

# New Controls for 8-ID

2006 User's Meetings Workshop 11  
Beamline Controls at the APS

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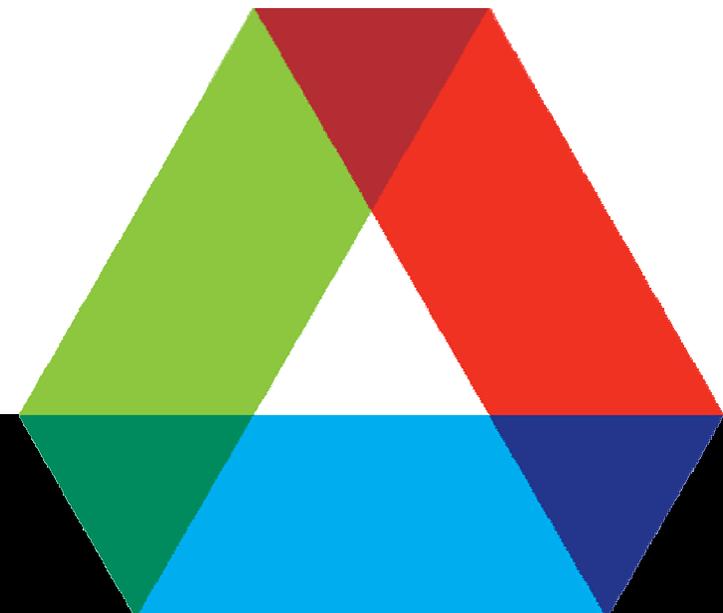


THE UNIVERSITY OF  
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# *New Controls for 8-ID*

## *Overview*

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- Goals
- Design Considerations
- Design Decisions
- Results
- Continuing Development
- Summary



# New Controls for 8-ID

## Goals

- No interruption of scheduled experiments
- Timely upgrade schedule
- Provide interoperability with **spec** (Experiment Control Language)
- Reuse 'in place' devices whenever possible
  - Motors and Stages (Tables, Slits)
  - Preamplifiers, Power Supplies, Temperature Controllers
  - Filters
- Improve reliability and maintainability
- Guard against obsolescence.
  - ISA BUS (1981 – 1997)
- Allow for incremental improvements and innovation

# *New Controls for 8-ID*

## *Design Considerations*

- **8-ID** Beamline Support Staff Responsibilities
  - Specify and select all control system devices (with **BCDA** consultation)
  - Make all decisions on Hutch layout and wire routing
  - Purchase and install control hardware and cabling
- **BCDA** Responsibilities
  - Primarily responsible for implementing the control system upgrade and maintaining it thereafter.
  - Recommend control hardware and supply **BCDA** ‘in-stock’ items.
  - Provide Electronic Technician support when needed.
- **BCDA** was already primarily responsible for upgrades and maintaining XOR Beamlines (1-4) with more to come.

