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Thu-Af-Po.11-04: The control system of sub-cooled liquid nitrogen cooling system for C11 CPMU at SSRF

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Cryogenic Permanent Magnet Undulator (CPMU) is an important kind of insert device at the synchrotron radiation facilities. The magnets of CPMU have a better magnetic performance than a conventional In-vacuum Undulator. The work temperature of CPMU magnets in C11 CPMU is below 80K. The cryogenic operation of CPMU requires a sub-cooled liquid nitrogen cooling system. The operational stability of cooling system is the key factor for device operation throughout one continuous operation period. The control system design for the sub-cooled liquid nitrogen cooling system will be discussed including control system architecture, hardware and software design, control methods. The control loop parameters and performance will be introduced. The system was put into operation in August 2024 and maintains a steady state till January 2025 which has a steady control effect on controlled temperature and pressure.

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