



Latin American Association for High Energy, Cosmology and Astroparticle Physics LAA-HECAP

Rogério Rosenfeld
IFT-UNESP/ICTP-SAIFR
On behalf of the Board



CLAF – Unidad Astropartículas
SWG0 Meeting
April 20, 2023

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 Energías - 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 as 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.

Latin American Association for HECAP

Founded in November 2021 – 453 members today

Board: LASF4RI + SILAF AE

Chair: Rogerio Rosenfeld

Vice-chair: Fernando Quevedo

Executive Committee:

Diana López Nacir, Edgar Carrera, Diego Restrepo and Alfredo Aranda

Several Committees being set up

www.ictp-saifr.org/laa-hecap/



LATIN AMERICAN ASSOCIATION FOR HIGH ENERGY, COSMOLOGY AND ASTROPARTICLE PHYSICS

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Information below is correct and hopefully useful.

Overview

The Latin American Association for High Energy, Cosmology and Astroparticle Physics (LAA-HECAP) was created in November 2021. 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 Energías – SILAFEA) series and the recent initiative of strategic planning through the Latin American Strategy Forum for Research Infrastructures for HECAP (LASF4RI-HECAP – lasf4ri.org), with the participation of several countries in the region.

The statutes of LAA-HECAP can be found [here](#). The current members of the Board and of the Executive Committee can be found [here](#).

[Announcements and News](#)

Social Media



Under Construction

XIV Latin American Symposium on High Energy Physics

XIV Latin American Symposium on High Energy Physics

14 – 18 de nov. de 2022

XIV SILAFAE - Quito, Ecuador



LASF4RI

lasf4ri.org



Latin American Strategy Forum for Research Infrastructure

Developing a strategy to strengthen Latin American Scientific Collaborations and their impact.

First time a strategic planning process in HECAP, with community input, is done in LA.

39 white papers submitted!

Three main documents produced:

- LA-HECAP Physics Briefing Book
- Strategy Document with recommendations
- Endorsement letter from HLSG

lasf4ri.org

arXiv:2104.06852v1 [hep-ex] 14 Apr 2021

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

LATIN AMERICAN HECAP PHYSICS BRIEFING BOOK

Preparatory Group

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Reina Camacho Toro- LPNHE/CNRS
Marcela Carena - Fermilab/U. of Chicago
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Thiago Goncalves - Valongo Observatory
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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

Very complex landscape revealed:

AstroParticles/Cosmology

- ALPACA
- LAGO
- AUGER
- HAWC
- DarkSide
- DAMIC
- TOROS/ABRAS
- QUBIC
- BINGO
- LLAMA
- LSST
- ASTRI
- CTA
- SWGO
- SAGO

