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Vibe Plotting: ServiceX, RDataFrame, and a LLM

Tuesday 18 November 2025 12:00 (20 minutes)

Can we teach an LLM to plot experimental HEP data? Modern particle physics workflows increasingly depend on a complex software ecosystem that connects large datasets, distributed data delivery, and user-level analysis tools. We demonstrate how a Large Language Model (LLM) can act as a coding assistant that bridges these components. Starting from a high-level user request—such as "plot jet transverse momentum in dataset X"—the LLM generates code that orchestrates ServiceX for columnar data delivery, configures RDataFrame operations, and produces the plot. The system dynamically adapts code generation to experimental conventions and schema variations, reducing the barrier to entry. We present examples of successful end-to-end workflows, discuss failure modes and reliability issues, and outline the challenges of integrating such assistants into production environments.

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