## *New Controls for 8-ID*

### *Design Decision*

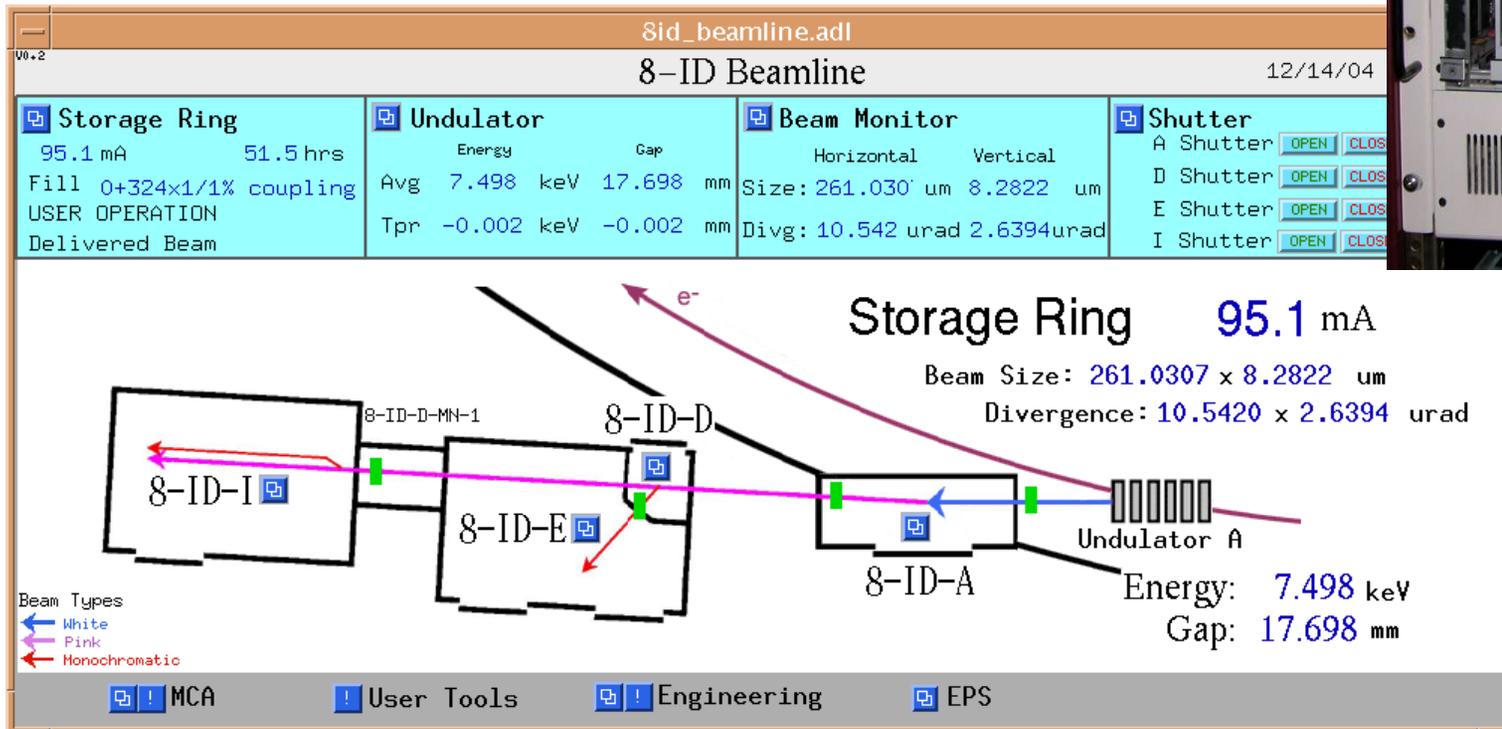
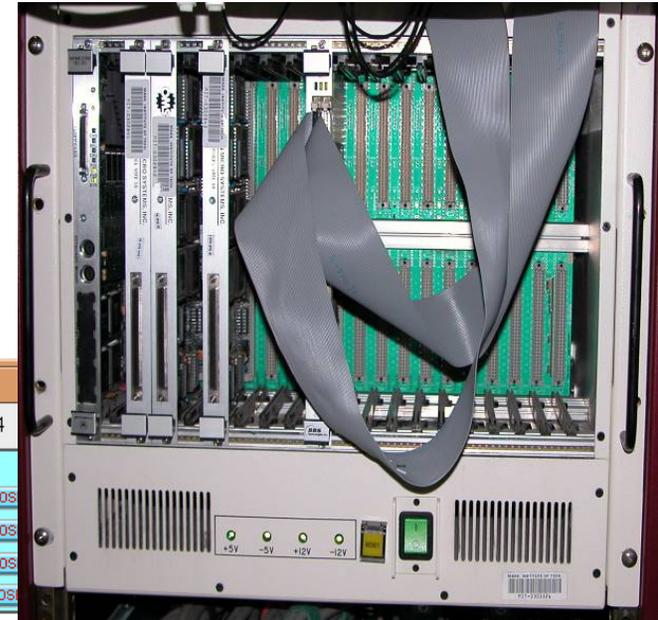
- Leverage **APS** wide (Beamline and Accelerator) control experience by using “standard” beamline control hardware and software.
  - **EPICS / synApps**
  - **VME64** Crates and Processors (MVME5100)
  - IndustryPack (IP) I/O Cards [Digital, A/D, D/A, Serial. GPIB]
  - OMS/Motor Controllers, Motor Drivers and Transition Modules
  - Joerger Scalers, AIM MCA
- ❖ Spend majority of development time integrating a few new devices and enhancing beamline capability.
- ❖ Minimize maintenance burden on **BCDA**



# New Controls for 8-ID

## Results – 8-ID

- Replaced five spec PC's with three EPICS IOC's
- Each Hutch (A,D,E,I) was fully converted over four consecutive shutdowns.
- spec – EPICS interface provided interoperability



