)

Long term (>10 y)

ANDES, GRAND200K,TAMBO



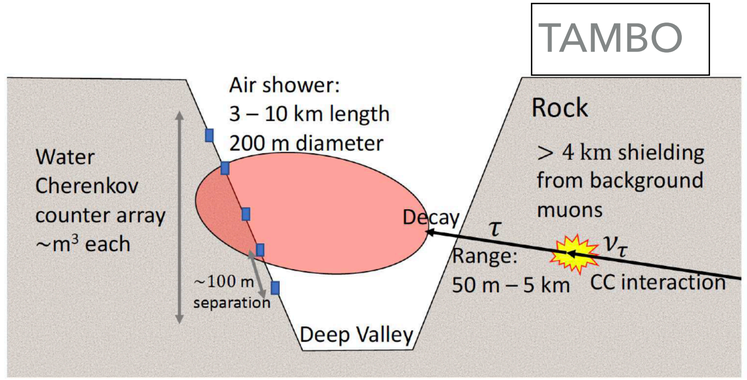
- Focused contribution to DUNE-PDS (Photon Detection System) from LA groups is a top priority.



- Programs in Europe with CERN and other large-scale multidisciplinary research infrastructures as KM3NeT, set a promising future for LA in neutrino physics.

- Opportunities to develop novel neutrino experiments in the region (vIOLETA, CONNIE)

- ANDES and TAMBO are two of the future initiatives for a large-scale implementation in the region.



Large scale experiment to study tau neutrinos from astrophysical sources (Peruvian Colca Valley)

- Five recommendations to strengthen the HECAP science program as a whole:

5. Foster R&D capabilities in key technologies
6. Support and develop advanced training programs
7. Connections between theorists and experimentalists
8. Enhance the high performance computing infrastructure and internet connectivity in the region
9. Societal engagement

- One major recommendation:

10. Develop formal and stable mechanisms for coordination and funding among research councils and funding agencies at the regional level to support HECAP initiatives.

It was clear the need of a coordinating body for HECAP as an important next step.

LATIN AMERICAN ASSOCIATION FOR HIGH ENERGY, COSMOLOGY AND ASTROPARTICLE PHYSICS (LAA-HECAP)

LAA-HECAP is hereby established as an association of the Latin American research community in the fields of High Energy, Cosmology and Astroparticle Physics (HECAP). It aims to leverage and amplify the successful and growing dynamics of research in HECAP in Latin America, as demonstrated by the fruitful and long-term organization of the Latin American Symposium on High Energy Physics (Simposio Latino Americano de Física de Altas Energias - SILAFAE) series and the recent initiative to form a Latin American Strategy Forum for Research Infrastructures for HECAP (LASF4RI-HECAP - lasf4ri.org) with the participation of several countries in the region.

- Strengthen existing ties within the Latin American HECAP community and foster new and existing collaborations
- Engage the wider scientific community and the general public through the promotion of HECAP.
- Represent the Latin American HECAP communities in other scientific international bodies
- Announce activities in HECAP in the region through means such periodic newsletters and a website
- Promote other activities such as the organization of symposia, workshops, schools, university-institution cooperation and exchange programs for students, and the production of educational and outreach material
- Engage with Ministries, funding agencies and other national authorities related to Science and Technology to promote the rollout and development of the current LASF4RI-HECAP process.
- Organize SILAFAE (Latin American Symposium on High Energy Physics) every two years.
- Coordinate periodic assessment and strategic planning within the LASF4RI-HECAP process.

2021

- ✓ New PG with delegates from 13 LA countries with a mandate until 2023.
- ✓ Publication of LASF4RI-HECAP Physics Briefing Book, arXiv:2104.06852
- ✓ Creation of the Latin American Association for High Energy, Cosmology and Astroparticle Physics (LAA-HECAP), approved at the SILAFAE in Nov. 2021. President: R. Rosenfeld, Vice President: F. Quevedo

2022

- ✓ Development of the bylaws for the Latin American Association for HEPCAP.
- ✓ Letters to Ministries & Funding agencies sent.

by-laws at:
www.ictp-saifr.org/wp-content/uploads/2021/10/Latin-American-Association-for-High-Energy-Cosmology-and-Astroparticle-Physics.pdf

FUTURE

- ➡ Examine progress and consolidate community input to develop/ update the strategic plans for the region.

This process would not have been possible without the contributions of the LA HECAP communities, and the dedication and commitment of the many colleagues in the PG and the HLSG.