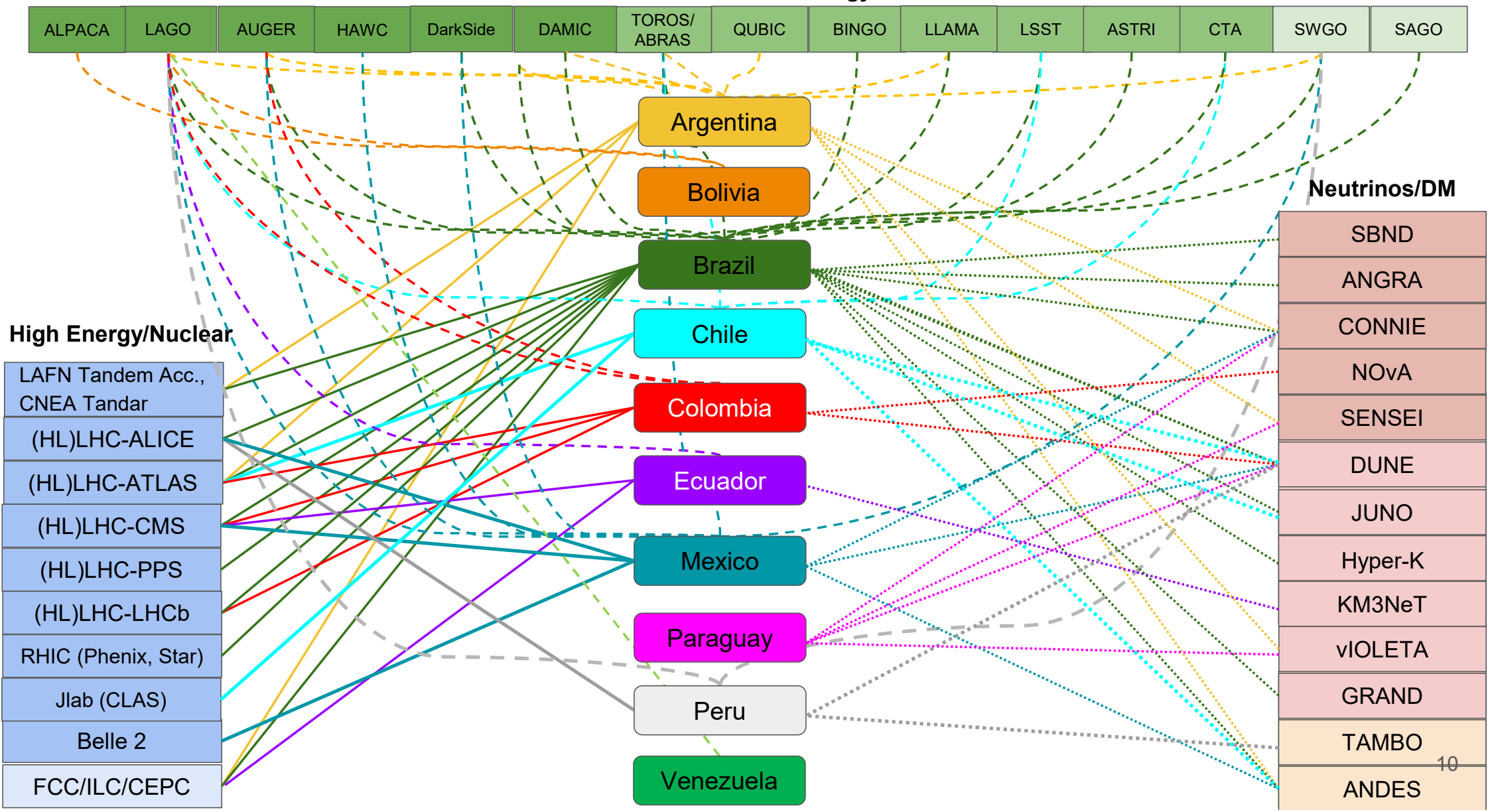
- Argentina
- Bolivia
- Brazil
- Chile
- Colombia
- Ecuador
- Mexico
- Paraguay
- Peru
- Venezuela

Neutrinos/DM

- SBND
- ANGRA
- CONNIE
- NOvA
- SENSEI
- DUNE
- JUNO
- Hyper-K
- KM3NeT
- vIOLETA
- GRAND
- TAMBO
- ANDES

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



PARTICLE PHYSICS & ASTROPHYSICS AROUND LATIN AMERICA



From symmetry magazine
(Fermilab)

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

Latin American Strategy for HECAP
Proposal submitted to the High Level Strategy Group

Strategy Document Committee

Alfredo Aranda, Diana López Nacir, Marta Losada, Rogerio Rosenfeld,
Arturo Sánchez, Federico Sánchez, Harold Yepes Ramirez

Preparatory Group

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VENEZUELA: Reina Camacho Toro, Arturo Sánchez

Date: October 1, 2020

Recommendation 1

Support the development and operation of current- and next-generation projects in astronomy, cosmology and astroparticle physics located in Latin America, enhancing leadership roles in these strategic regional projects that drive capacity building and technological development.