# New Controls for 8-ID

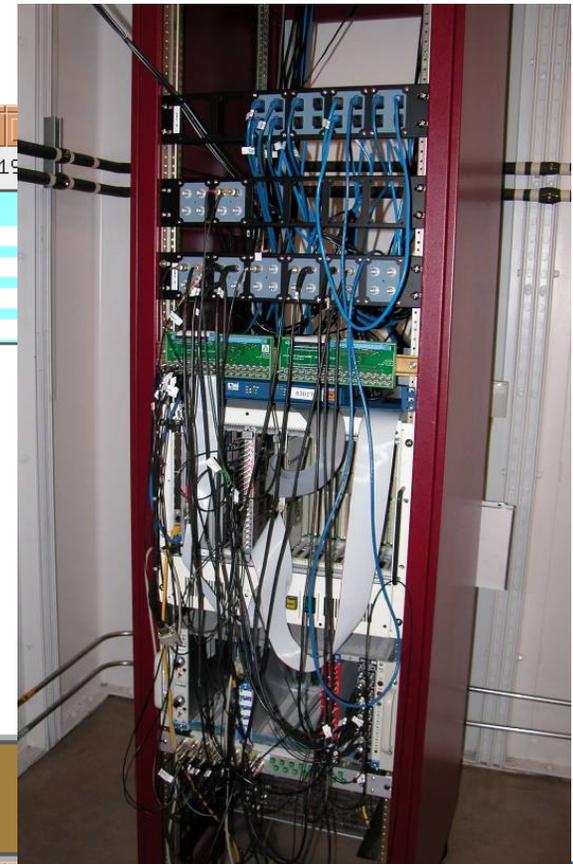
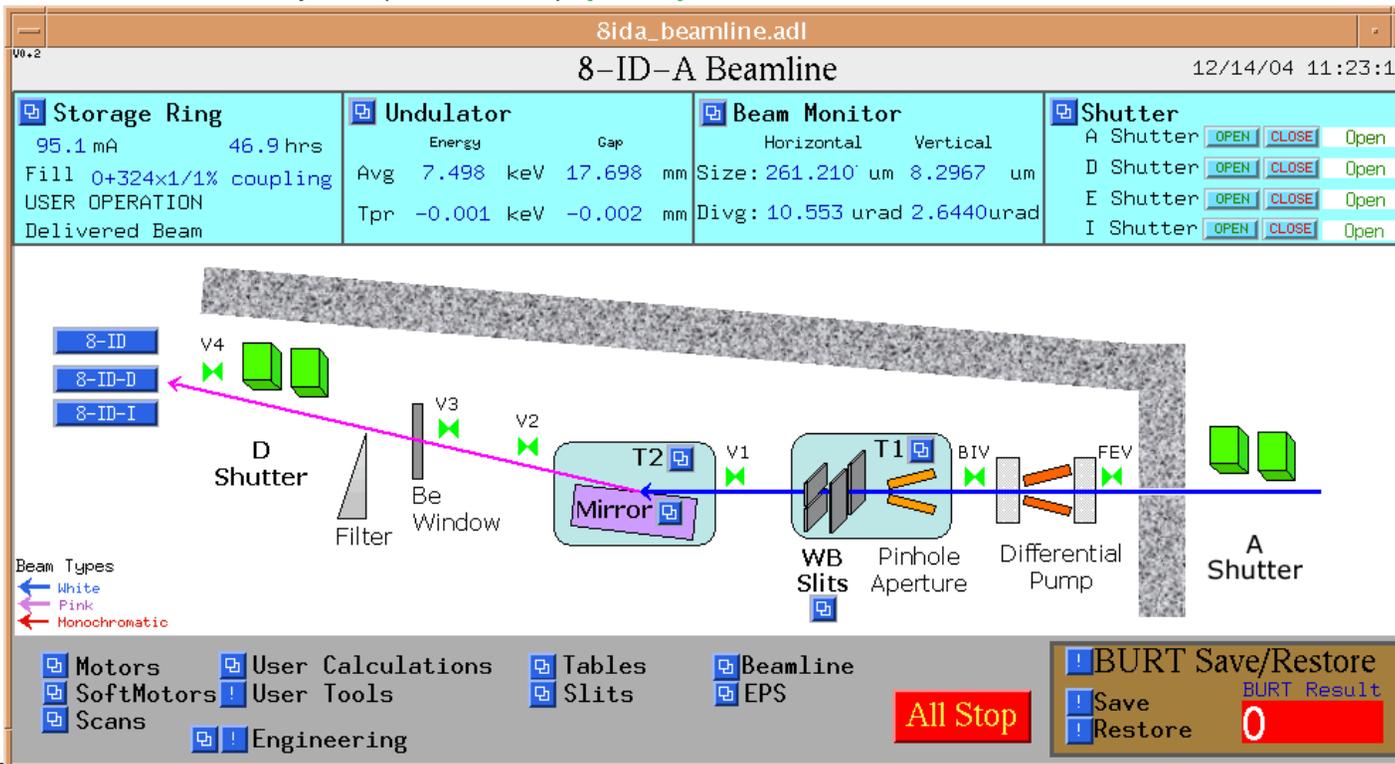
## Results - A & D Station

