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Control and simulation of cryogenic plants at CERN

CERN is operating the largest helium cryogenic installations of the world to maintain the 40 000 tons of the LHC at 1.9 K. To control these industrial plants, around 80 PLC (programmable Logic Controllers) are used handling more than 40 000 Inputs/Outputs. The PLC are also embedding around 5 000 PID regulation loops to maintain temperatures, pressures and flows at desired values. In these context, some advanced regulations techniques such as IMC (Internal Model Controller) or optimal controllers have been tested and validated through sophisticated modelling and simulation tools to improve the different control strategies in future.

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