- ✓ Successful design, deployment and operation of astro/astroparticle/cosmo physics infrastructures in the region.
- ✓ Strong science drivers to further understand the Universe.
- ✓ Clear comparative geographic and atmospheric advantages in the region.
- ✓ Sustained annual increase of scientists participating in these experiments.
- ✓ Desirable to enhance participation of LA groups.
- ✓ Ensure continuity of human resources and funding.

- Ongoing experiments: AUGER, LAGO, TOROS
- Short term (< 3 years): ABRAS, AUGERPrime, BINGO, QUBIC, LLAMA, LSST
- Mid term (3-10 years): CTA/Astri, SWGO
- Long term (> 10 years): GRAND200K, SAGO

CONCLUSIONS

- CLAF has been an important player in the development of Physics in Latin America for 60 years;
- The High Energy, Cosmology and Astroparticle Physics (HECAP) community is an important part of CLAF;
- SILAF AE has been the forum for discussions in HECAP in LA since 1996;
- A first bottom-up Strategy Planning in HECAP in Latin America was done by LASF4RI
- Community created LAA-HECAP in 2021 to coordinate efforts in the region – 450+ members

CONCLUSIONS

- LAA-HECAP is interacting with CLAF: nominations for ICFA
- LAA-HECAP is interacting with IUPAP: representative in C11 and proposal to host ICHEP in 2026
- We plan to start interacting with FEIASOFI
- **Update of Strategy Planning will start soon – stay tuned**
- Maybe the model of LAA-HECAP (and especially LASF4RI) can be followed by different areas of Physics.

Gracias/Obrigado/Thank you

Back up slides

Timeline

Brainstorming with the HEP community at ICTP-SAIFR 5th ann. and **XI SILAFAE** in Guatemala

Initial ideas



Iberoamerican Science and Technology Ministerial meeting in Guatemala: mandate declaration

Mandate



National Meetings and formation of the Preparatory Group with delegates from 10 LA countries.

Preparatory Group



Initial landscape

Two-page briefs of 18 experiments. Gathering support from national communities.

Town Hall

Town hall meeting at the **XII SILAFAE** in Peru to discuss mandate and next steps



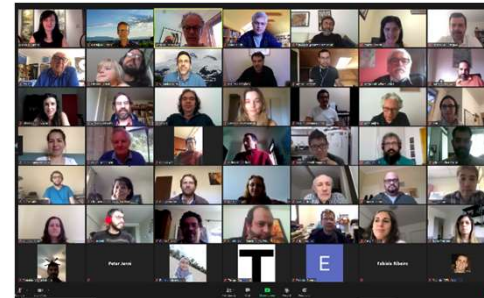
1st LASF4RI Workshop and Meeting of the Preparatory Group at ICTP-SAIFR

LASF4RI Workshop & 1st Meeting of Preparatory Group

Timeline

Deadline for the submission of White Papers to LASF4RI

White papers



Write-up of the Physics Briefing Book and the Strategy Document.

Documents write-up



High-Level Strategy Group

Definition of the composition of the High-Level Strategy Group for HECAP

HLSG Meeting

Kick-off meeting of the High-Level Strategy Group

Open Virtual Symposium

Open Virtual Symposium of LASF4RI for HECAP organized by ICTP-SAIFR, delayed from March due to the pandemic

Timeline



Recognition of advances
LASF4RI-HECAP
process



**IB S+T
Ministerial
Meeting**



..... **To be continued**

High-Level Strategy Group

Endorsement of Strategy Document to the High-Level Strategy Group for HECAP

Preparatory Group Meeting

Next steps for the Preparatory Group and national processes for next cycle

CLAF@60

Main Goals of the Process

- To chart the landscape of existing infrastructure and expertise already developed in the region.
- To build consensus and support a strategy-based approach for the participation in, and development of, large-scale research infrastructure projects in Latin America.
- To make a call to Latin American scientific communities to establish a strategic scientific forum in order to coordinate Latin American activities in the area.
- To set-up the LA scientific roadmap based on actual participation in large-scale research infrastructures and the inherent need for long term planning and funding implementing an open call for input from the scientific communities.
- To enable a more effective development of Latin American research groups, facilitating multilateral participation in regional and global research infrastructures, increasing their impact.
- To inform the Ministerial meetings of the development, implementation and impact of the strategy for HECAP.

