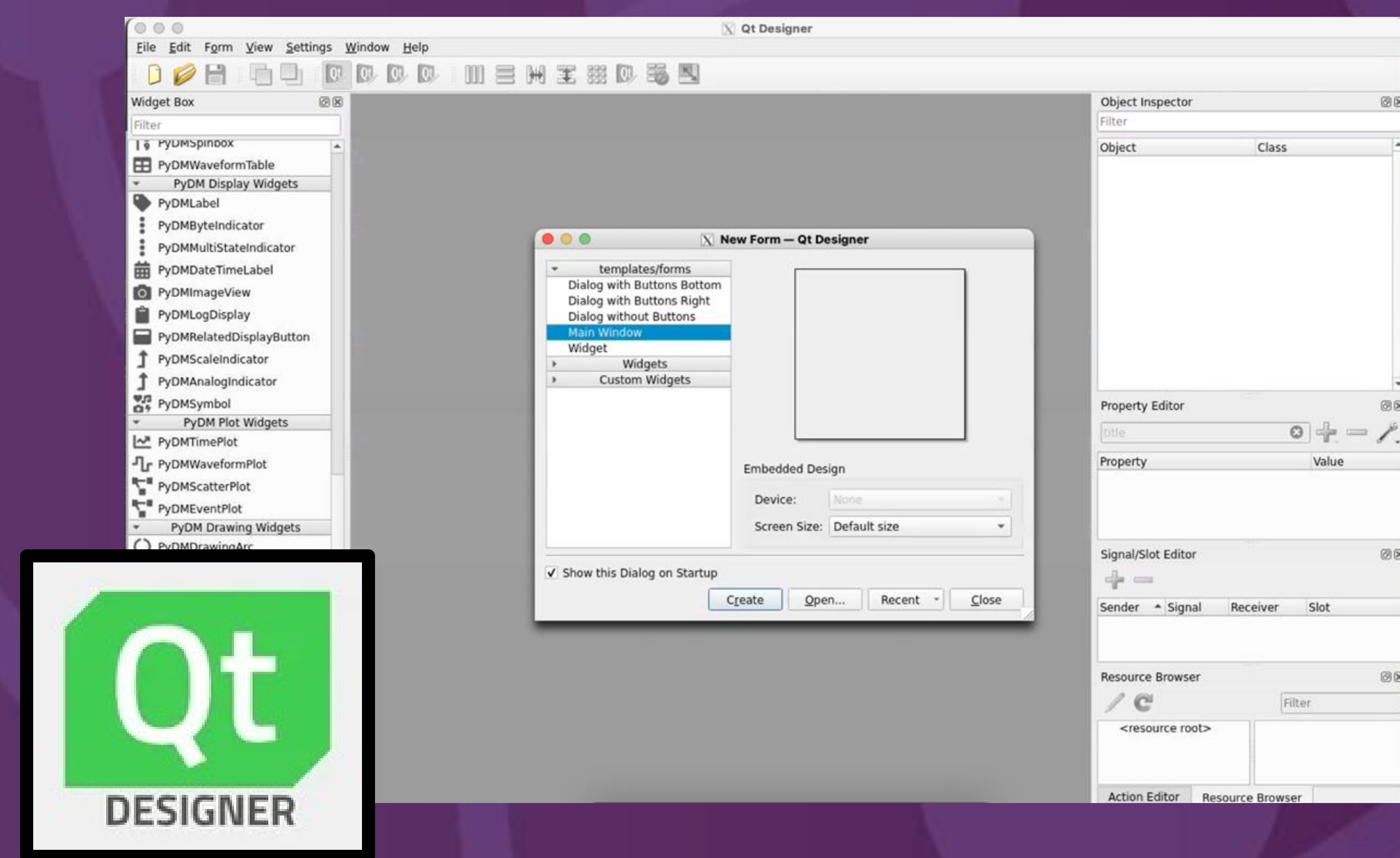


Developing GUIs for Monitoring and Controlling the X-Ray Correlation Spectroscopy Split and Delay System

