

Large Language Models for Particle Accelerator Tuning

Autonomous tuning of particle accelerators is an active and challenging field of research with the goals of reducing tuning times and enabling novel accelerator technologies for novel applications. Large language models (LLMs) have recently made enormous strides towards the goal of general intelligence, demonstrating that they are capable of solving complex task based just a natural language prompt. Here we demonstrate how LLMs can be used for autonomous tuning of particle accelerators using natural language. We test our approach on commonly performed tuning task at the ARES accelerator facility at DESY, and briefly compare its performance to other state-of-the-art autonomous accelerator tuning methods. Ultimately, this line of work could enable operators of particle accelerators to request working points through natural language and collaborate with autonomous tuning algorithms in an intuitive way, thereby significantly simplifying the operation of these complex and high-impact scientific facilities.

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