Latin America FCC National Contacts Report

Patricia Rebello Teles (CBPF)

7th FCC Workshop, Annecy 29th Jan 2024

Latin America in FCC

Instituions (#Part.)	MOU	Funding Agencies	Papers Presentations	Student Engagement	Other Exp. (colliders)
CBPF* (6)	✅ (2016)	✅ (HI+ECAL@CBPF)	✅	✅ (UG + PhD + PostDoc)	✅ LHC
UFRN (15)	✅ (2023)	✅	✅	✅ (UG + MSc + PhD + PostDoc)	☑ ?
Others	Interested	✅	✅	✅ (UG + MSc + PhD + PostDoc)	✅ LHC

Others: UFPel (10), UFRGS (2), UERJ (6) and USP (2) – Brazil*, PUC and SAPHIR – Chile (5), UNLP and UBA – Argentina (13)

***Latin American Strategy Forum for Research Infrastructure (LAS4RI)**

Brazilian Participation in the Next-Generation Collider Experiments link

FUTURE CIRCULAR COLLIDER

CERN

Detailed information from each participant

Thanks to all participants to kindly sharing your plans and activities for this report

Brazilian Center for Physics Research – CBPF
Rio de Janeiro - Brazil

Gilvan Alves (senior researcher) &

Patricia Rebello Teles (postdoc)

(CMS Collaboration – LHC)

CBPF

FCC MOU since 2016

PED goals:

- FCC-ee/eh/hh as $\gamma\gamma$ colliders* (David d'Enterria - CERN): Higgs, ALPs, Gravitons, aQGCs; FCC Reports
- **Project HI+ECAL@CBPF** (FAPERJ - 2022)
  - 1 postdoc + 1 PhD + 2 undergraduate
  - Detector simulation in GEANT: ECAL studies
  - FCC-hh: UltraPeripheral Collisions

Publications

- Prospects for $\gamma\gamma \to H$ and $\gamma\gamma \to W^+W^-$ measurements at FCC-ee. PHOTON'15, e-Print: 1510.08141 [hep-ph]
- Measurements of $\gamma\gamma \to H$ and $\gamma\gamma \to W^+W^-$ in e^+e^- collisions at the Future Circular Collider, EDS BLOIS 2017, e-Print: 1712.07023 [hep-ph]
- Prospects for $\gamma\gamma \to H$ observation in ultraperipheral ion collisions at the Future Circular Collider, PHOTON'17, e-Print: 1712.10104 [hep-ph]
- Two-photon fusion Higgs production in collisions with proton and ion beams at LHC, HE-LHC and FCC, PHOTON'19, Frascati Phys.Ser. 69 (2019) 156-163
- Higgs boson production in photon-photon interactions with proton, light-ion, and heavy-ion beams at current and future colliders, Phys.Rev.D 101 (2020) 3, 033009
- New Physics Searches at Future Colliders (from HL-LHC to FCC), talk in the Spring Meeting of Brazilian Physics Society (2023)
- Searches for axion-like particles via $\gamma\gamma$ fusion at future e^+e^- colliders, e-Print: 2310.17270 [hep-ex], to appear in PRD and in FCC mid-term report.
- Contributed to the FCC Reports FCC-ee, FCC-hh, Physics Opportunities, FCC HE-LHC
- Other works in progress: phenomenology and detector simulation

Engaging and motivating young students

International Master Class Hands-On in HEP (since 2019)

Physics School

Email: patricia.rebello.teles@cern.ch

EAFEXP CBPF

Advanced Experimental Physics School

Funding Agencies

FAPERJ

CNPq Conselho Nacional de Desenvolvimento Científico e Tecnológico

CAPES

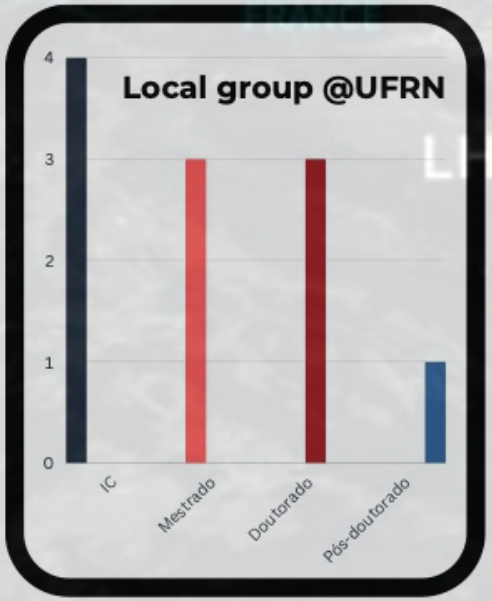
UFRN – working Group –International Inst. of Physics, Brazil

Farinaldo Queiroz, Victor Gonçalves, Luciano Abreu, Sandro Fonseca

FCC MOU 2023

PED goals

New Physics at FCC:
dark matter
Z' models
Seesaw



Publications

[1] Vector-Like Fermions and Inert Scalar Solutions to the Muon g-2 Anomaly and collider probes at the HL-LHC and FCC-hh, arxiv:2312.03851

[2] On the role of LHC and HL-LHC in constraining flavor changing neutral currents, PLB 2024, arxiv: 2304.00041

[3] Flavor changing interactions confronted with meson mixing and hadron colliders, PRD 2023, arxiv: 2208.08462

