

Neutron Day

Data and Instrument Software

Steven Hartman

Group Leader

Instrument Data Acquisition
and Controls

Oak Ridge, Tennessee

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IDAC Group is responsible for

- Designing, building and maintaining custom electronics for acquiring neutron scattering data from detector systems
- Developing and supporting software for acquiring, processing and managing data
- Developing and supporting software for beam line control, experiment automation and data collection
- Building and maintaining the computing, data storage and network infrastructure for data acquisition, data analysis and remote access.

RAD Instrument DAQ & Controls Group (IDAC)

- DAQ Hardware

- Miljko Bobrek
- Steve Hicks
- Rob Knudson
- Vlad Sedov

- Instrument Controls

- Gayle Green
- Carl Lionberger
- Matt Pearson
- Mariano Ruiz-Rodriguez
- Tara Watkins

- DAQ Software

- Greg Guyotte
- Jeeem Kohl
- Klemen Vodipivec
- Marie Yao

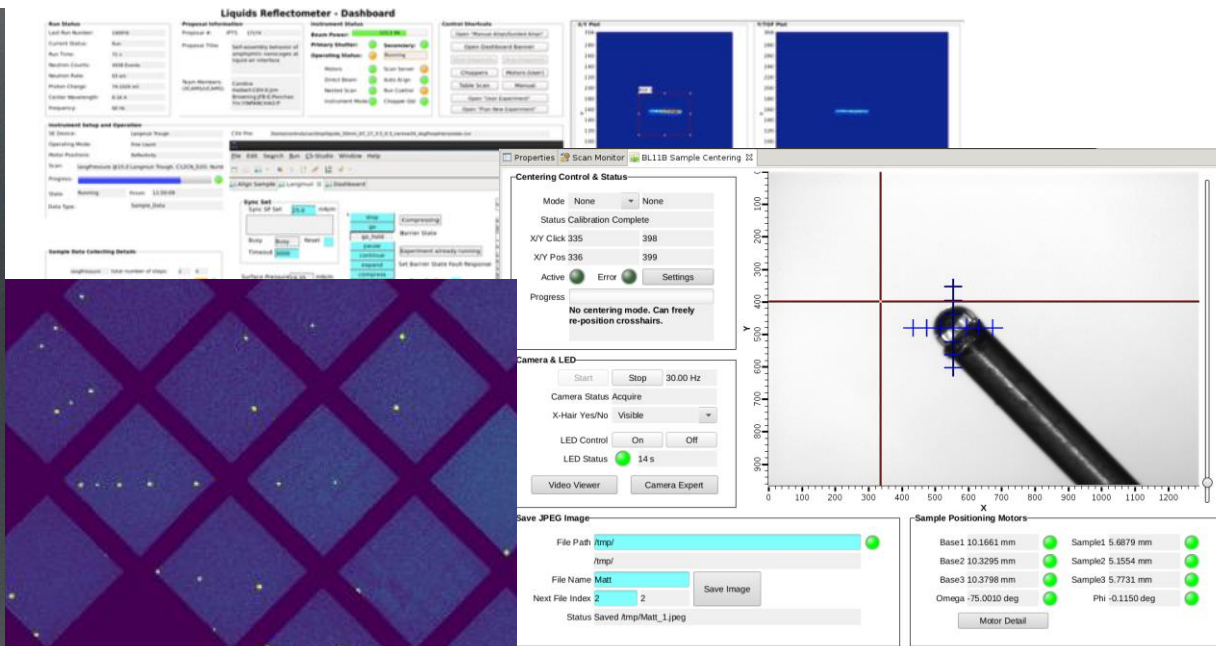
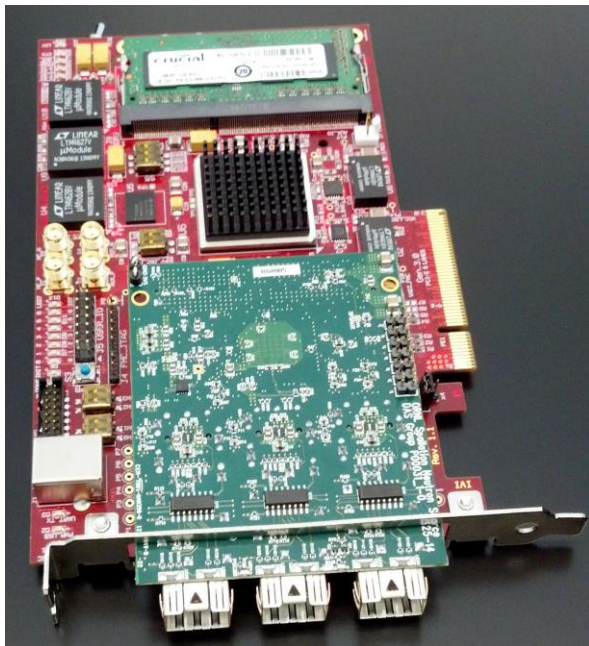
- Computing Infrastructure

