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Estimating the environmental cost of HEP software and computing hardware at the University of Manchester

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In this talk, we will describe the studies undertaken at the University of Manchester to estimate and improve the energy efficiency of computing hardware and software used by students and researchers.

The goal of these studies is to build an understanding of the environmental impact of paticle physics research focusing on two fronts:
1) the carbon cost of the hardware uses for high power computing hardware and the local computing cluster
2) the energy efficiency of data analysis software and machine learning models in "big data"-related scientific fields including as high-energy particle physics.

The focus of this contribution will be the energy efficiency of scientific software algorithms and MC generation packages, taking FastJet and Herwig as examples, as well as the energetic cost of top tagging algorithms. We will then describe our plans towards a lifecycle analysis for computing hardware, as well as the policies that could be put in place for hardware re-use; this may benefit also the Tier2 where we plan to do testing in a second phase. We will also describe our plans for integration into teaching materials for software development courses.

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