### 8-ID-A

- Stepper motors (24)
- BLEPS Interface (New)
- Optical Tables (2)
- Slit Stage
- Remote Shutter Control (New)
- Shutter Auto Open (A-shutter) (New)

### 8-ID-D

- Stepper motors (4)
- Monochromator Position Feedback (New)
- Machine Status Link (New)
- Bunch Clock Generator (New)



# New Controls for 8-ID

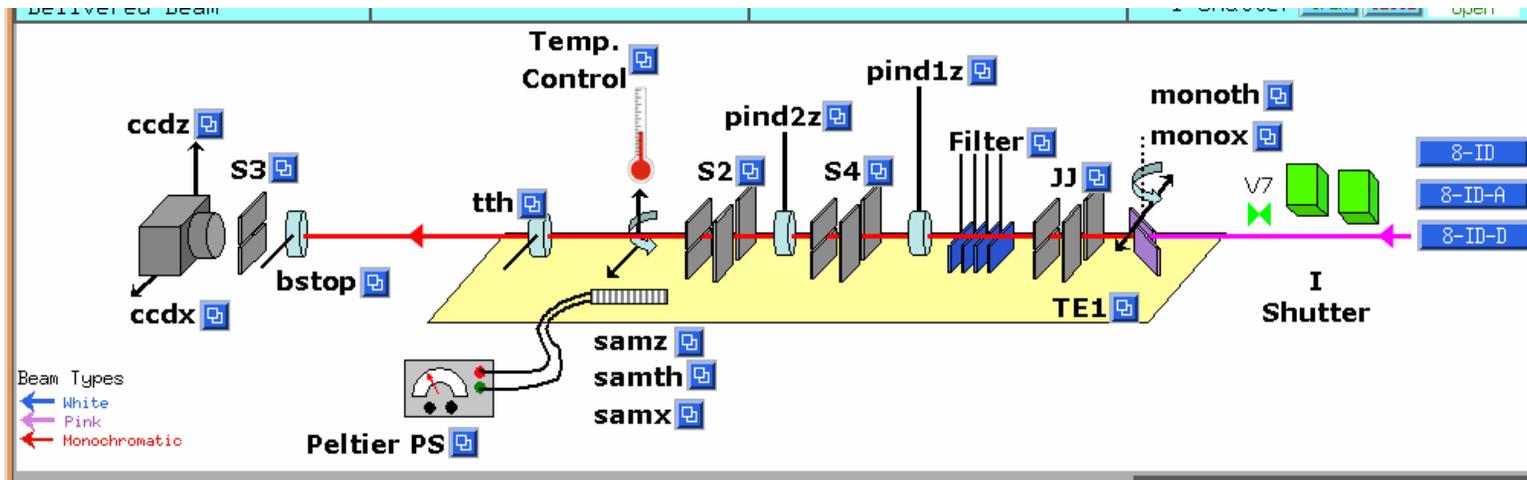
## Results - I & E Station

### 8-ID-I

- Stepper motors **(32)**
- Servo motor controllers **(2)** – 8 axis (RS232)
- Optical table
- Slit Stages **(4)**
- Filter Controller (digital)
- Current Preamplifiers **(4)** (RS232)
- Temperature Controller (RS232) **(New)**
- Programmable Power Supply (RS232) **(New)**
- Scaler (16 channel)
- Programmable D/A's – 8 channels **(New)**
- Programmable DIO – 24 channels **(New)**

