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Agents of Discovery

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Particle physics and other sciences are becoming more and more data centric, requiring increasingly complex analysis methods. Often large parts of these methods belong to standard procedures which have to be implemented by hand again and again, taking time away from more interesting and innovative work. With the rise of agentic AI systems, driven by the rapid improvement of large language models (LLMs) in the last years, other approaches become feasible: Tasking AI agents with implementing those known parts, making workflows more efficient. In this work we present a framework allowing a team of AI Agents to work autonomously on a given task, including capabilities for writing code, code execution, error correction and logic checks.

The setup uses state-of-the art OpenAI LLMs and has been tested in the realm of anomaly detection with a task based on the LHC Olympics challenge. The performance was monitored throughout many different technical and physical metrics, allowing us to draw detailed conclusions on the capabilities of the different LLMs: Most are capable of solving the given task, while the best were able to match human level performance.

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