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

Observers

Leandro de Paula, Brazil

Recently groups from **Guatemala, Honduras**

Costa Rica building a CA effort represented

today by Ma. Eugenia Cabrera and Melissa Cruz.

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
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Recommendations for HECAP Research Infrastructures

Recommendation 2

Pursue the establishment of the flagship international laboratory, ANDES, that will enable the region as a global center for underground physics and other sciences.

- ✓ Multi-purpose flagship international underground laboratory located in Latin America.
- ✓ Unique opportunity for frontier underground physics experiments and related sciences.
- ✓ Ideal for competitive neutrino and dark matter experiments for which there is tech expertise.
- ✓ Also relevant for geological and biological sciences.
- ✓ Requires a coordinated and strategic commitment from LA countries.

Recommendation 3

Support the existing efforts in international projects in which Latin American groups are actively participating, and in some cases leading initiatives, as a strategy to position Latin America to key leadership roles in future international flagship projects in collider and neutrino physics.

Colliders

- ✓ Strong involvement in all LHC experiments.
- ✓ Major scientific drivers in EW/QCD/Flavour/CP/BSM.
- ✓ Significant contributions made and capacity building over the past 15 years.
- ✓ Highest priority in electron-positron collider.
- ✓ Focus LA contribution to a unique effort in a future collider to enhance impact and relevance of LA groups.

- Ongoing experiments: LHC
- Mid term (3-10 years): HL-LHC
- Long term (> 10 years): FCC/ILC/CEPC

Neutrinos

- ✓ Seven countries active in neutrino experiments.
- ✓ Focused contribution to DUNE-PDS from LA groups is a top priority.
- ✓ Significant technological expertise given the broad neutrino physics program.
- ✓ Opportunities to develop novel neutrino experiments in the region.

- Ongoing experiments: vANGRA, CONNIE,NOvA,SBND, KM3NeT (Phase-I).
- Short term (< 3 years): vIOLETA, JUNO.
- Mid term (3-10 years): DUNE, Hyper-K, KM3NeT (Phase-II).
- Long term (> 10 years): TAMBO, GRAND200K

Recommendation 4

Support small scale, high impact dedicated experiments across HECAP.

- ✓ Striking a balance that gives room to the development of new ideas.
- ✓ Existing and future small and mid- scale experiments targeting specific scientific objectives and measurements across all HECAP.
- ✓ Direct contributions to advanced training (R6) and R&D (R7).
- ✓ Performance studies for (sub)detector components and prototypes.
- ✓ Development of Skipper CCD-based proposals.

Recommendation 5

Strengthen the collaboration among different theoretical groups in the region working in HECAP and their interactions with the experimental efforts.

- ✓ Contributes to building a stronger science program.
- ✓ Strong theoretical and phenomenology groups in LA.
- ✓ Relevance of SILAF AE, continued support for this event.
- ✓ Significant benefits of interactions between theorists and experimentalists.

Recommendation 6

Support and develop advanced training programs that harness regional capacities and expertise across all Latin American countries active in HECAP.

- ✓ Contribute to highly qualified human talent training.
- ✓ Advanced training programs are critical to support planned activities.
- ✓ Intra-regional training networks enhanced by links to hubs of knowledge.
- ✓ Opportunities to be trained at the same level as global peers while enhancing retention for the benefit of the region.
- ✓ Highly qualified human resources that can enrich other domains of society with their knowledge and skills.
- ✓ Role of regional institutes to continue to support these initiatives.

