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Gas supply control system for straw tube detectors in the PANDA experiment

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In the PANDA experiment designed for studies with antiproton beams at the FAIR (Facility for Antiproton and Ion Research) accelerator complex, gaseous detectors of straw tube type are used for precise reconstruction of charged particle tracks. Developed multi-channel gas mixture supply system for the PANDA straw detectors meets high requirements regarding, among others, precision of mixing the component gases, stabilization of gas pressure in the detectors and protection of the detectors in the event of a system failure.
The hardware architecture of the gas system integrates gas supply components, atmospheric condition sensors, and automation based on PLC controllers to maintain optimal working conditions. The software structure, based on EPICS, enables modular control, real-time monitoring, and efficient data collection. The user interface, developed using Phoebus, provides an intuitive graphical environment for system operation and diagnostics.
This work presents the design, implementation, and functionalities of the gas supply control system, highlighting its role in ensuring precise and reliable operation of the PANDA straw detectors. Potential improvements and future extensions are discussed, focusing on optimizing system performance for upcoming experimental phases.

Footnotes

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