EPICS IOC based on Computer-On-Module for the LNL laboratory

J. Vasquez[1], D. Pedretti[1], R. Ponchia[1], M. Bellato[2], R. Isocrate[2], M. Bertocco[3]

[1]INFN - Laboratori Nazionali di Legnaro. V.le dell'Università 2, 35021, Legnaro (PD), Italy
[2]INFN – Sezione di Padova. Via Marzolo 8, 35131, Padova (PD), Italy
[3]Università degli Studi di Padova. Via Gradenigo N. 6b, 35131, Padova (PD), Italy

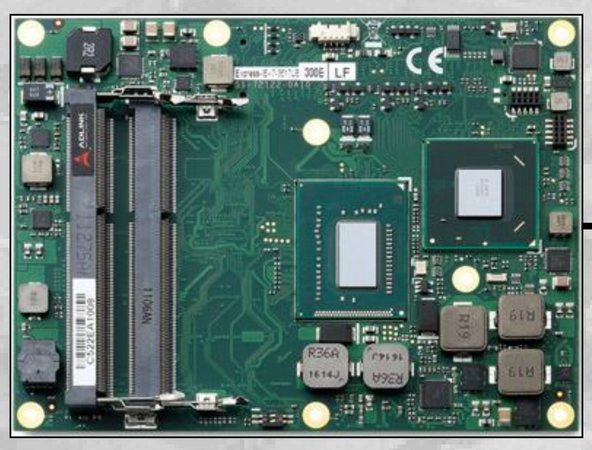
Istituto Nazionale di Fisica Nucleare
Laboratori Nazionali di Legnaro
Viale dell'Università 2, I-35020 Legnaro (PD), Italia
Tel: +39 049 8068 311 - Fax: +39 049 641925
http://www.lnl.infn.it

The LNL EPICS IOC

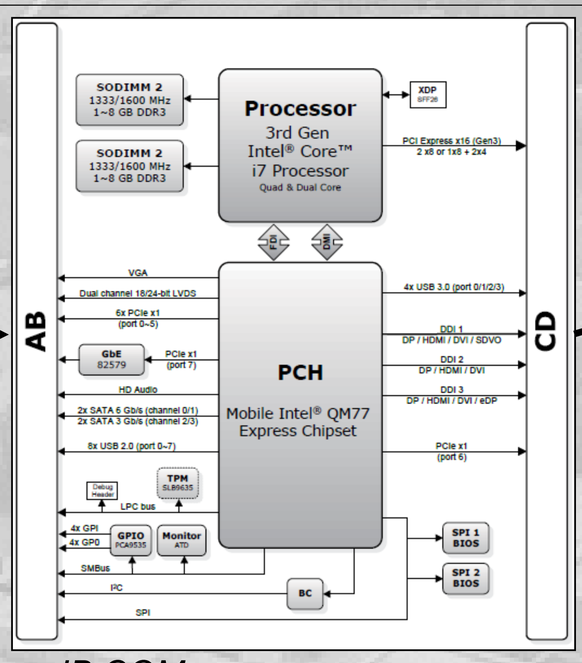
Form by:

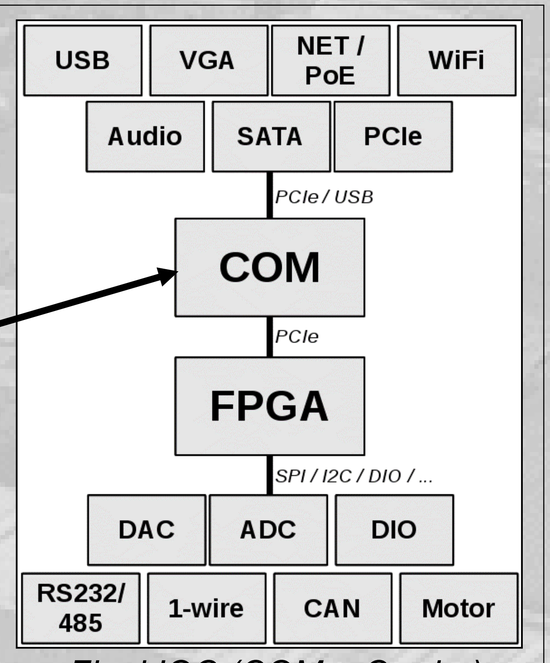
1. Computer-On-Modules: which includes all the basic component and IO interfaces of a PC (CPU, RAM, USB, SATA, serial, audio, video, Ethernet, PCI, PCIe)
2. Custom Carrier board with additional IO interfaces (ADC, DAC, DIO, fieldbuses)

Common hardware platform for all current and future control systems at LNL.



