Contribution ID: **415** Type: **Poster Presentation**

AI-Ready Control Infrastructure for Cyclotron Systems Using GPU-Accelerated Python GUIs and LabVIEW over ZeroMQ

We present a modular, AI-ready control and monitoring infrastructure developed for the 76-inch isochronous cyclotron at the Crocker Nuclear Laboratory, University of California, Davis. The system combines a GPU-accelerated Python GUI engine on a high-performance Linux workstation with a LabVIEW-based supervisory platform for real-time control and data acquisition.
Communication between platforms is handled via ZeroMQ, enabling low-latency, asynchronous data exchange. Benchmark results show end-to-end response times below 10 ms with minimal jitter, supporting real-time visualization and interactive feedback.
Designed to separate deterministic control from high-level logic and user interaction, this architecture offers robust performance, scalability, and extensibility. It lays the groundwork for future integration of AI-based optimization, autonomous control, and predictive diagnostics in cyclotron operations.

Please consider my poster for contributed oral presentation

Yes

Would you like to submit this poster in student poster session on Sunday (August 10th)

No

Footnotes

Funding Agency

I have read and accept the Privacy Policy Statement

Yes

Author: LOPEZ OSSES, Claudio (University of California, Davis)

Co-authors: PREBYS, Eric (University of California, Davis); Mr BACKFISH, Michael (University of California, Davis); Mr SOTO, Gabriel (University of California, Davis); Mr LOPEZ, Irwin (University of California,

Davis); Mr SAHEBZADA, Rafiaullah (University of California, Davis); Mr NOVOTNY, Mathew (University of California, Davis); Mr HANS-GERD, Berns (University of California, Davis)

Presenter: LOPEZ OSSES, Claudio (University of California, Davis)

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