- Matt Bedynek
- Caleb Cooper
- Rich Crompton
- Katie Palmer

We collaborate with instrument scientists, scientific associates, RAD, ISD and NDAV staff to produce robust software and hardware solutions that serve NScD scientific priorities.

We have made substantial progress for the instruments in the past five years

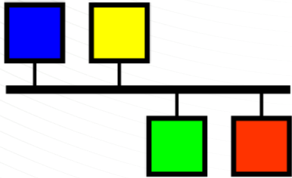
Software, firmware and hardware components for a complete upgrade to the data acquisition system have been deployed to most of the SNS instruments. All of the SNS instruments will be using the new system within two years. HFIR instruments are now being prioritized and scheduled.



Motor	Position	Status
Base1	10.1661 mm	Sample1 5.6879 mm
Base2	10.3295 mm	Sample2 5.1554 mm
Base3	10.3798 mm	Sample3 5.7731 mm
Omega	-75.0010 deg	Phi -0.1150 deg

We use standard tools to solve instrument data collection and computing needs

EPICS



Software tool kit for instrument controls, including sample environments, motion control, choppers, vacuum systems, detectors.



Integrated framework for building user-interfaces and enabling experiment automation



nED and areaDetector for counting criteria and online visualization with adara for file creation

FPGA-based electronics for real-time data acquisition

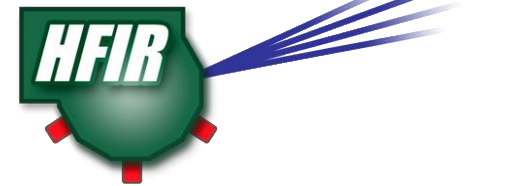


Linux computing infrastructure for data acquisition, data reduction and data analysis