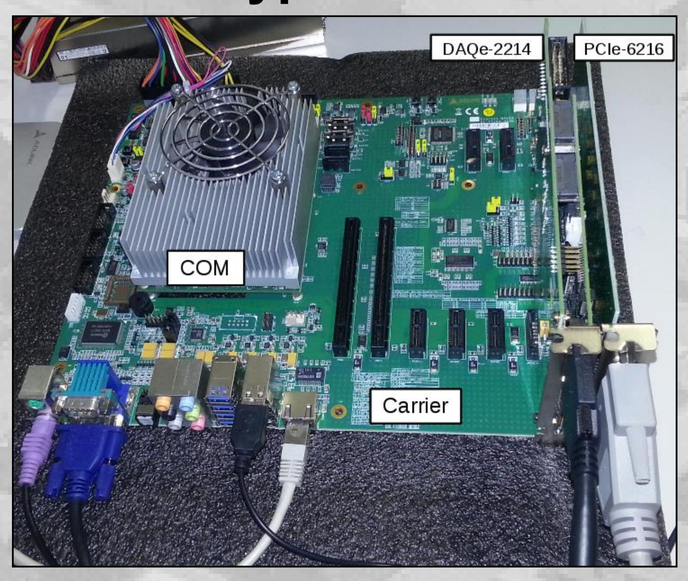
Adlink's type 6 Express-IB COM



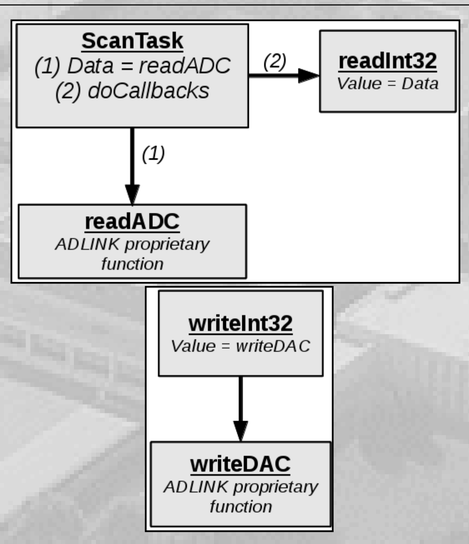


Final IOC (COM + Carrier)

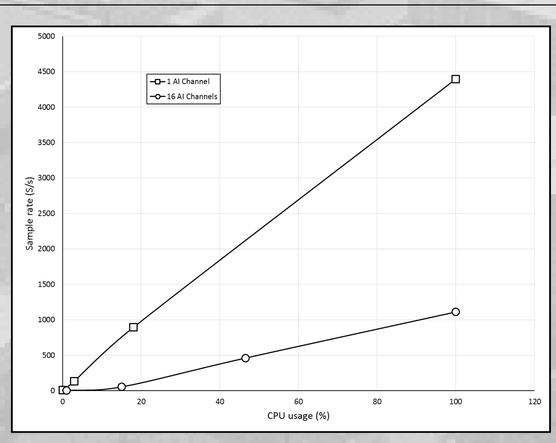
IOC Prototypes

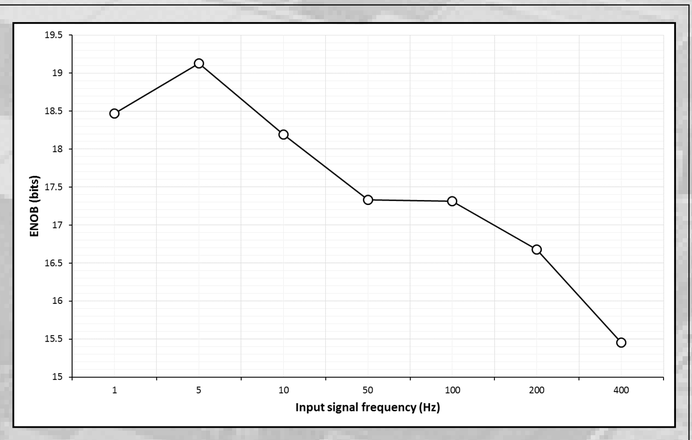


COM on generic carrier board with commercial DIO, ADC and DAC PCIe expansion boards



EPICS drivers written using asynDriver along proprietary boards drivers, both for inputs and outputs channels (digitals and analogs)