XIV SILAFAE, ECUADOR, 14–18 NOV. 2022

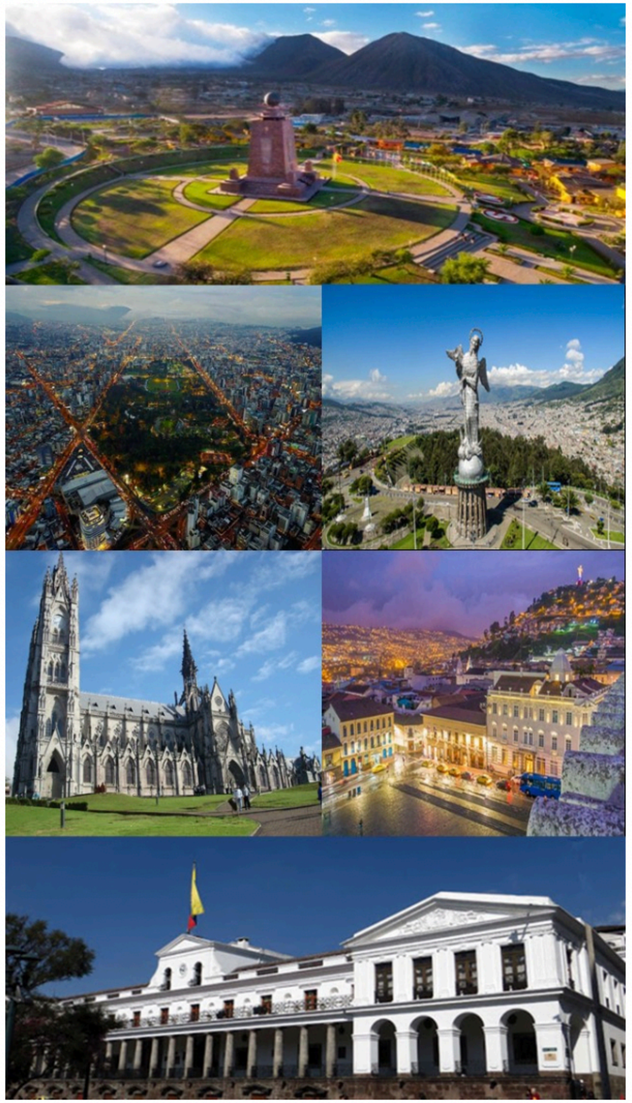
Registration deadline: **30 September, 2022.**

Abstract submission deadline: ~~**9 September 2022.**~~ **16 September 2022.**

The **Latin American Symposium on High Energy Physics (SILAFAE)** is a traditional event that brings together the regional and international community of particle physics and related areas such as cosmology, gravitation and astroparticle physics. The conference has been the main regional hub for discussions on topics in the relevant fields, knowledge update and the exploration of new ideas and perspectives towards the future. The event also promotes the expansion of regional and international cooperation as well as the advancement of younger scientists and students.

The conference format consists of a series of plenary and parallel talks covering a range of theoretical and experimental topics. An active posters session is also planned.

This is the 14th edition of the SILAFAE series, which will take place in Ecuador, for the first time, at the beautiful campus of Universidad San Francisco de Quito.



BACKUP

1ST. PREPARATORY GROUP MEMBERS

Argentina: Diana López, Federico Sánchez, Hernán Wahlberg
Bolivia: Martin Subieta Vasquez
Brazil: Thiago S Goncalves and Rogerio Rosenfeld
Chile: Alfonso Zerwekh and Mauro Cambiaso
Colombia: Marta Losada and Diego Restrepo
Ecuador: Edgar Carrera and Harold Yepes Ramírez
Mexico: Alfredo Aranda, Juan Carlos D'Olivo, Gerardo Herrera
Paraguay: Jorge Molina
Peru: Alberto Gago
Venezuela: Reina Camacho, Arturo Sánchez
Europe: Martijn Mulders
US: Marcela Carena and Marcelle Soares
Asia: Hiroaki Aihara

HIGH LEVEL STRATEGY GROUP MEMBERS

Luciano Maiani – Chair
Fernando Quevedo - Co-Chair

Country/Regional Scientific Representatives

Argentina: Maria Teresa Dova
Brazil: Joao dos Anjos
Chile: Claudio Dib
Ecuador: Bruce Hoeneisen
Mexico: Jacobo Konigsberg
Venezuela: Jose Ocariz
Europe/CERN: Peter Jenni
Asia: Hesheng Chen
US: Francis Halzen/Gabriela Gonzalez
ICFA/Fermilab: Pushpa Bhat
Asia Pacific: Geoffrey Taylor

Institute Directors

Nathan Berkovits, ICTP-SAIFR
Daniel de Florian, ICAS
Alvaro Ferraz, IIP
Jose Roque, LNLS
Ignacio Bediaga, CLAF
Luis Felipe Rodriguez, MAIS