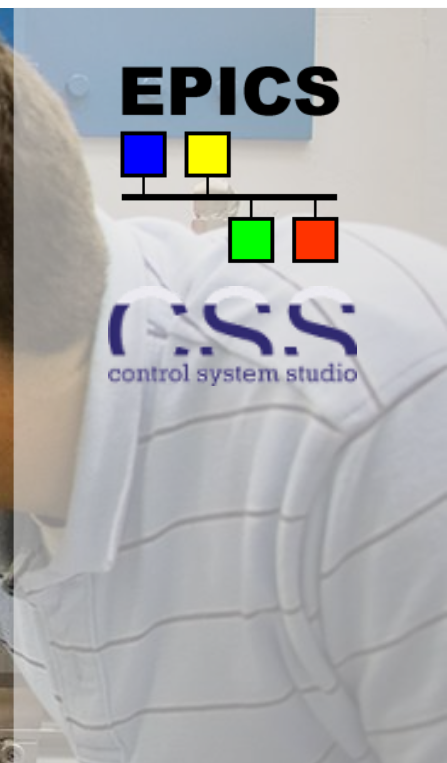
Upgrades Completed to Date



IMAGING Neutron Imaging Facility



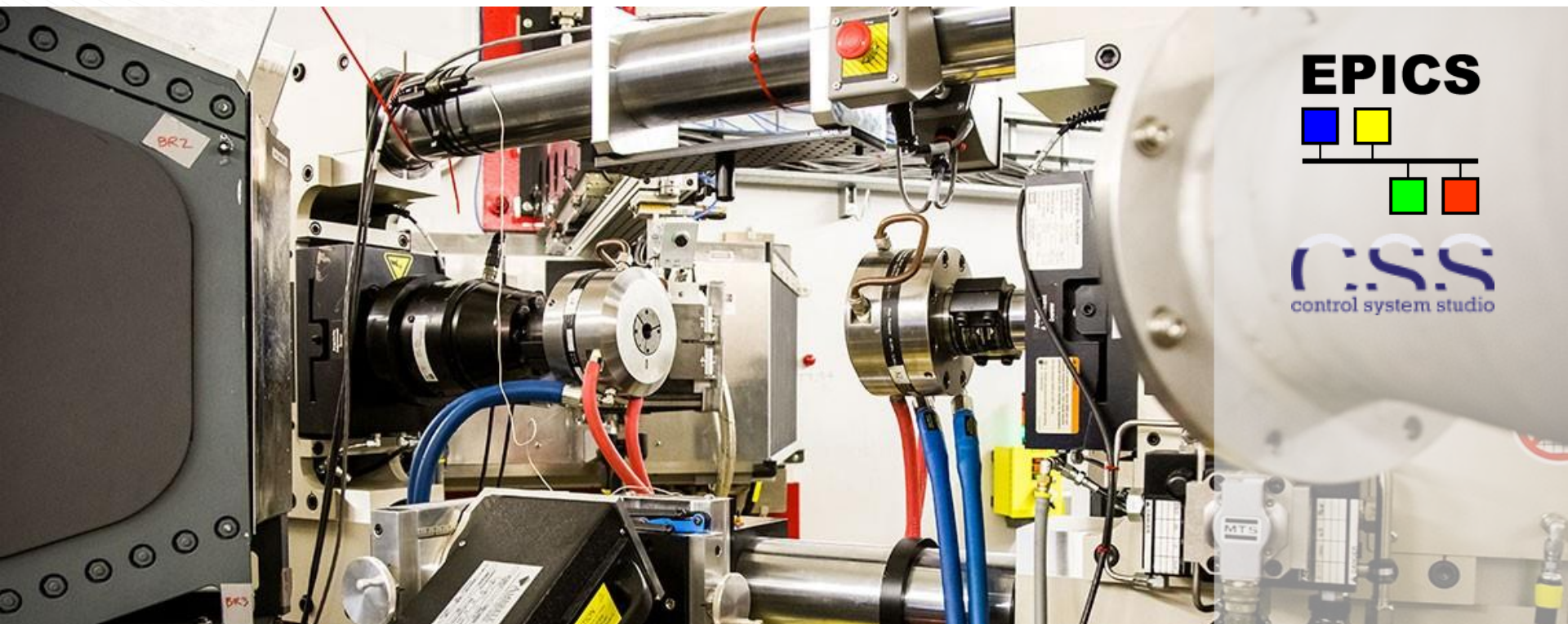
Automation and workflows for tomography scans



