Dr. Sai物理分析智能体系统

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Joint-efforts from IHEP-UCAS-LZU-JLU

IHEP

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Outline

1. Xiwu

2. Agent
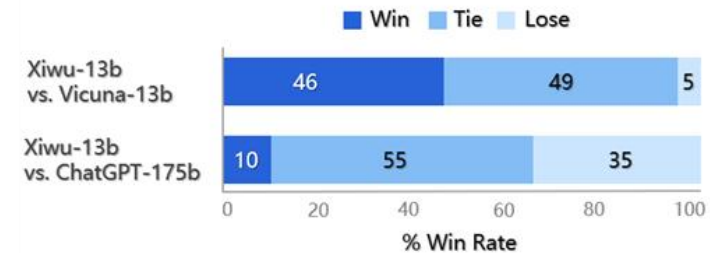
3. The multi-agent system

4. Summary

Xiwu

- Xiwu: a basis flexible and learnable LLM for HEP
  Xi(溪)：Streamlet → Drops of water
  Wu(悟)：Understand and inferring
- First version release at April (refer to arXiv:2404.08001 for more details)
  - high level model based on open-source foundational LLM, e.g., LLaMa
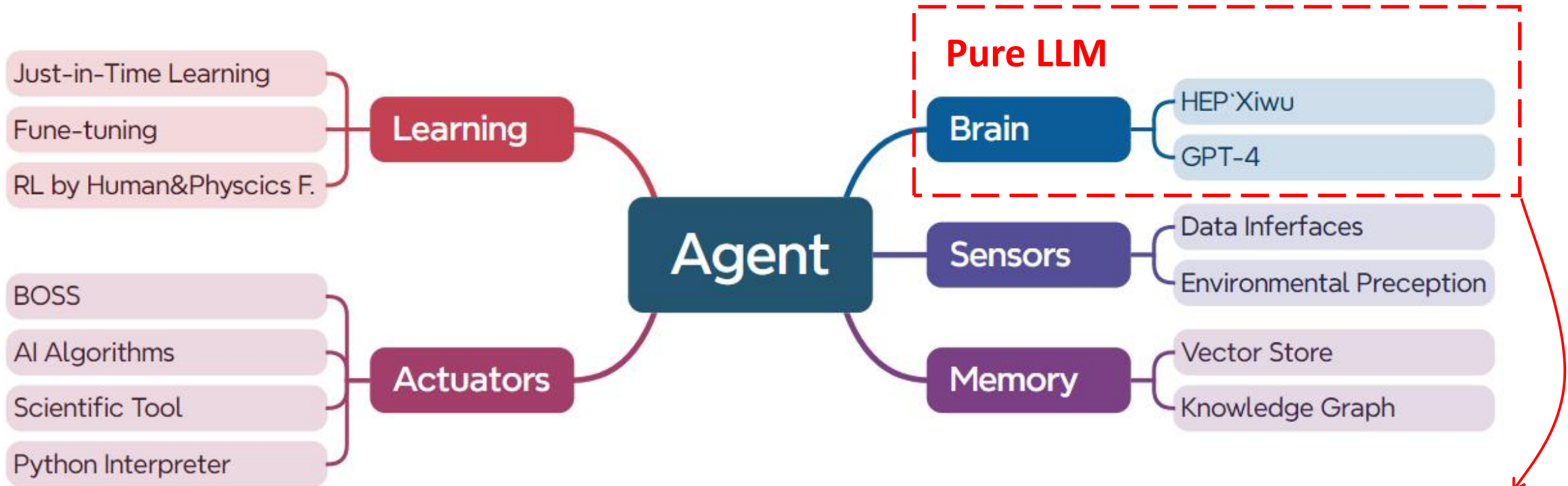 - **First LLM for HEP, version 2 based on LLaMA-3-70B is on-going**
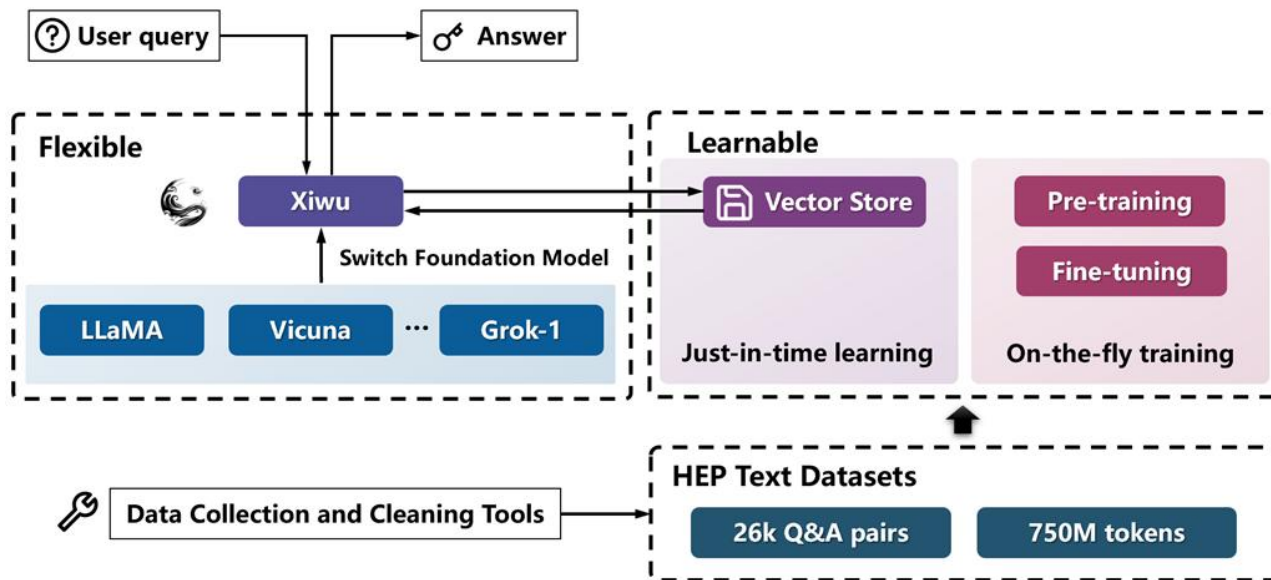
Agent