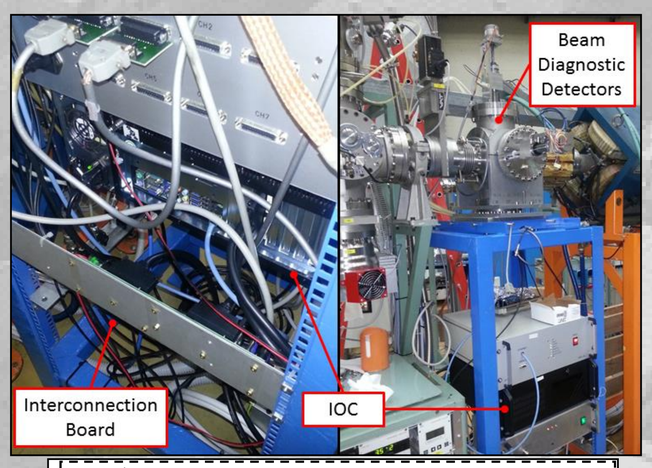


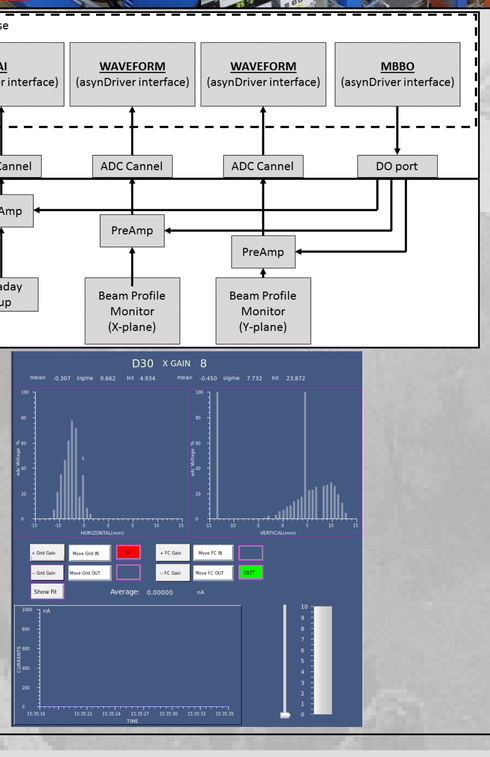
Performance test (CPU usage vs acquisition rate, and ENOB):

1. Up to 4.4KSample/s @ 99%; Good choice for LNL is 1KSample/s @ 20%; For most current application at LNL is enough tens Sample/s with negligible use of CPU
2. ENOB between 15.4bits (@ high acquisition rates) and 19 bits (@ low acquisition rates)

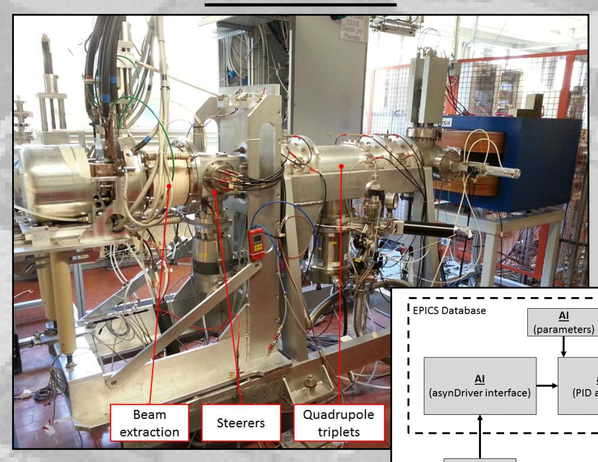
Control System Implementation at LNL using the Prototype IOC