VULCAN (Part 1) Engineering Materials Diffractometer



Integration with specialized sample environments



CORELLI Elastic Diffuse Scattering Spectrometer



Integration of a low temperature and magnetic field sample environments



USANS Ultra-Small-Angle Neutron Scattering Instrument



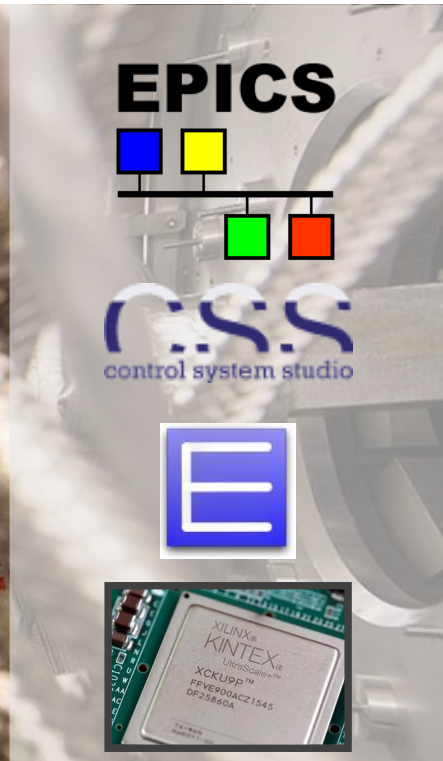
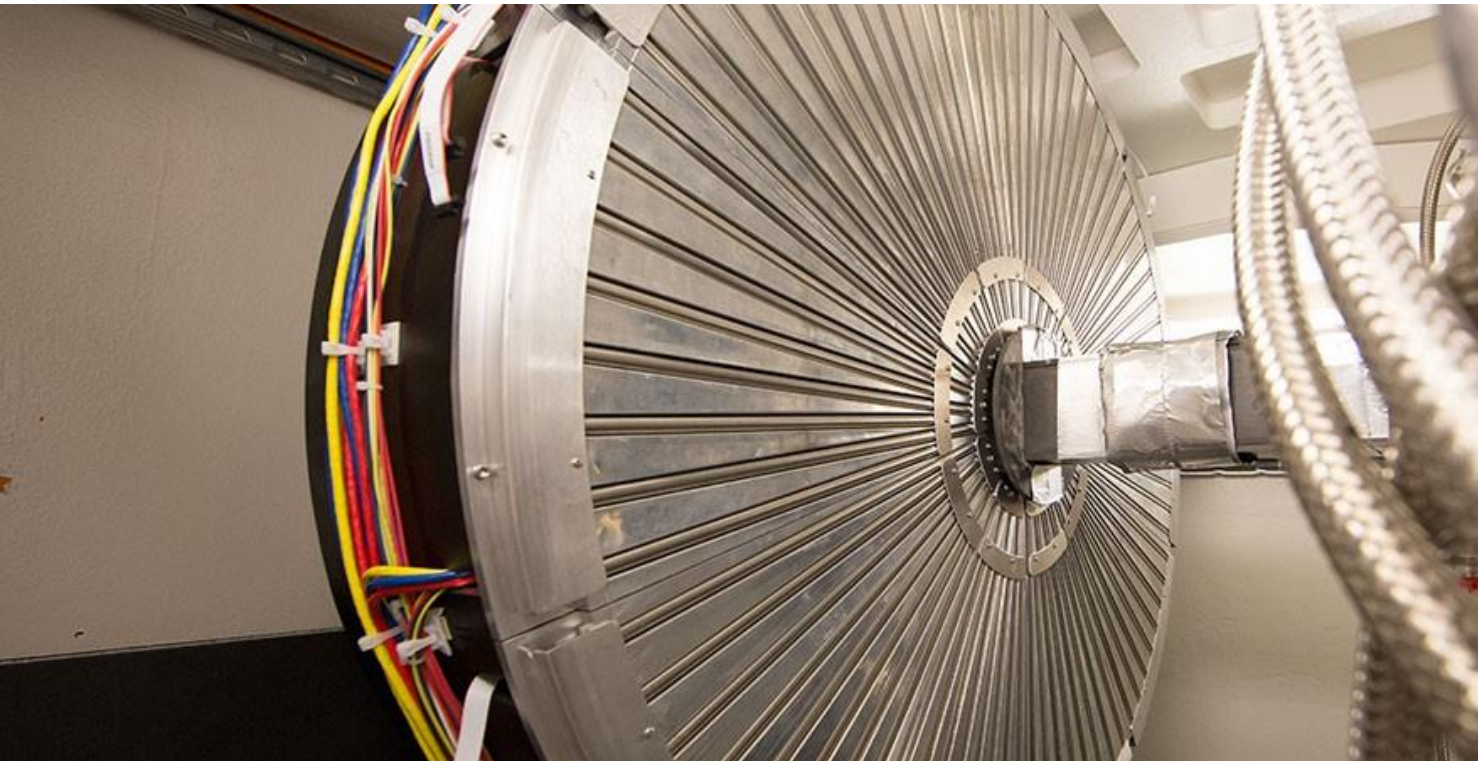
Table-based configuration for data collection and reduction



