Strategies and Plans in Latin America

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On behalf of the Preparatory Group of the Latin American Forum for Research Infrastructures on High Energy, Cosmology and AstroParticles (HECAP)

Snowmass Community Planning Virtual Meeting – October 5-8, 2020
LASF4RI for HECAP

lasf4ri.org

Latin American Strategy Forum for Research Infrastructure for High Energy, Cosmology and Astroparticles

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

1st time a strategy process is conducted in LA
Timeline for LASF4RI

Initial ideas
- Brainstorming with the HEP community at the XI SILAFAE in Guatemala

Mandate
- Ibero-American Ministerial Science and Technology meeting in Guatemala: mandate declaration
- National Meetings and formation of the Preparatory Group with delegates from 10 LA countries.

Preparatory Group
- Town hall meeting at the XII SILAFAE in Peru to discuss mandate and next steps

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

Timeline:
- Nov. 2016
- 2017
- 2018
- Oct. 2018
- Nov. 2018
- J/F/M 2019
## Timeline for LASF4RI

<table>
<thead>
<tr>
<th>Event</th>
<th>Date</th>
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<tr>
<td>1st LASF4RI Workshop and Meeting of the Preparatory Group at ICTP-SAIFR</td>
<td>May 2019</td>
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<td>LASF4RI Workshop &amp; 1st Meeting of Preparatory Group</td>
<td>May/June 19</td>
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<td>Deadline for the submission of White Papers to LASF4RI</td>
<td>Dec. 2019</td>
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<td>White papers</td>
<td>July 2020</td>
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<td>Documents write-up</td>
<td>Sept. 2020</td>
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<td>High-level Strategy Group</td>
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<td>Definition of the composition of the High-level Strategy Group</td>
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<td>Open Virtual Symposium</td>
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<td>Open Virtual Symposium of LASF4RI for HECAP organized by ICTP-SAIFR, delayed from March due to the pandemic</td>
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Landscape in High Energy, Cosmology and AstroParticles (HECAP) in Latin America

~1,000 physicists in HECAP
Based on ~40 submitted white papers

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

**PRELIMINARY**

**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 - Valeo Observatory
Diana López Nacir - DF/IFIBA UBA-CONICET
Jorge Molina - Universidad Nacional de Asunción
Diego Restrepo - Universidad de Antioquia,
Arturo Sánchez - INFN 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 Cambiasso - Universidad Andrés Bello
Edgar Carrera - Universidad San Francisco de Quito
Alberto Gago - Pontificia 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
Marín Subieta - U. Mayor de San Andrés
Harold Yepes Ramírez - YTU

Will be put in the arXives
1 Introduction

2 Astronomy, Astrophysics and Astroparticle Physics
   2.1 Introduction
   2.2 Involvement of Latin American countries
   2.2.1 Pierre Auger Observatory (PAO)
   2.2.2 Latin American Giant Observatory (LAGO)
   2.2.3 Cherenkov Telescope Array (CTA)
   2.2.4 Southern Wide Field Gamma-Ray Observatory (SWMGO)
   2.2.5 Large Latin American Millimeter Array (LAMMA)
   2.2.6 Giant Radio Array for Neutrino Detection (GRAND)

3 Cosmology
   3.1 Introduction
   3.2 BAO from Integrated Neutrino Gas Observations (BINGO)
   3.3 Muon Ridge Astronomical Site: The ABRA and TOROS projects
   3.4 QLU Bolometric Interferometer for Cosmology (QUIC)
   3.5 South American Gravitational-Wave Observatory (SAGO)
   3.6 Vera Rubin Observatory's Legacy Survey of Space and Time (LSST)
   3.7 Latin American PhD program

4 Dark Matter
   4.1 Introduction
   4.2 Astrophysical and cosmological probes of DM
   4.2.1 Direct detection
   4.2.2 Indirect detection
   4.3 DM production at colliders
   4.4 DM portals
   4.5 DM phenomenology community in LA

