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Prototype control system for the Low Energy Branch ion beamline

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We are developing a prototype control system for the Low Energy Branch (LEB) ion beamline at the Micro-analytical Infrastructure Centre (MIC) of the Jozef Stefan Institute (JSI) in Ljubljana, Slovenia. This activity is ongoing simultaneously with the hardware construction of the ion beamline branch dedicated to the research with low-energy ion beams with energies from 1 to 30 keV.

The LEB instrumentation is categorized into: a) Ion sources, b) Ion beam transport optics, and c) Accessories, including specialized detector systems and devices, used to prepare and maintain optimal experimental conditions. Therefore, key functionalities of the control system include the control of devices like vacuum pumps, power supplies, etc., data acquisition from sensors and detector systems, and ensuring reliable autonomous operation for high-precision physics experiments [1]. The control system will be implemented within the Experimental Physics and Industrial Control System (EPICS) environment [2], providing us with the tools required to develop a comprehensive and scalable control system.

In this work, we present a block scheme, a device list, the control system architecture with its development layers, a minimal control system prototype currently operational in our laboratory, and a 3D visualization of the complete LEB experiment.

Footnotes

[1] Ž. Brenčič, M. Skobe et al, Development of Low Energy Branch at MIC, Ljubljana, 14th IPAC, 2023.

[2] P. Weigel et. all, The EPICS control system for IsoDAR, Nucl. Instrum. Methods Phys. Res. Section A, 1056 (2023) 168590.

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