VISION Vibrational Spectrometer



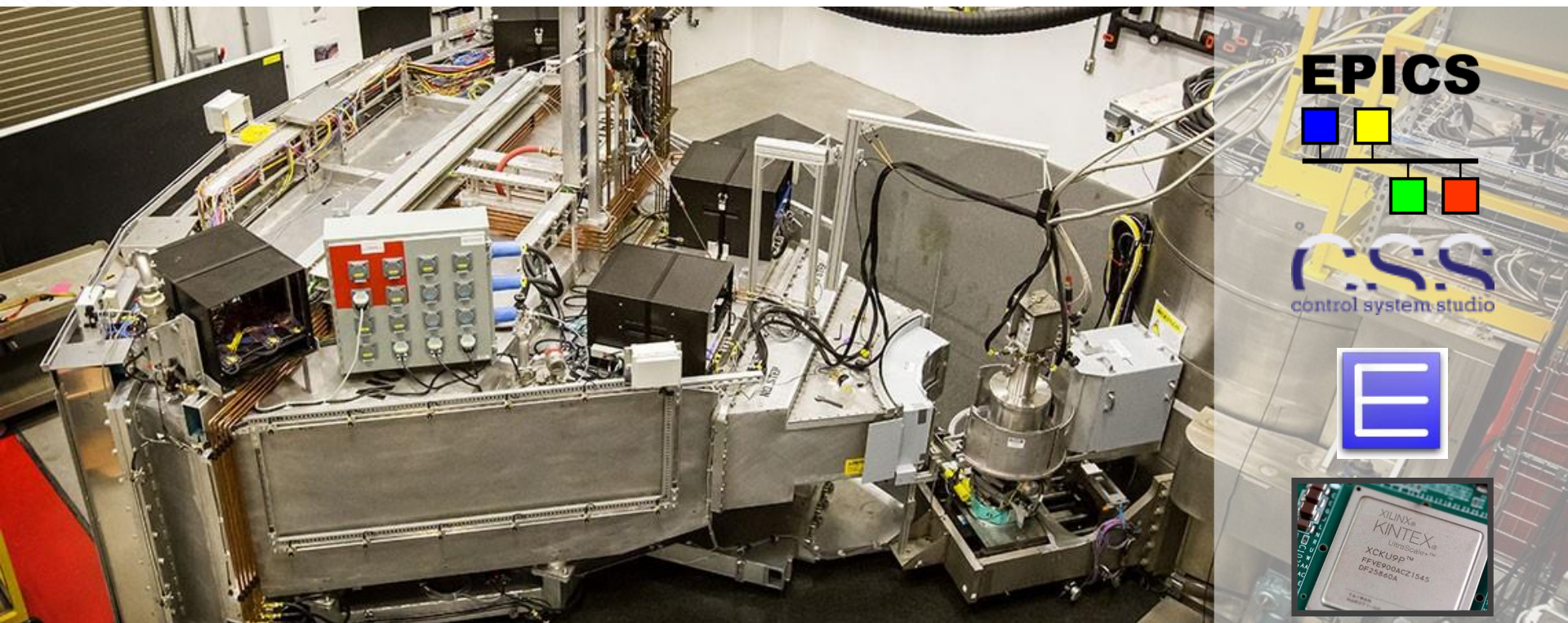
New software and firmware for very high data rates



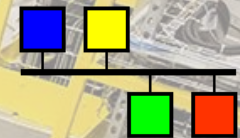
HYSPEC Hybrid Spectrometer



Integrated motion control and incident energy selection



EPICS



CSS
control system studio



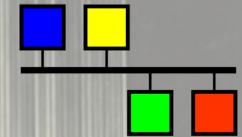
SEQUOIA Fine-Resolution Fermi Chopper Spectrometer



Planning tools and calculators for experiment setup



EPICS



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control system studio



LR Liquids Reflectometer



Guided user experiment workflows and enhanced automation for alignment and data collection