5 Neutrinos
   5.1 Introduction: open questions, basic science and current context
   5.1.1 Neutrino oscillations, mass hierarchy and leptonic phase
   5.1.2 Neutrino masses and nature
   5.1.3 Astrophysical probes
   5.1.4 Search for new neutrino states: sterile and heavy neutral leptons

5.2 Research infrastructures
   5.2.1 Local large-scale infrastructures
   5.2.2 Local small-scale infrastructures
   5.2.3 International large-scale infrastructures

5.3 Areas of excellence in Latin America
   5.4 Synergies with other sciences
   5.4.1 Local large-scale infrastructures
   5.4.2 Local small-scale infrastructures
   5.4.3 International large-scale infrastructures

5.5 Conclusions

6 Electroweak & Strong Interactions, Higgs Physics, CP & Flavour Physics and BSM
   6.1 Introduction
   6.2 Participation of LA in HEP Activities
   6.3 Jefferson Laboratory
   6.4 LHC-ATLAS
   6.5 LHC-CMS
   6.6 LHC-LHCb
   6.7 LHC-ALICE
   6.7.1 SuperKEKB
   6.7.2 Future Colliders
   6.7.3 Theory
   6.7.4 Training, outreach, exchange programmes
   6.8 Areas of excellence and leadership
   6.9 Synergies
   6.10 Conclusions

7 Instrumentation and Computing
   7.1 Introduction and Highlights
   7.2 Common developments: status and plans
   7.3 Topics within similar instrumentation drivers
   7.4.1 73.2 FP7A Boards
   7.4.3 Small Area Photomultipliers (SAPMs)
   7.4.4 Silicon Photomultipliers (SiPMs)
   7.4.5 Charge-Coupled Devices (CCDs and Skipper CCDs)
   7.4.6 Resistive Plate Chambers (RPC)
   7.4.7 ARAPUCA Light Trap (Argon R&D Advanced Program at UNICAMP)
   7.4.8 Water Cherenkov Detectors (WCD)
   7.4.9 Laser Interferometer
   7.5 Computing
   7.6 Conclusions

8 Appendix
   8.1 List of White Papers
   8.2 Glossary of Experiments
Few highlights (my personal picks):

- UHECR - Auger Observatory – success story in the region
- Novel technology for the detection of liquid argon scintillation light – Arapuca – adopted in DUNE
- Full development of a new front-end readout chip for two ALICE detectors
- Neutrino/DM detectors - skipper CCDs
- Southern Wide-field-of-view Gamma-ray Observatory (SWGO) – recently formed collaboration
- Possibility of an underground facility in the region - ANDES
10 recommendations submitted to the High Level Strategy Group:

Chair: Luciano Maiani – University of Rome
Co-chair: Fernando Quevedo – ICTP & Cambridge University
Scientific representatives:
- Joao dos Anjos – Brasil/ON
- Pushpa Bhat – ICFA/Fermilab
- Hesheng Chen – China/IHEP
- Claudio Dib – Chile/UTFSM
- Teresa Dova – Argentina/UNLP
- Gabriela González – Argentina/LSU

Directors of institutions:
- Nathan Berkovits – ICTP-SAIFR
- Alvaro Ferraz – IIP
- Daniel de Florian – ICAS

LA representative to the Snowmass Advisory Group:
- Jacobo Konisberg -Mexico/U. of Florida
- Francis Halzen – US/Wisconsin
- Bruce Hoeneisen – Ecuador/USF
- Peter Jenni – Europe/CERN
- Jose Ocariz – Venezuela/IN2P3
- Geoffrey Taylor – Asia Pacific/Melbourne
- Antônio José Roque da Silva – CNPEM
- Ignacio Bediaga – CLAF
Next steps:

Oct. 20 - Meeting of the High Level Strategy Group

Oct. 27 – Meeting of the Ibero-American Ministers of Science, Technology and Innovation