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KIG: a tool for carbon footprint monitoring in physics research (Remote presentation)

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Greenhouse gas (GHG) emissions have been recognized as accelerators of the Global climate change phenomenon and several human activities take part in it. In particular, the contribution of the computing sector is significant and deemed to grow. While on one side unprecedented discoveries have been obtained thanks to the increasing computational power available, on the other the heavy reliance on power-eager resources might lead scientific research to become energetically unsustainable as a result of overlooking the burst of energy-intensive operations, resulting, as an example, from the spread of AI in most research fields, including Physics.

In order to guarantee the sustainability of research, all the stakeholders, namely users and data centers, should be able to keep track, analyze and report the carbon footprint and energy-intensiveness associated to their operations, in addition to the currently adopted performance metrics. By doing so, the stakeholders can reach a deeper understanding of the burden related to their operations and take informed decisions. For instance, users might plan energy optimizations of the workflow while data centers might adopt different management policies to abate the footprint of the facility.

In this work, we introduce an open tool, written in C++, that allows users and data centers to easily keep track, analyze and report the energy requirements and carbon footprint in gCO2e of their computing tasks. Such tool should help shedding some light on the often not-so-trivial trade-off between performance and environmental Footprint. By gathering detailed data, such tool should also trigger meta-analyses on the behaviour of algorithms as well as computing infrastructures with a view to better leveraging said resources. In the following, sample Physics research-related use-cases are discussed to present the tool.

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