Recommendation 7

Foster R&D capabilities in key technologies across HECAP, enabling connections with industry, and with possible broader societal impact.

- ✓ R&D crucial to provide successful participation and contributions to major experimental endeavors.
- ✓ Important regional advances in harnessing expertise in some technologies that are now bearing fruit but clear gaps that still need to be addressed.
- ✓ Innovative technology developments allow for novel design of experiments to pursue the outstanding scientific drivers.
- ✓ Particular relevance of R&D in areas that are common to several types experiments.
- ✓ Relevance of maintaining a dynamic R&D activity in parallel and in latency periods of the operation of major experiments.
- ✓ Some successful regional examples of industrial connections that can only increase with a thriving HECAP science program.
- ✓ Identification of applications for broader societal impact.

Recommendation 8

Enhance the high performance computing infrastructure and internet connectivity in the region.

- ✓ HECAP experiments are among the largest producers of big data that drives valuable expertise among its users.
- ✓ Integration of existing infrastructures to develop and consolidate linked macro-structures that perform as a single entity.
- ✓ Development of a robust, high-performance scientific computing (HPSC) infrastructure, as well as the improvement of internet connectivity in the region, is fundamental to all experimental efforts.
- ✓ A Latin American Science Cluster, similar to the European ESCAPE project, that includes HECAP should be a priority.
- ✓ A strong computing infrastructure also allows for the training and capacity building in the area of software development, computer-integration and data analysis that feeds into ever increasing needs for data scientists in the region.

Recommendation 9

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

- ✓ Coordinating support at the funding agency level for Latin American groups in HECAP research allows for synergies to increase both scientific impact and local benefits.
- ✓ Continuity in funding mechanisms is required to develop the HECAP strategy.
- ✓ Resources to contribute to detector development, software and computing requirements for the various experiments and the successful completion of these projects.
- ✓ Fulfillment of commitments to international collaborations ensuring outcomes and science goals.

Recommendation 10

Encourage the dissemination of knowledge, outreach and the active involvement of the general population in scientific research, boosting Societal Engagement.

- ✓ Recognize the importance of looking beyond responding open scientific questions and advances in technological development to consider how to benefit society more broadly.
- ✓ Need to continue to make the case for science and its importance in our societies.
- ✓ Increase the pipeline of younger generations motivated by science.
- ✓ Wider implementation of citizen science initiatives.
- ✓ Create a positive culture around the facilities and experiments, crucial for their long-term survival.

Summary of Recommendations

Four major recommendations with regard to HECAP research infrastructures:

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

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

- R&D technologies
- Advanced training program
- Connections between theorists and experimentalists
- Computing and network infrastructures
- Societal engagement

One major recommendation for stability and continuity mechanisms in funding and cooperation across funding agencies in LA.

Endorsement by the High-Level Strategy Group

- HLSG Meeting of Oct 20 2020

After reviewing and discussing this document the HLSG wishes to express that it applauds the process that has been undertaken in Latin America for the *first time* to develop with broad participation of the HECAP scientific community a strategy for research infrastructures. The research topics combine an exciting contribution to understand the deepest structures and fundamental interactions of our Universe with the latest technological developments and with concrete applications to society. The resulting documents reflect an in-depth and systemic exercise to understand the current landscape, identify the regional strengths and weaknesses, and propose concrete projects to focus on while maintaining a balanced perspective that includes crucial capacity building initiatives.

The **LASF4RI-HECAP Strategy Document** presented to the HLSG shows an impressive degree of maturity of the Latin American region in moving forward with participation and leadership roles in state of the art large research infrastructures and related experimental facilities in HECAP areas. Its pillars are *ten* overarching recommendations whose successful implementation could lead to significant improvement of the impact of, and benefit for, the Latin American region in technological and scientific development in the near and medium term future. The findings and recommendations define the priorities for Latin American scientists in the coming decade and beyond.

