Brazilian Participation in the Next-Generation Collider Experiments

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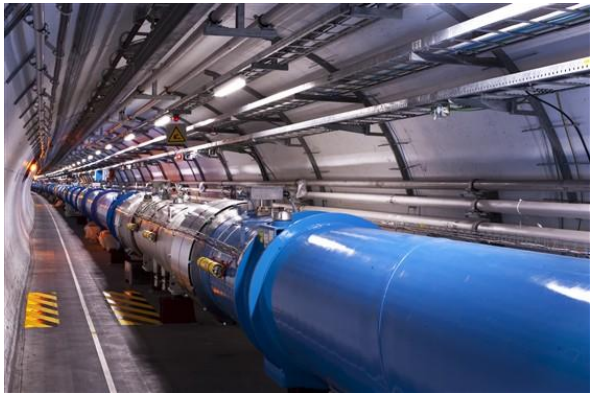
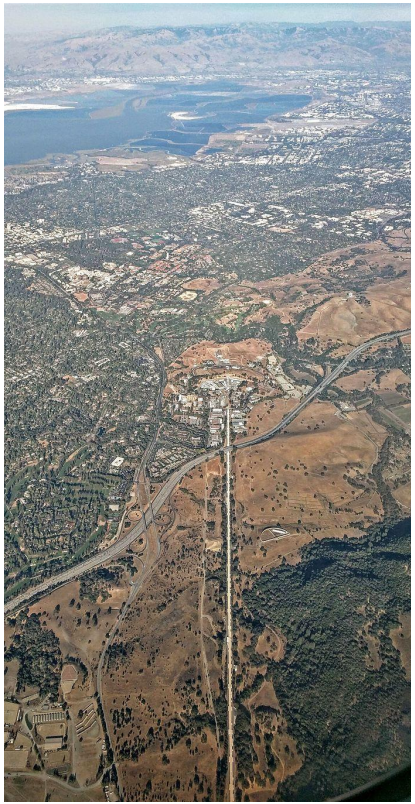
(High-Energy) Collider Physics

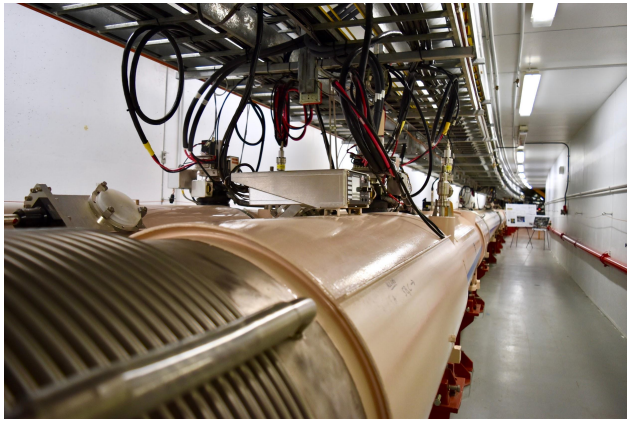
Sub-field of Particle Physics.

Discovery and precision physics.

Experiments run by large international collaborations.







Current Status

- Personpower
  - O(100) members in the community.
- Infrastructure
  - Short-medium term: LHC and RHIC
    - Brazil participates in ALICE, ATLAS, CMS, LHCb, PHENIX and STAR.
    - Path charted until ~2035 (HL-LHC).
  - Medium-long term: still open. Proposals:
    - Circular Electron Positron Collider (CEPC) in Qinhuangdao, China.
    - Linear Collider: ILC in Japan, CLIC in Geneva.
    - Future Circular Collider (FCC) in Geneva.
- Funding
  - Groups / individuals submit proposals to funding agencies.
  - Difficulties securing long-term grants.
  - RENAFAE helps expand and consolidate HEP research in Brazil but is **not** a funding agency.

Future Challenges

- Experiment Construction & Operation
  - Brazilian “fair-share” contribution 1–3% of total funding needed.
  - Hardware contribution: instrumentation labs needed.
  - Software contribution: computing centres needed.
    - Storage, computing cores and connectivity requirements.
  - Support and upgrades should be guaranteed over the lifetime of the experiments.
- Human Resources
  - Train our students in the local institutes.
  - Secure funding for mission trips to the experiments.
  - Attract international researchers.

Objectives

- To organise the community of experimental HEP in Brazil to become a member of only one large experimental collaboration in the next high-energy collider.
- Organise and connect smaller groups in the country with an interest in more specific experiments, for example future DIS colliders.
- Restructure the financial and practical organisation of large HEP collaboration membership, to **evolve towards a National Institute type of entity** (INCT).
- In the long term, we would like to build local physical infrastructure with **one or more national laboratory sites**, both for instrumentation research and development and for computing, data processing and analyses.

National Institutes Successful Examples

Fermilab

Fermilab is America's particle physics and accelerator laboratory.

INFN

INFN is the Italian research agency dedicated to the study of the fundamental constituents of matter and the laws that govern them.

CNPEM (🇧🇷)

Our mission is to integrate unique skills in National Laboratories for scientific and technological development and support for innovation in energy, materials and biosciences.