



Contribution ID: 519 Contribution code: TUPD025

Type: **Poster Presentation**

Continuous integration of control systems in parallel to the existing systems of LIPAc, for a radio-frequency conditioning test bench.

Tuesday 23 September 2025 16:00 (1h 30m)

Under the Broader Approach agreement between Japan and Europe, the Linear IFMIF Prototype Accelerator (LIPAc) aims the validation of the International Fusion Materials Irradiation Facility (IFMIF) accelerator design, to produce a deuteron beam of 125 mA at 9 MeV in continuous wave. In parallel to the installation of a superconductive linear acceleration stage, a high-power test bench was set up for the testing and conditioning of four pairs of radio-frequency (RF) couplers for LIPAc's RF quadrupole*. Accordingly, the control systems (CS) part was implemented in parallel to the existing CS of LIPAc, benefiting from the tools available while avoiding their modification. Also, additional functionalities and devices were integrated to tackle the test bench specificities. This work was continuously performed during the operations of the test bench, identifying and answering further needs, such as deploying an automated conditioning tool, or enabling slow feedback loops for automatic parameter tuning. Furthermore, this test bench became a testing environment for the modifications foreseen in the LIPAc CS refurbishment plan, such as upgrading the CS framework to EPICS v7, switching to CS-Studio Phoebus and its applications for the operator interfaces, or using Debian 12 as the operating system and ProxMox 8 for the virtualization environment. The experience acquired here will be precious for the IFMIF-DONES Facility Project (DEMO-Oriented NEutron Source) implementation of IFMIF.

Footnotes

*see "Performance on high-power test bench of RF couplers for the LIPAc's RFQ" - foreseen to be presented at IPAC25 by Luis Gonzalez Gallego Sanchez Camacho in June 2025

Funding Agency

This work has been carried out within the framework of the EUROfusion Consortium, funded by the European Union via the Euratom Research and Training Programme.

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Session Classification: TUPD Posters

Track Classification: MC02: Control System Upgrades in Existing Facilities