Rare processes and precision measurements

frontier calendar

Instrumentation needs

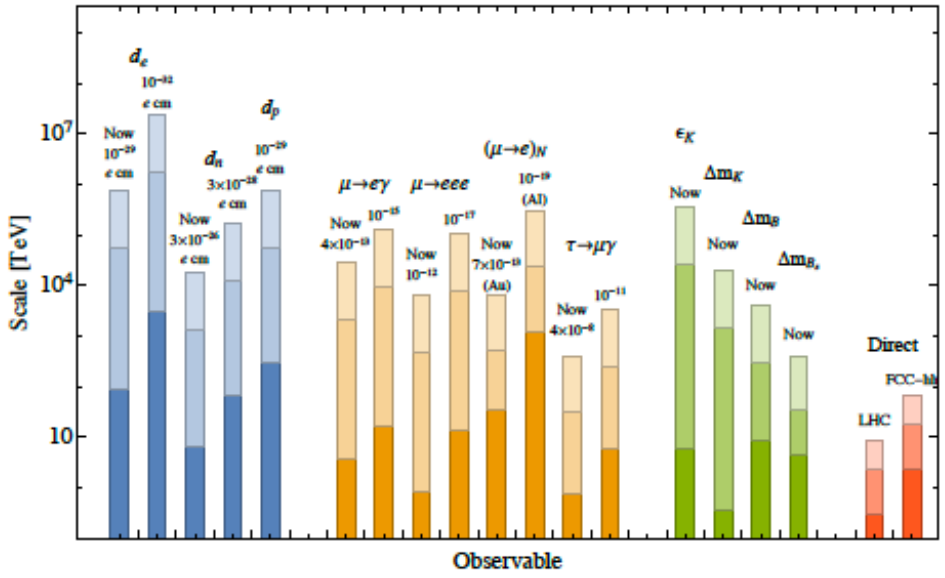
Frontier conveners ***Marina Artuso,*** *Bob Bernstein and Alexey Petrov*

Our road map

- Elucidate the case for the physics program that we are engaged in
  - Practical aspects: develop a program of workshops, open up slack conversation, formalize joint studies to sharpen the physics case with scenarios on how we will achieve our physics goals in the medium and long- term future ↔ **Develop milestones [coordination with MA, RB & AP]**
  - Methodology: identify key measurements, theoretical needs to relate measurements to fundamental physics (e.g. Lattice QCD…), bottom up and top down interpretation tools
- Gather a strong community to advocate for this physics program
  - Invite participation to slack channels, listservs and workshops
  - Solicit LOIs
- Find connection with other communities
  - Build network with other frontiers (physics groups, computing, instrumentation, accelerator, social engagement)
    - Identify cross-sectional physics interest
    - Identify common instrumentation needs
    - Identify computing infrastructure needs
    - HEP and society

We are not doing this exercise in vacuum

From BRN DOE BRN Study on HEP Detector Research and Development Report



Similar plot in many other studies

- European Strategy Slides June 19th, 2020
- DOE BRN Study on HEP Detector Research and Development commissioned by DOE HEP [co-Chairs Bonnie Fleming and Ian Shipsey] Report will become public at the time of its presentation by the co-Chairs at the HEPAP Meeting July 10, 2020, more information at https://science.osti.gov/hep/hepap/Meetings

Case made at instrumentation frontier kick-off meeting (June 19, 2020) [MA liaison]slides

- RP frontier encompasses a wide portfolio of instrumentation needs that will allow key measurements that will help us in answering fundamental questions
- Broad synergies with other fields:
  - Precision tracking with state-of-the-art timing
  - 5D calorimetry
  - Cost-effective and radiation hard photon detectors
  - ASICs for specific goals
  - Fast DAQ and processing of increasing data volumes
  - …

Develop connections with community engagement frontier

- Take inspiration from young scientists engaged in European Strategy:

Climate change and particle physics

- In a world with increasing demand on limited resources and undergoing climate change it is crucial to keep energy consumption, sustainability and efficiency in mind when discussing the future of particle physics
- In the discussion of the optimal choice for a new facility, the energy efficiency of the accelerator should be considered alongside factors such as cost, timescale and physics reach
- Research into environmentally-friendly alternatives for materials with high global warming potential for use in particle physics detectors should be strongly stimulated and supported
- The community should invest in both hardware and software efforts to improve the energy efficiency of its computing infrastructures
- The community is expected to be in the vanguard of alternatives to physical travel such as virtual meeting rooms. and should support low-carbon forms of travel and carbon offsetting, whenever travel is unavoidable

Next generations of particle physicists

- The exploratory nature of particle physics and its fundamental questions about the universe fascinates many inside and outside the field and draws in talented students
- National laboratories, research institutes and universities worldwide provide the training ground of future young scientists. Education and training in key technologies are crucial for the needs of the field and society at large
- It is essential to make the research environment in particle physics as attractive as possible and in particular to consider the worries expressed by the early career researchers (document under the auspices of ECFA)
- The principles of equality, diversity and inclusion should be clearly and recognisably present in all of the field's activities

We have to be aware of the societal impacts of our work, synergy with outside of HEP work, and, especially during these times, be aware of the need to sustain equality, diversity and inclusion in all of our efforts.