Endorsement by the High-Level Strategy Group

The **LASF4RI-HECAP Strategy Document** addresses several aspects that need to be simultaneously developed to sustain a thriving research environment which includes fostering R&D for key technologies, enhancing the computing and network infrastructures, advanced training of the younger generations, and broad dissemination of knowledge with increased initiatives for citizen science. The importance of reinforcing connections between theorists and experimentalists to advance the research questions posed and the exploration of answers through experimentation is clearly stated and is considered of great value by the HLSG.

The recommendation for stable and continuous mechanisms for funding and coordination at the level of funding agencies and research councils for HECAP is of paramount importance and this HLSG endorses it enthusiastically.

Finally, the HLSG strongly recommends that the HECAP community put in place a robust structure and mechanisms that would allow the community to come together, on a periodic basis, ideally about every five years, to examine progress and consolidate community input to develop and/or update the strategic plan for the region. The European Particle Physics Strategy Update and the United States “Snowmass” processes are examples of successful national/regional models. Such sustained and recurring community engagement in the strategy development process will ensure regional coordination in the participation, as well as in developing leading roles, in regional and global scientific research infrastructures. This would also facilitate funding agencies in their decision-making process to adequately support the HECAP efforts in Latin America.

Given the above considerations the High Level Strategy Group expresses its endorsement of the 2020 LASF4RI-HECAP Strategy Document.

2020 Iberoamerican S+T Ministerial Meeting

October 27 2020

- https://www.segib.org/wp-content/uploads/Declaracion-IV-RMCTI_ES.pdf

Recognition of LASF4RI-HECAP process:

Los avances en el establecimiento del Foro Estratégico Iberoamericano para las Grandes Infraestructuras, a partir del desarrollo de un programa piloto en el área de física de altas energías, astropartículas y cosmología, cuyos resultados se han plasmado en el documento estratégico para el desarrollo de estas disciplinas, que incluye la definición de recomendaciones y el establecimiento de una hoja de ruta.

LASF4RI-HECAP Preparatory Group 2021-2023

Chair: Rogerio Rosenfeld; Co-chair: Diana López Nacir

Argentina

Diana López Nacir
Federico Sánchez
Hernán Wahlberg

Bolivia

Martín Subieta

Brazil

Jailson Alcaniz
Ignácio Bediaga
Rogerio Rosenfeld

Chile

Alfonso Zerwekh
Mauro Cambiaso

Colombia

Nicolás Bernal
José David Ruiz Álvarez

Ecuador

Francisco Yumiceva
Dennis Cazar Ramírez,
Harold Yepes

Central America

Maria Eugenia Cabrera - Guatemala
Melissa Cruz Torres - Honduras
Federico Muñoz - Costa Rica

Mexico

Alfredo Aranda
Juan Carlos D'Olivo
Gerardo Herrera

Paraguay

Jorge Molina

Peru

Alberto Gago

Venezuela

Reina Camacho Toro
Arturo Sánchez Pineda
José Antonio López

International

Marcela Carena
Martijn Mulders

Marta Losada (ex-officio)

New Timeline (continued)

1st Meeting of the new Preparatory Group

Mandate 2021-2023

You can find the by-laws at:

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



XII³/₄ SILAFEA EXPRESS

Creation of the Latin American Association for HECAP

XIV SILAFEA - Ecuador 1st LAA-HECAP General Assembly

Latin American Association for HECAP (LAA-HECAP)

Should be as inclusive as possible:

Anyone interested in HECAP can in principle be a member

There are no fees

You can join the Association by just filling a simple form at

<https://forms.gle/SrWWcjrMWEPFHa7t7>

At the moment we have ~400 members

Hosted by ICTP-SAIFR (webpage under construction)

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O Simpósio Latino-Americano de Física de Altas Energias (SILAFAE) é um evento tradicional que reúne a comunidade regional e internacional de física de partículas e áreas afins como cosmologia, gravitação e física de astropartículas.