POWGEN Powder Diffractometer



Integrated ITEMS sample info for automated reduction



NOMAD Nanoscale-Ordered Materials Diffractometer

Improved stability at high data rates



EPICS



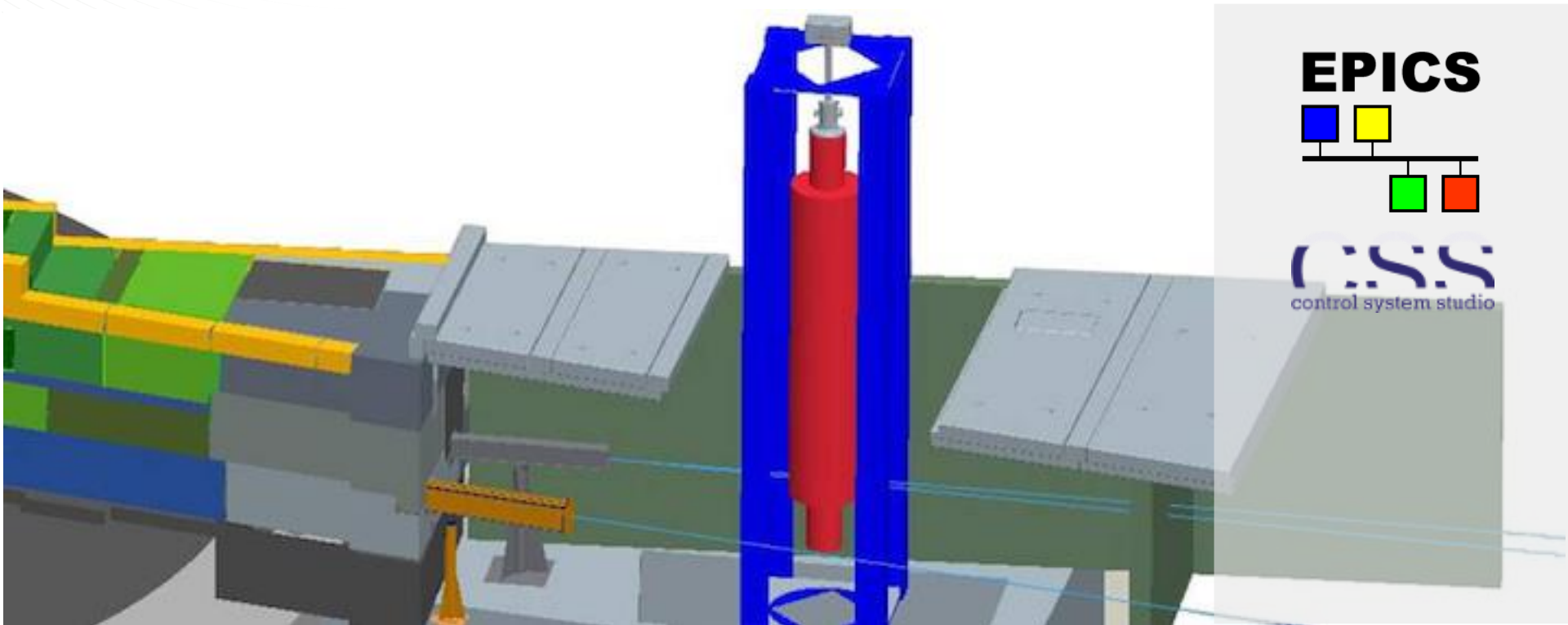
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control system studio