[4] Search for leptophilic dark matter at the LHeC, J.Phys.G 50 2023 , arxiv: 2207.01656

[5] Constraining 3-3-1 models at the LHC and future hadron colliders, PRD 2023 , arxiv: 2203.02520

Schools/Workshops

School on Collider Physics and Madgraph, February 2024

School on Collider Physics Topologies, June 20024

Workshop on Collider Physics, September 2024

SIMONS FOUNDATION CNPq

UFPEL Federal University of Pelotas – UFPel
Pelotas - Rio Grande do Sul - Brazil

MOU expected

Victor Goncalves (Full Professor)

Yan Bandeira (PhD)

Brenda Miranda (MSc)

Rafael Coelho (PhD => PostDoc)

- Phenomenology for the FCC, with special emphasis on exclusive photoinduced processes (photon - foton & foton - pomeron) => made predictions for several processes that can be studied at the FCC*
- 4 PhD thesis finished with FCC predictions
- 1 PhD + 1 MSC in progress with FCC predictions
- **Strongly interested to officially link UFPel**

*List of Publications

https://inspirehep.net/literature/2670801
https://inspirehep.net/literature/2670812
https://inspirehep.net/literature/2667550
https://inspirehep.net/literature/2689262
https://inspirehep.net/literature/2163280
https://inspirehep.net/literature/1939928
https://inspirehep.net/literature/1808871
https://inspirehep.net/literature/1804305
https://inspirehep.net/literature/1801130
https://inspirehep.net/literature/1768719
https://inspirehep.net/literature/1764168
https://inspirehep.net/literature/1489083
https://inspirehep.net/literature/1791934
https://inspirehep.net/literature/1782234
https://inspirehep.net/literature/1780827
https://inspirehep.net/literature/1779424

Porto Alegre: Prof. Gil da Silveira

MOU expected

- Ongoing preparation for membership to participate in simulation studies for the FCC detectors
  - Planned to be formalized in late 2024 due to ongoing responsibilities with other experiments
  - The initial plan is to place one student providing simulation studies and MC data analysis
- In 2020 a strategic plan for the Latin American Strategy Forum for Research Infrastructure (LASF4RI) has been prepared by the community of young researchers in Particle Physics namely “Brazilian Participation in the Next-Generation Collider Experiments".
  - This document listed the ongoing initiatives by Brazilian researchers focused in high-energy colliders, with proposals related to FCC as well.
  - In 2024 an update for this strategic plan will be provided and we expect that the share of FCC projects improves with the arrival of new researchers in the area of High-Energy Physics in Brazil.

University of Rio de Janeiro State – UERJ
Rio de Janeiro - RJ - Brazil

MOU expected

- Filling the paperwork to join FCC in the next couple of months
  - Contact: Andre Sznajder <Andre.Sznajder@cern.ch>
- Several permanent professors interested in contributing to FCC Feasibility study:
  - Andre Sznajder, Marisílvia Donadelli, Clemencia Mora Herrera, Antonio Pereira Vilela, Sandro Fonseca, Dilson Damião.
- For the moment considering undergrad students to work on the projects.
- No special funding for hiring PhD's or Posdocs to work on the projects.

University of São Paulo – USP
São Paulo - SP - Brazil

- contact: Marcelo Gameiro Munhoz <munhoz@if.usp.br>
- intend to hire physicist to work on FCC

Chile and FCC

MOU expected

- Francisca Garay is leading the efforts in Chile. Academic at Pontificia Universidad Católica - PUC and subdirector of SAPHIR institute. Both supporting FCC.
- Recently she has been awarded a 4 year grant (ANID funding agency) were FCC study is included: "Long lived particles as means of new physics in the Future Circular collider"
- Team:
  - Francisca Garay, Giovanna Cottin (profesors)
  - 2 Master students
  - A postdoc position open (part-time in FCC): https://inspirehep.net/jobs/2638533

Agencia Nacional de Investigación y Desarrollo
Ministerio de Ciencia, Tecnología, Conocimiento e Innovación
Gobierno de Chile

PONTIFICIA UNIVERSIDAD CATÓLICA DE CHILE

MILLENNIUM INSTITUTE FOR SUBATOMIC PHYSICS AT HIGH-ENERGY FRONTIER
SAPHIR

Argentina and FCC

Contact: Gustavo Otero Y Garzon

MOU expected

- **Two groups sharing efforts from Argentina**
  - Currently also involved in ATLAS
  - Universidad Nacional de La Plata (UNLP): 4 faculty, 3 Ph.D students
  - Universidad de Buenos Aires (UBA): 2 faculty, 4 Ph.D students
- **Waiting for possible funding from**
  - CONICET (National Sience Council)
  - ANPCyT (Sience and Technology Agency)

Summary

- So far, only CBPF and UFRN with signed MOU.
  - Others with MOU in progress, expected soon.
- Dedicated funding for FCC project:
  - In Brazil, for the moment mainly using existing infrastructure from LHC experiments to work on FCC projects.
    - HI+ECAL@CBPF project mix funds for LHC - CMS and FCC activities.
  - In Chile, ANID fund agency 4 years grant that includes FCC. Argentina waiting for possible fundings.
- All institutions have person power (senior and junior professors, researchers, postdocs, PhD, MSc and undergrad) already working on FCC feasibility studies (total of 59)