Definition: An entity that can <u>perceive its environment</u>, <u>make decisions</u>, and <u>take actions</u> in order to reach certain goals or sets of goals.

Pure LLM

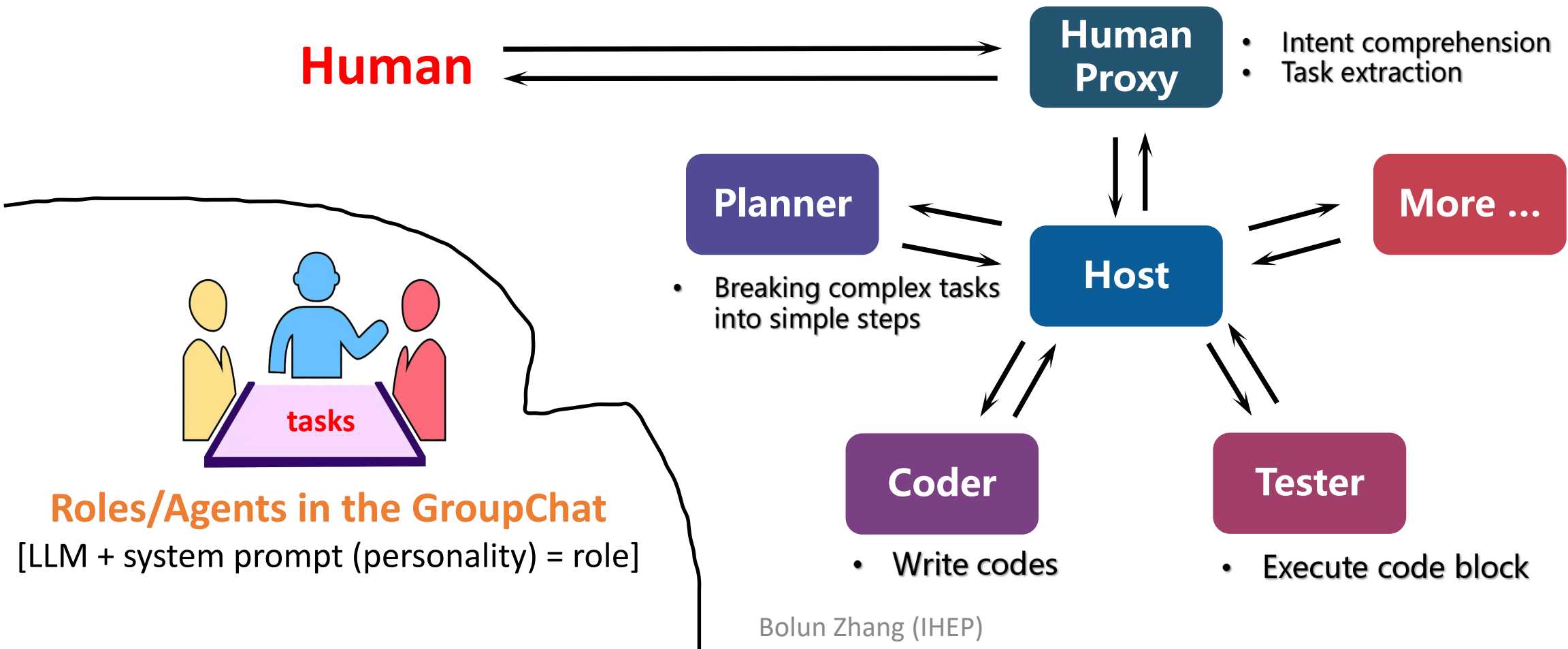**Capable, But not Infinitely capable.**

1. **Domain Expertise**: Models are either general or specialized, but not both.
2. **Cognitive Abilities**: Limited reasoning and contextual understanding.
3. **Resource & Adaptability**: Restricted by processing capacity and flexibility in diverse tasks.