### 8-ID-E

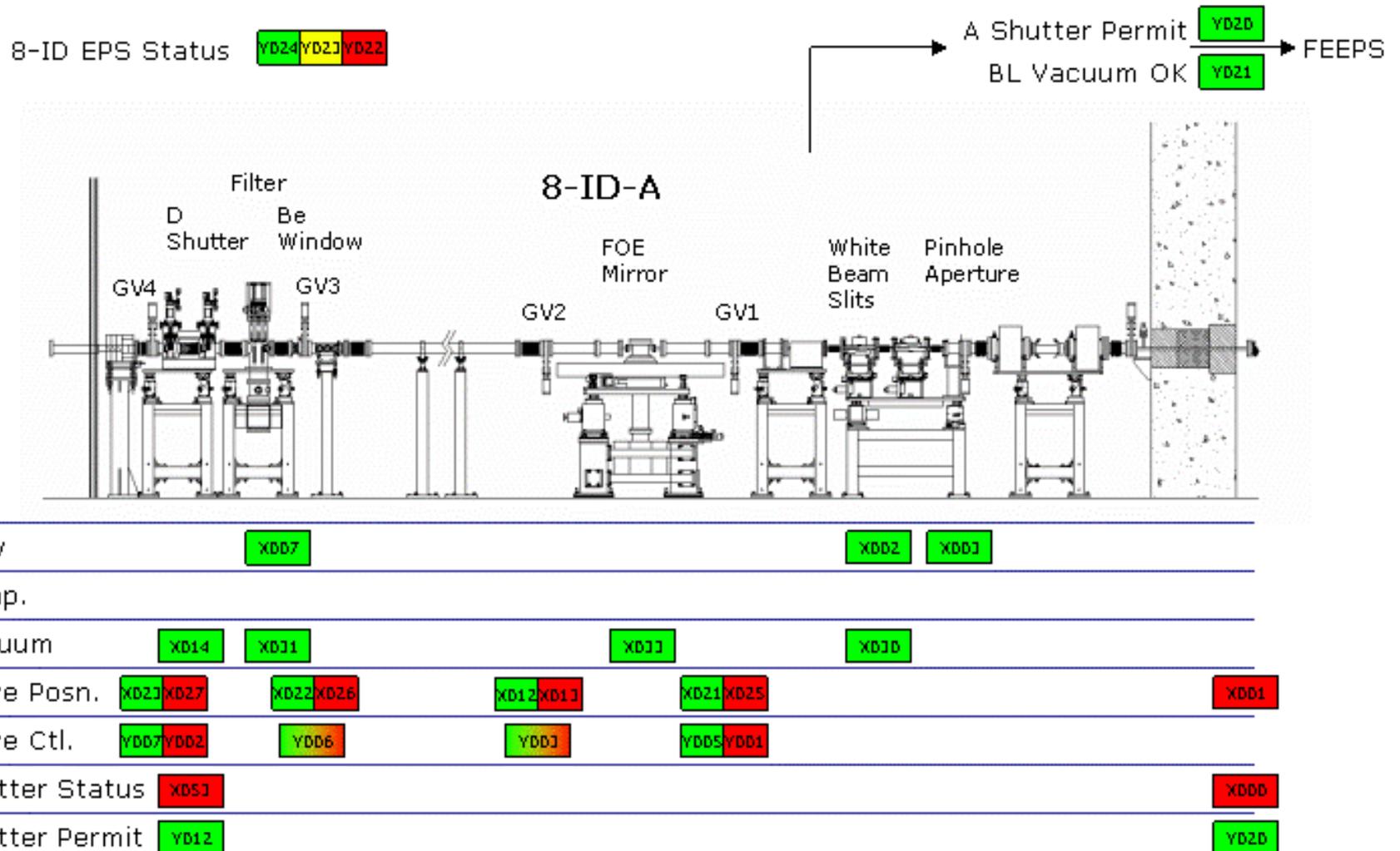
- Stepper motors **(16)**
- Servo motor controllers **(3)** – 12 axis (RS232)
- Pico Motor Stage (XYZ) **w/closed loop positioning**
- Optical table
- Slit Stages **(5)**
- Filter Controller (digital)
- Current Preamplifiers **(3)** (RS232)
- Programmable Electrometer – 10 channel **(New)**
- Scaler (16 channel)
- AIM MCA **(New)**
- Programmable DIO – 24 channels **(New)**