<https://indico.cern.ch/event/1151741/>

Estudante Pesquisadores Pesquisadores

Universidade de São Francisco de Quito

Are you a Latin American student or studying in Latin America?

Or a professional in high energy physics, cosmology or astrophysics?

SILAFAE - Quito 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.

<https://indico.cern.ch/event/1151741/>

14th to 18th November 2022

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para mim ▾

qui., 8 de set. 16:03



XIV Latin American Symposium on High Energy Physics

The XIV Latin American Symposium on High Energy Physics (SILAF AE) will take place in November 14-18, 2022 in Quito, Ecuador. The SILAF AE conference series is a traditional event that brings together the community of Particle Physics and related areas such as Cosmology, Gravitation and Astrophysics. The conference has been the main regional hub for discussions on topics in the relevant fields, updates of the recent developments, and exploration of new ideas and perspectives towards the future. The

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Particle Physics in Latin America

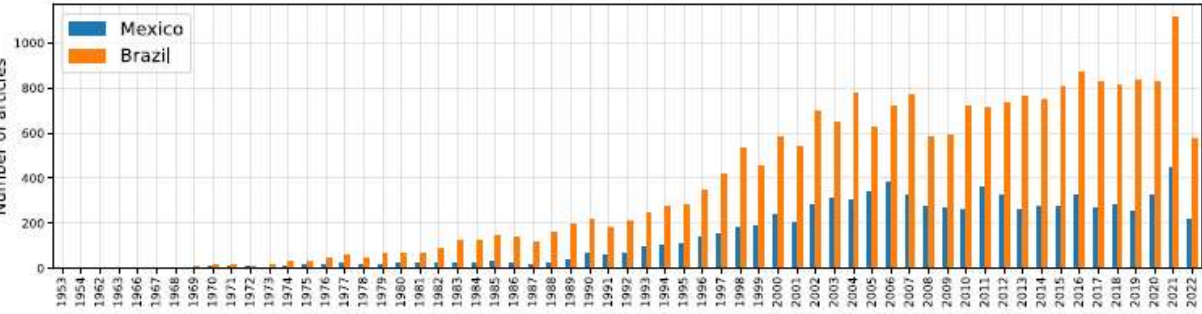
Fernando Quevedo
University of Cambridge UK
Snowmass 2022
July 25 2022

ROADMAP FOR THE FIRST STRATEGY FOR LATIN AMERICAN PHYSICS

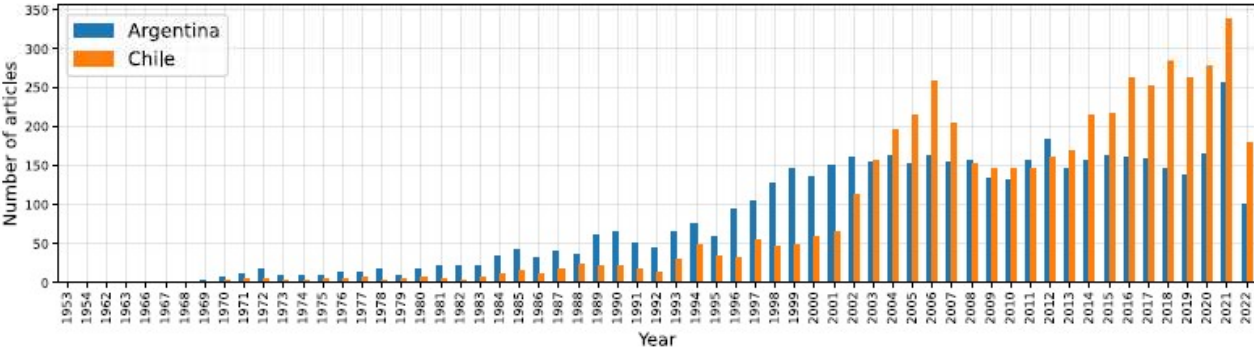


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