EPICS as Standard for Controls and Monitoring Systems across Physics Division Halls

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EPICS in Jefferson Lab Physics Division

- **EPICS** is a collection of software tools and applications that make up a distributed control system
- **Control Systems Studio (CSS)** is most common GUI onsite
- **WEDM** and **WebOPI** used for off-site remote monitoring
- **EPICS ALH** (ALarm Handler) and **CSS BEAST** (Best Ever Alarm System Toolkit) used for alarm handling
- **PLC-to-EPICS communication** performed using Ethernet/IP drivers on an IOC or KEPServer (OPC server with IOC shell)

Security

- **Separate subnets** established by Computer Center isolate Hall networks
- **Two-factor login** through gateway required to get to any Hall subnet from CUE or external network
- **Authentication** required for web browser monitors
  - Web browser monitoring is read-only
- **Limit** users' and host computers' access to GUIs
- **Make** PVs or GUIs read-only
- **Require confirmation** for critical controls before writing to PVs
  - Magnet dump
  - Resets

Hall B

- **GUIs:** CSS
  - clascss environment for opening individual sessions for each user
- **Web Monitoring:** WebOPI
  - hallbopi.jlab.org
- **Alarm Handler:** CSS BEAST
- **PLC-EPICS interface:** Ethernet/IP driver on IOC
- **System Maintainer:** Nathan Baltzell

Hall D

- **GUIs:** CSS
  - CSS environment set up to open CSS workspaces that have a menu option for all systems
- **Web Monitor:** WEDM
- **Alarm Handler:** CSS BEAST
- **PLC-EPICS interface:** Ethernet/IP driver on IOC
- **System Maintainer:** Hovanes Egiyan

Hall C Proposal

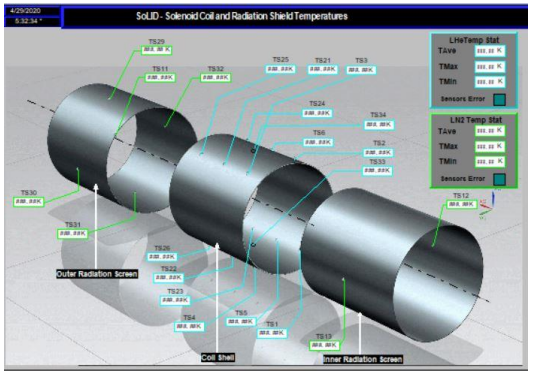
- **GUIs:** CSS, Tcl/Tk, HMI
  - CSS screens are used for detector HV controls
  - DSG is converting PLC HMI screens to CSS screens
  - Tcl/Tk still used by some users as swap to CSS is ongoing
  - HMIs used for all magnet controls
- **Web Monitor:** WEDM
- **Alarm Handler:** EPICS ALH
- **PLC-EPICS interface:** KEPServer
- **Proposed System Maintainer:** Peter Bonneau
  - **Advisor:** Steve Wood

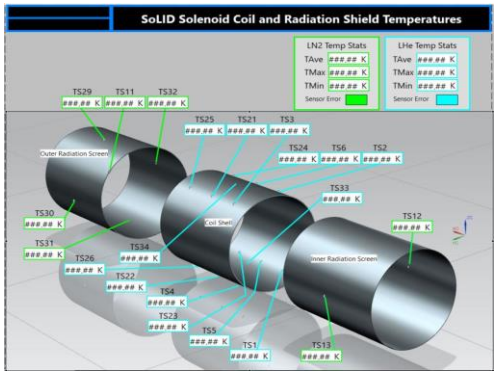
Hall A Proposal

- **GUI:** CSS
- **Web Monitor:** WEDM or WebOPI
  - Investigate latest that allows CSS screens to be directly used
- **Alarm Handler:** CSS BEAST
- **Proposed System Maintainer**: Peter Bonneau
  - **Advisor:** Steve Wood

Conclusion

- **Goal** is to standardize EPICS across Physics Division
- **Security concerns** addressed by limiting full access to specific host computers and users
- **DSG** is developing Hall A SoLID PLC code with HMIs and CSS and EPICS in parallel





HMI CSS

SoLID Solenoid Radiation Shield Temperatures

- **DSG Staff**: Mary Ann Antonioli, Aaron Brown, Peter Bonneau, Pablo Campero, Brian Eng, and Tyler Lemon
- **Peter Bonneau** proposed system maintainer for Hall A and Hall C

Backup

- **IOC Server**
  - Will run EPICS base and support software
  - OS: Red Hat Enterprise Linux 7 (RHEL7)
- **KEPServer**
  - Currently used by Hall C for PLC-to-EPICS communication
  - PLC tags are read by KEPServer (an OPC server) and then published to EPICS through an IOC Shell