| Hallucination |
| :---: |
| **Closed knowledge system** |
| **Not good at calculation** |

The multi-agent system

The solution designed for complex physics analysis tasks.
- Based on [AutoGen](#) framework.
- Each agent is equipped with specific knowledge, tools, and LLM.
- Improve work efficiency by assigning the right task to the right agent.

Human

Human Proxy
- Intent comprehension
- Task extraction

Planner
- Breaking complex tasks into simple steps

Host

More ...

Coder
- Write codes

Tester
- Execute code block

tasks

Roles/Agents in the GroupChat

[LLM + system prompt (personality) = role]

Agents in Dr. Sai

- Break down complex tasks into executable simple steps
- Use CoT, Chain of Thought

Planner

Coder

- Write code based on task content
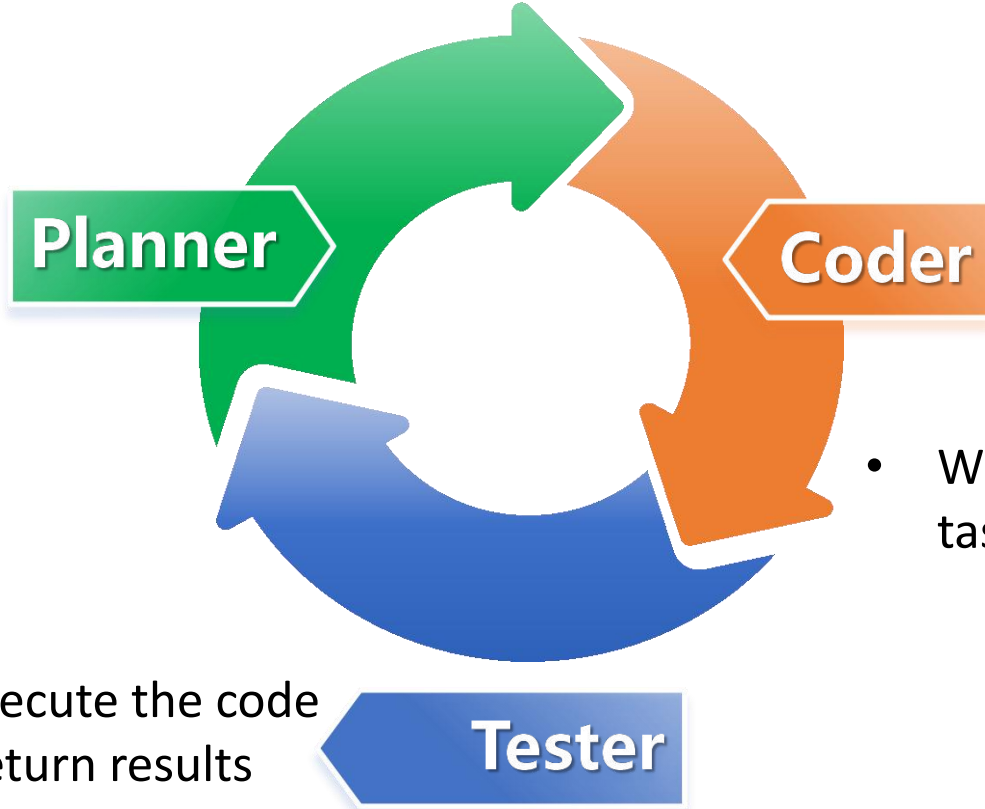
- Execute the code
- Return results

Tester

A typical collaboration process

👤 Human proxy
- Extract executable tasks from user query

👤 Navigator
- Link to external search engines
- Arxiv, DocDB, websearch

👤 Editor
- Polish scientific writings

👤 Charm
- Other tasks
- General reply

Summary

➢ **Fine-tuning LLaMa for Physics**: The LLaMA-3-70B version of Xiwu is on-going!

➢ **Multi-Agent System for Complex Tasks**: With customized agents, we built a multi-agent collaborative system for handling complex physical anaysis.

➢ **Modular Design for Scalability**: Optimizing the system performance is easy, as we can conveniently replace the base model or add customized intelligent agents

Thanks