

XIV SILAFEA

Final Remarks

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November 18, 2022

XIV Latin American Symposium on High Energy Physics

Ecuador, November 14 -18, 2022



Universidad San Francisco de Quito

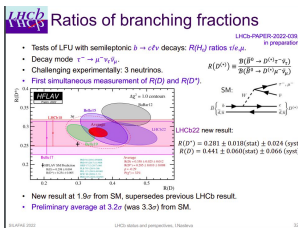


XIV SILAFEA: all round success!

List of invited speakers

- **Elke-Caroline Aschenauer (BNL, USA):** The electron-ion collider -- A world wide unique collider to unravel the mysteries of visible matter
- **Gabriela Barenboim (UV, Spain):** Neutrinos at 66
- **Ulisses Barres (CBPF, Brazil):** The SWGO experiment
- **Mauricio Bustamante (NBI, Denmark):** Astrophysics and fundamental physics from high-energy cosmic messengers
- **Marcela Carena (Fermilab, USA):** New opportunities for Electroweak Baryogenesis
- **James Dent (SHSU, USA):** New physics with gravitational waves
- **Claudio Dib (USM, Chile):** The ANDES project
- **Carlos Andres Florez Bustos (UniAndes, Colombia):** CMS status and perspectives for Run 3
- **Marcelo Gameiro Munhoz (IFUSP, Brazil):** ALICE status and perspectives for Run 3
- **Carlos Herdeiro (UA, Portugal):** Black holes: on the universality of the Kerr hypothesis
- **Ana Machado (UNICAMP, Brazil):** The DUNE experiment
- **Fernando Monticelli (UNLP, Argentina):** ATLAS status and perspectives for Run 3
- **Irina Nasteva (UFRJ, Brazil):** LHCb status and perspectives for Run 3
- **Luis Otiniano (CONIDA, Peru):** The LAGO Project
- **Claudia Ratti (UH, USA):** QCD equation of state
- **Laura Reina (FSU, USA):** The Higgs after LHC: from the HL-LHC to future colliders
- **Pablo Roig (CINVESTAV, Mexico):** New physics tests in lepton decays
- **Rogerio Rosenfeld (IFT-UNESP, Brazil):** Cosmology with state-of-the-art photometric galaxy surveys - Dark Energy Survey and Legacy Survey of Space and Time
- **Carlos Wagner (UChicago, USA):** Higgs physics in the LHC Era
- **Gordon Watts (UW, USA):** New computing and software frontiers in particle physics
- **Oscar Zapata (UDEA, Colombia):** Multi-component dark matter

- 85 registered participants
 - 49 faculty
 - 9 postdocs
 - 25 students
 - 2 other
 - 22 non-male (~27%)
- 20 plenary speakers
 - 8 non-male (~40%)
- 21 plenary presentations
- 42 parallel talks
- 18 posters



X-ARAPUCA small scale prototype TESTS

The X-ARAPUCA small scale prototype being used to measure the photon detection efficiency (DE) in LHC.

These measures were performed in three different laboratories to evaluate:

- Dichroic Filters: OPTO
- SiPM: Hamamatsu
- Light Guides: EJ286 and Glass to Power (G2P)

DEFF measured: OPTO + Hamamatsu + EJ286 $\rightarrow 2.2 \pm 0.5\%$

DEFF measured: OPTO + Hamamatsu + G2P $\rightarrow 2.9 \pm 0.1\%$

DEFF measured: OPTO + Hamamatsu + G2P $\rightarrow 2.7 \pm 0.3\%$

Higgs precision reach of Future Colliders: a summary

Energy Frontier DarkSide Integrated Studies

EF Decays	$\gamma\gamma$	$Z\gamma$	$Z\nu\bar{\nu}$	$Zl\bar{l}$	$Z\nu\bar{\nu}$	$Zl\bar{l}$	$Z\nu\bar{\nu}$	$Zl\bar{l}$	Higgs WBF	A_1	A_2
LHC/HL-LHC	□	□	□	□	□	□	□	□	□	□	□
ILC/CLIC	□	□	□	□	□	□	□	□	□	□	□
CEPC	□	□	□	□	□	□	□	□	□	□	□
FCO-w/CEPC	□	□	□	□	□	□	□	□	□	□	□
FCO-w/ILDC	□	□	□	□	□	□	□	□	□	□	□
μ -Collider	□	□	□	□	□	□	□	□	□	□	□
FCO-w/ILDC	□	□	□	□	□	□	□	□	□	□	□

Order of Magnitude for Fractional Uncertainty: $\times 10^1$ $\times 10^2$ $\times 10^3$ $\times 10^4$ $\times 10^5$ $\times 10^6$ $\times 10^7$ $\times 10^8$ $\times 10^9$ $\times 10^{10}$

