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Dr.Sai AI Agents System based on LLMs: Revolutionizing Particle Physics Analysis at BESIII and Beyond

Friday, 21 March 2025 10:00 (22 minutes)

The rapid advancement of Large Language Models (LLMs) has opened new avenues for accelerating data processing and analysis in high-energy physics (HEP). In this presentation, we introduce the Dr.Sai AI Agents System, a cutting-edge intelligent agent designed specifically for the BESIII experiment. This system leverages the power of LLMs to streamline complex tasks in particle physics analysis, from data interpretation to hypothesis generation, significantly reducing the time required to achieve meaningful physics results.

We will discuss the architecture of the AI agent, including its "brain" for logical reasoning, "sensors" for data intake, "memory" for knowledge storage, "actuators" for task execution, and "learning systems" for continuous improvement. The system's application in hadron spectroscopy studies will be highlighted as a prime example of its potential to boost experimental efficiency and drive new discoveries.

Additionally, we will explore the broader vision of developing a "scientific large model" capable of directly processing particle physics data and the roadmap toward creating an AI scientist. This talk will provide an overview of recent progress, technical considerations, and future directions in harnessing AI to redefine particle physics analysis.

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