# New Controls for 8-ID

## Continuing Development

### ■ BL-EPS Status and Control Screen

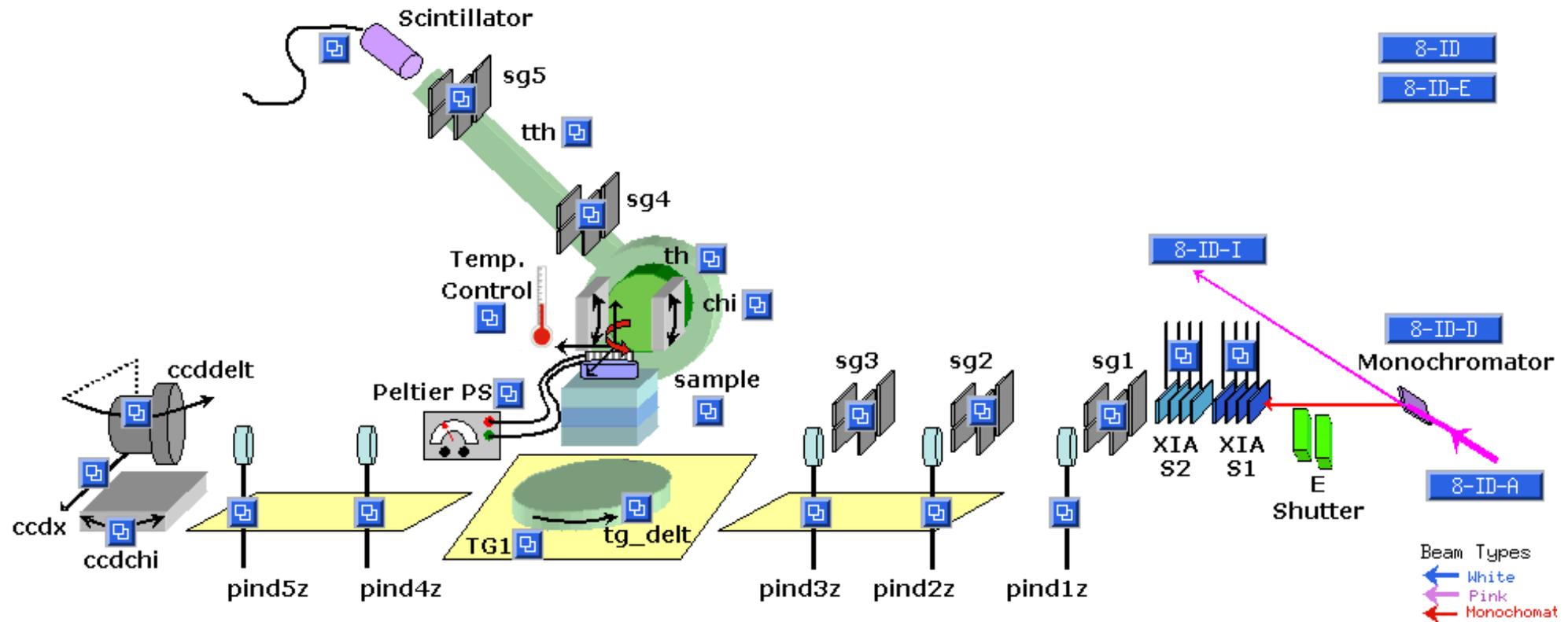


# New Controls for 8-ID

## Continuing Development

### ■ G-Station (added to E Hutch)

- 52 Motors
- 5 Slit Stages
- Oxford Cyberstar Detector



## *New Controls for 8-ID*

### *Continuing Development*

- 8-ID-A: Position feedback on optical tables and WB Slits
- Collaborated with Operation & Analysis Group (OAG) to provide web based data logging.  
[http://www.aps.anl.gov/Accelerator\\_Systems\\_Division/Operations\\_Analysis/logging/8ID.html](http://www.aps.anl.gov/Accelerator_Systems_Division/Operations_Analysis/logging/8ID.html)
- 8-ID-I: Addition of two optical tables
- Vacuum Ready Motors for Monochromator
  - ACS/Tech80 SPiiPlus Motor Controller – Nanomotion Stage
  - PI Piezo Servo Controller
  - NewFocus Pico Motor (Ethernet)

## *New Controls for 8-ID*

### *Summary*

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- BCDA has efficiently and effectively upgraded Beamline 8-ID's control scheme to a modern VME-based control system and provided many benefits to 8-ID such as greater automation, reliability and data acquisition rates.
- This successful conversion demonstrated that BCDA can effectively support and enhance the many new beamlines that the APS is charged with operating.