Legend: \times (red) \times (green) \times (blue) \times (purple) \times (orange) \times (yellow) \times (cyan) \times (magenta) \times (brown) \times (pink) \times (grey) \times (white)

Phase Transitions – the parameters (simplified)

Nucleation rate per unit volume:

$$\Gamma(T) = n_0 T^3 e^{-S_0/T}$$

Provides the transition rate:

$$\frac{\beta}{\dot{\beta}} = \frac{d(S_0/T)}{dT}$$

Bounce solution:

$$\frac{\partial^2 \phi}{\partial t^2} + 2\dot{\phi} \frac{\partial \phi}{\partial t} - \frac{\partial V(\phi)}{\partial \phi} = 0$$

For prob. $\sim \mathcal{O}(1)$ nucleation of a bubble per Hubble volume:

$$\frac{S_0(T_c)}{T_c} \approx 140$$

Assuming relative dominance:

$$\frac{V_0}{V_1} \approx \frac{S_0(T_c)}{S_0(T_1)}$$

There is a suppression of the signal due to the source lifetime:

$$\gamma = 1 - \frac{S_0(T_c)}{S_0(T_1)}$$

Well speak with: S. Hobe, J. Kawanishi, A.J. Long, J. Turner, and Y. Wang, 2007, 10543; M. Laine and M. Trott, 2014, 11320; M.B. Fradette, M. Laine, J. Turner, and M. Piai, PoS(Pair Phys Lect Notes 2021), 2008, 0156.

What is needed to address the EIC Physics

The Golden Process: Deep Inelastic Scattering (DIS)

- As a probe, electron beams provide unmatched precision of the electromagnetic interaction
- Direct, model independent determination of parton kinematics of physics processes

Large kinematic coverage:

- center-of-mass energy \sqrt{s} : 20 – 140 GeV
- access to a vast CP over a wide range

Equation: $Q^2 = s + x^2 y^2$

Variables: x = center of mass energy squared, y = inelasticity, Q^2 = resolution power, x = the fraction of the nucleon's momentum carried by the struck quark ($0 < x < 1$), y = inelasticity.

Countries of origin of participants:

- Argentina
- Brazil
- Canada
- Chile
- Colombia
- Costa Rica
- Ecuador
- Germany
- Honduras
- India
- Italy
- Japan
- México
- Portugal
- Peru
- Spain
- United States
- Venezuela

Countries of institutions of participants:

- Argentina
- Brazil
- Canada
- Chile
- Colombia
- Costa Rica
- Denmark
- Ecuador
- France
- Germany
- Honduras
- India
- Italy
- Japan
- México
- Portugal
- Peru
- Spain
- Switzerland
- United Kingdom
- United States
- Venezuela

Thanks to our sponsors ...



... and your kind contributions, which allowed us to:

- fully pay for the lodging of 8 students from the region
- reduce the registration fee of some participants from the region
- have great service at social events
- among other many details....

Thanks to our LOC

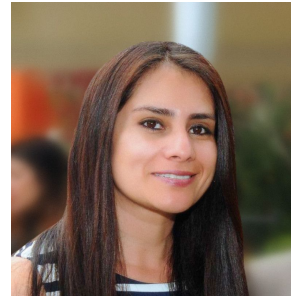
Edy Ayala (Escuela Politécnica Nacional)
Andrés Baquero (Universidad del Azuay)
Mario Audelo (Escuela Politécnica de Chimborazo)
Ernesto Contreras (Universidad San Francisco de Quito)
Álvaro Dueñas (Escuela Politécnica Nacional)
Silvana Guitarra (Universidad San Francisco de Quito)
Óscar Lasso (Universidad de las Américas)
Carlos Marín (Universidad San Francisco de Quito)
Christian Mejía (Universidad de Cuenca)
Carlos Reinoso (Yachay Tech)
Clara Rojas (Yachay Tech)

Our undergrad and grad students from USFQ and EPN.

But most especially to....



Andrea Ayala



Alexandra Polanco

and her team:
Daniela Armijos
Pablo Calderón

Looking forward to the XV SILAF AE in CDMX In 2024

SILAF AE24

Place: MEXICO CITY

Dates proposed:
4-8 November 2024



Possibility to enjoy “Día de Muertos” for those arriving a few days in advance.

In the past days we had in Mexico City a maximum temperature which, on average, was 25°C and a minimum average temperature of 11°C (both with very little variation). It was mostly sunny, with only a couple of drizzles late in the evening.

→ *Satellite meeting at MCTP after SILAF AE?*



Thanks everyone for attending and farewell!