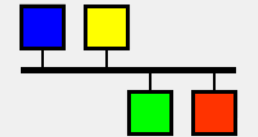
FNPB Fundamental Neutron Physics



Standardized chopper and motion controls



EPICS

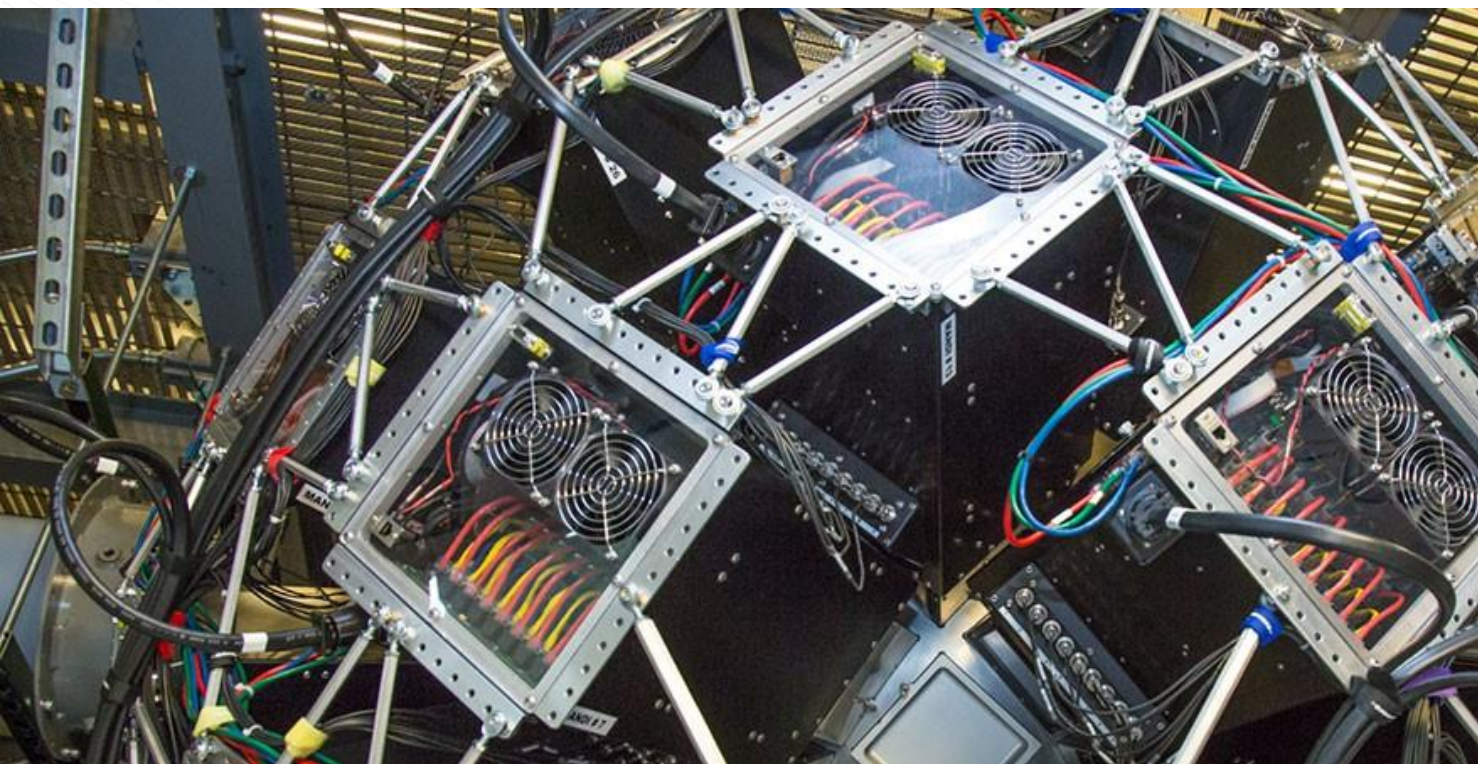


CSS
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MANDI Macromolecular Neutron Diffractometer



Click-to-center sample alignment



EPICS



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Next Upgrades Scheduled: Summer 2017



EQ-SANS

Extended Q-Range Small-Angle
Neutron Scattering Diffractometer

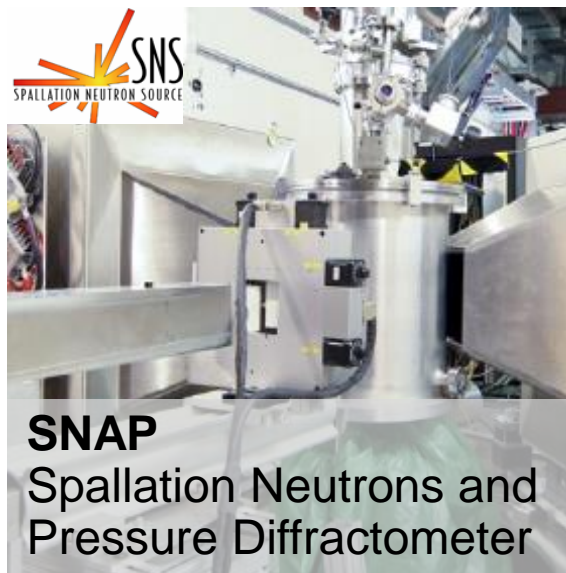
CNCS

Cold Neutron Chopper
Spectrometer



VULCAN (part 2)
Engineering Materials
Diffractometer

Next Upgrades Scheduled: Winter/Spring 2018



Future upgrades are scheduled in consideration of science priorities and implementation efficiencies.

Priorities Going Forward

- Detector electronics for better performance and reliability
- Science-oriented user interfaces
- Suite-based planning tools and calculators
- Enhanced automation and experiment workflows
- Integration with data reduction and analysis
- Computing and data storage infrastructure and data management

Learn more at the lunch break-out session.

For more information

Contact:

Steven Hartman

hartmansm@ornl.gov

865-466-6473

