



Input to the European Strategy Update: Ensuring the Future of Particle Physics in a More Sustainable World

We live in a warming world [1]. The consequences for current human society of a world warmer than 2C compared to pre-industrial times are catastrophic [2]. In order to address this, countries have pledged, in 2015 with the Paris Agreement, to undergo a deep decarbonisation of their economies and civil life in order to control carbon emissions to levels that would mitigate the serious effects of climate change from warming over 2C [3]. As scientists we recognize these facts.

The future of particle physics research is exciting and inspiring: will we discover new particles or symmetries? New space-time dimensions? What is the origin of dark matter? In addition, the economic and societal impact of particle physics research is vast and is a significant driver of technological innovation [4]. We want our passion for particle physics research to still be possible for future generations. As the timespan of some of our particle physics experiments could cover the next few decades, it is appropriate to take into account the impact of climate change, as some European laboratories have started doing [5] and as is recommended by the UN [6].

Consequently, we want to express the following recommendations as input to a European Strategy Update [7] that will steer the direction of European particle physics laboratories and universities over the next few years.

Recommendation 1:

As part of their grant-giving process, European laboratories and funding agencies should include criteria evaluating the energy efficiency and carbon footprint of particle physics proposals, and should expect to see evidence that energy consumption has been properly estimated and minimized.

Recommendation 2:

Any design of a major particle physics experiment should consider plans for reduction of energy consumption, increased energy efficiency, energy recovery and carbon offset mechanisms. Similarly, any design for new buildings associated with particle physics research should consider the highest building and energy efficiency standards.

Recommendation 3:

European laboratories should invest in the development and affordable deployment of next-generation digital meeting spaces including virtual reality (VR) tools in order to minimize the need for frequent travelling to the laboratory, thereby minimizing the travel carbon and energy footprint of their users.

We believe that the above recommendations will help sustain the field of particle physics research into the next century. We also hope that they will send a strong signal to European governments to put in place mechanisms to speed up the pace of decarbonisation across all public and private sectors. It is also our hope that these examples inspire other scientific communities to follow suit in similar ways and help generate opportunities to set up collaborative interdisciplinary efforts to share the knowledge and practices in the research community at large.

We are excited about the future of particle physics and believe that these recommendations will help maximize its potential in a more sustainable, low carbon emissions world.

References:

- [1]: IPCC Working Group 1 Report: "Climate Change 2013: The Physical Science Basis" <https://www.ipcc.ch/report/ar5/wg1/>
- [2]: IPCC Working Group 1 Report: "Climate Change 2014: Impacts, Adaptation and Vulnerability" <https://www.ipcc.ch/report/ar5/wg2/> and IPCC special report on "Global Warming of 1.5C": <http://www.ipcc.ch/report/sr15/>
- [3]: The United Nations Climate Change Paris Agreement, <https://unfccc.int/process-and-meetings/the-paris-agreement/the-paris-agreement>
- [4] See for example: The UK Science & Technology Facilities Council Impact Report 2016, <https://stfc.ukri.org/about-us/our-impacts-achievements/annual-impact-reports/impact-report-2016/> or The Impact of CERN, 2016, <http://cds.cern.ch/record/2256277>
- [5] See for example: <https://europeanspallationsource.se/building-project/site-architecture-energy>, <http://erf.desy.de/energyworkshop/>
- [6] UN Sustainable Development Goals: <https://sustainabledevelopment.un.org>
- [7] <http://europeanstrategyupdate.web.cern.ch>

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