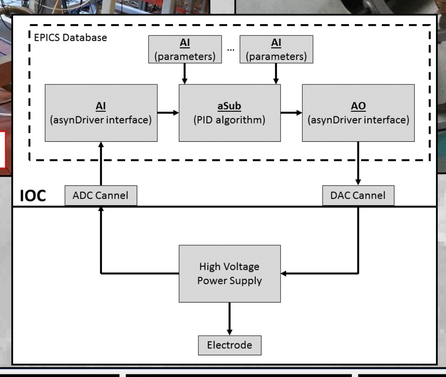
Beam diagnostic data acquisition



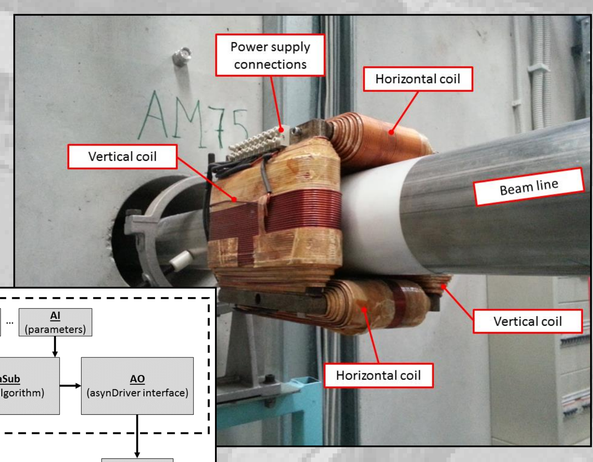


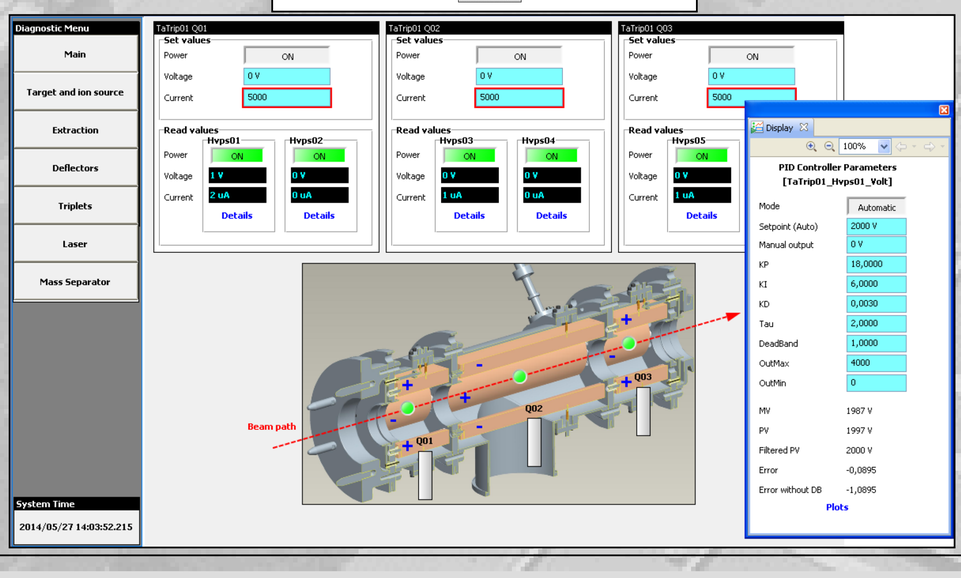
Electrostatic beam focalization and beam extraction



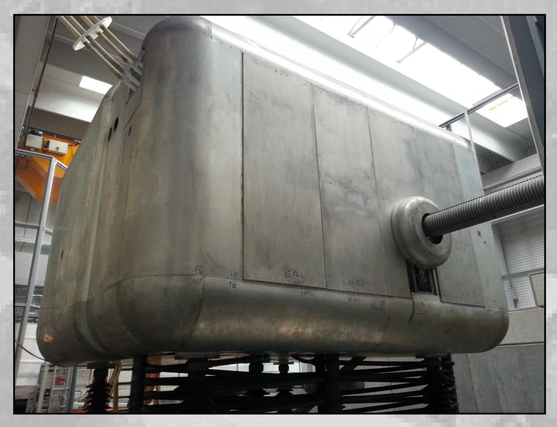


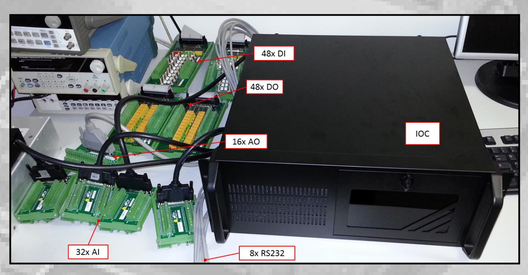
Magnetic beam steerer

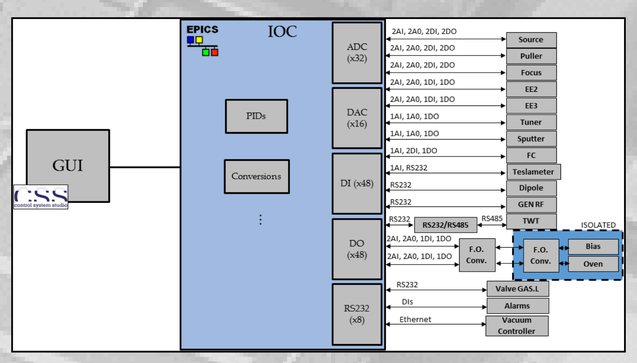




ECR negative beam source







Work in progress…

2015 ICALEPCS melbourne • australia

15th International Conference on Accelerator & Large Experimental Physics Control Systems
October 17-23, 2015. Melbourne, Australia.