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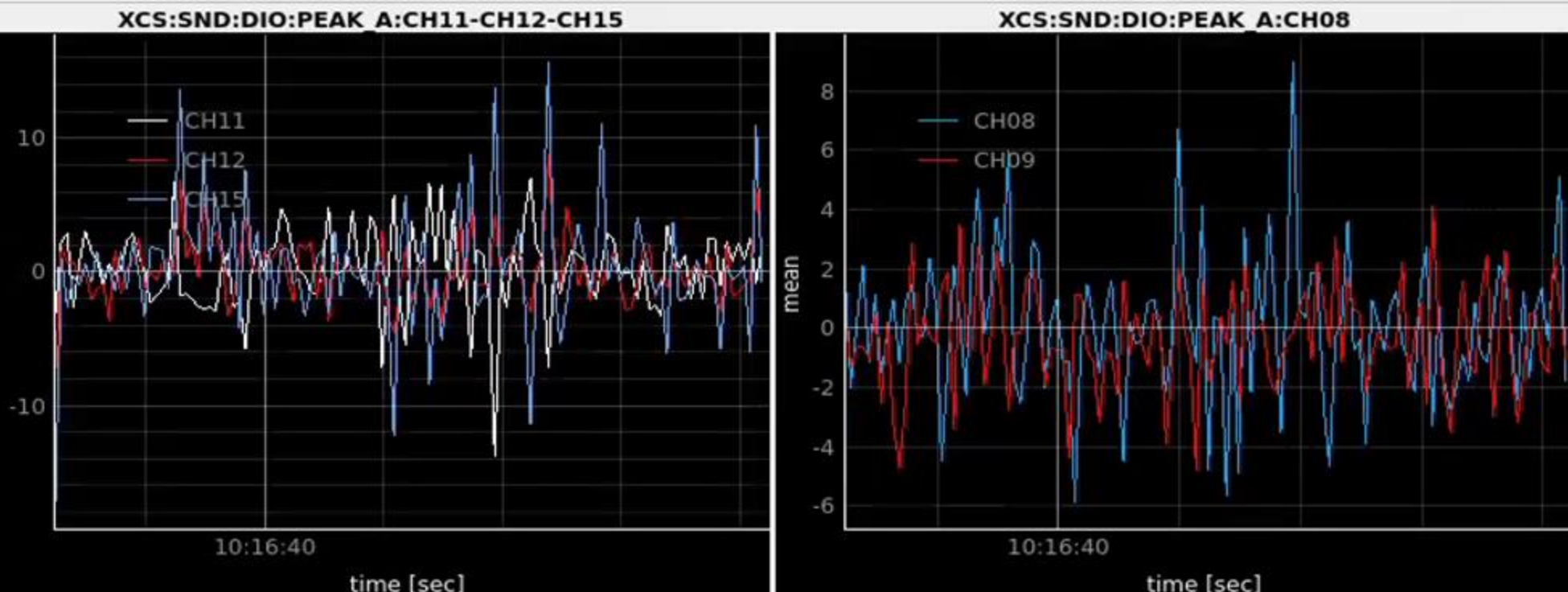
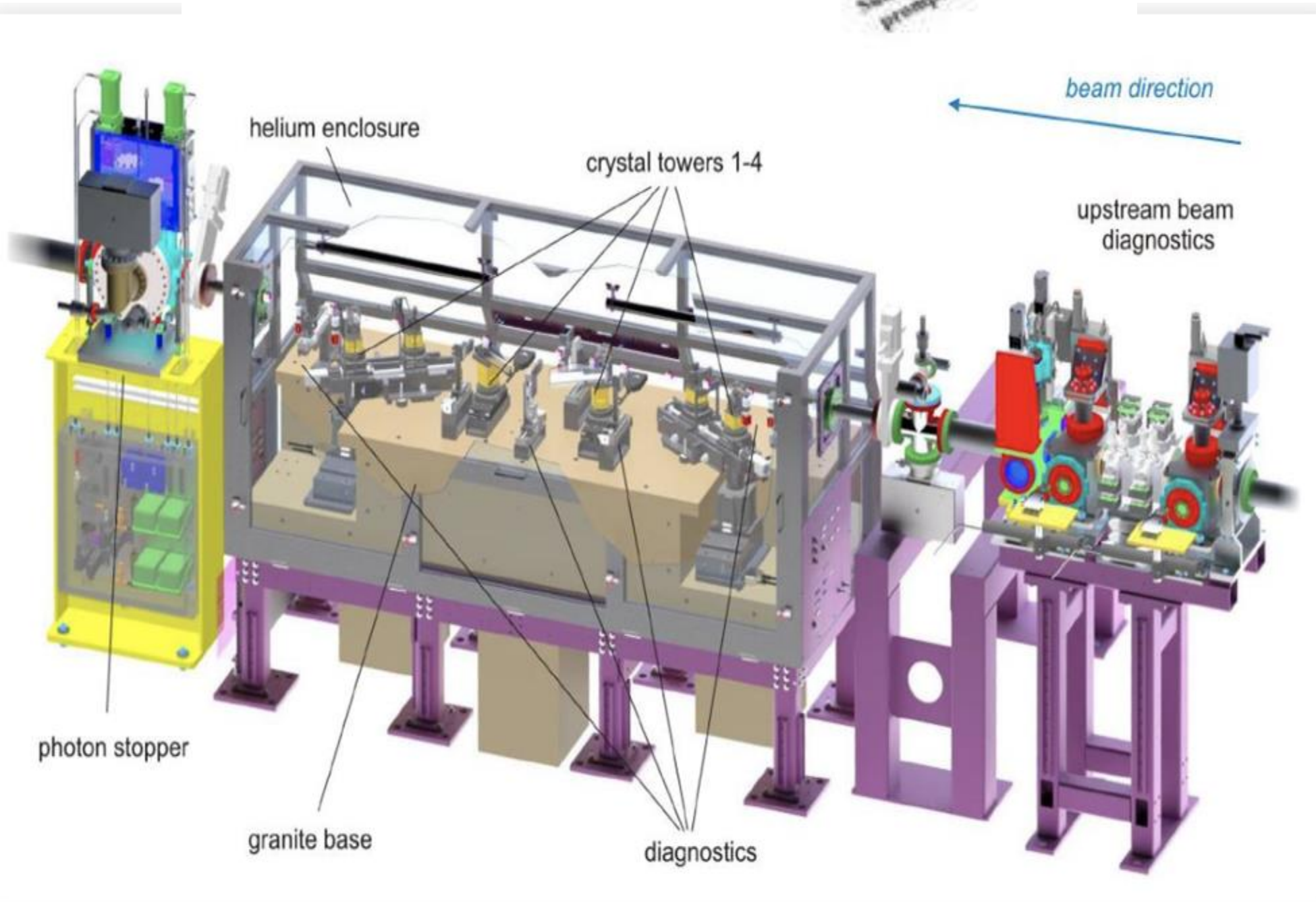
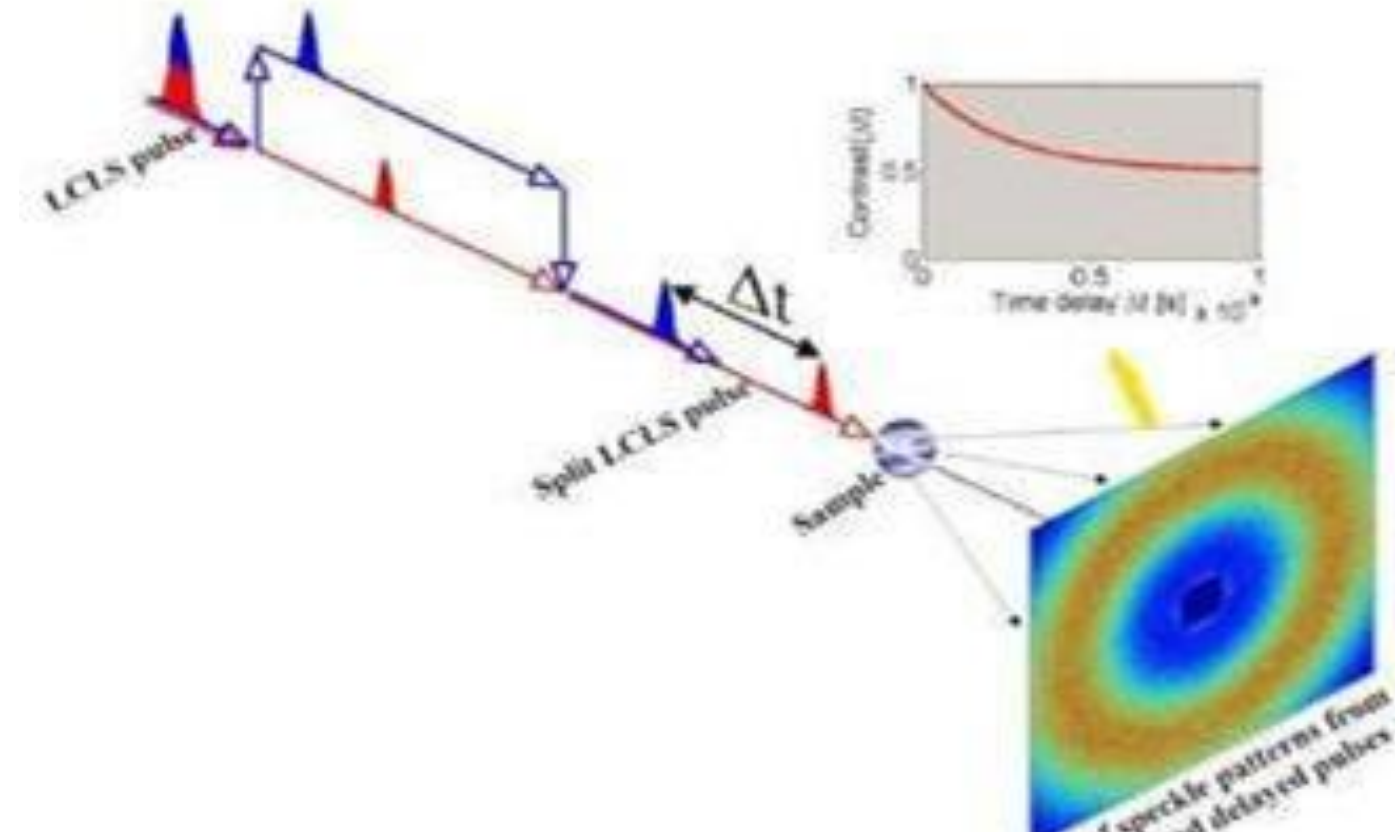
1. UC Davis 2. SLAC National Accelerator Laboratory, USA.



Background

Split and Delay (SnD) mode of the XCS instrument probes dynamics of matter on timescales of 100 femtoseconds to several nanoseconds.

- Splits laser beam into two with a time difference of a few femtoseconds to a few hundred picoseconds
- Pulses travel through an arrangement of crystal diffractors on rotating stages
- Once the two pulses converge on the sample, a double exposure image is captured and analyzed
- Diodes positioned along the path measure the intensity of the incoming beam

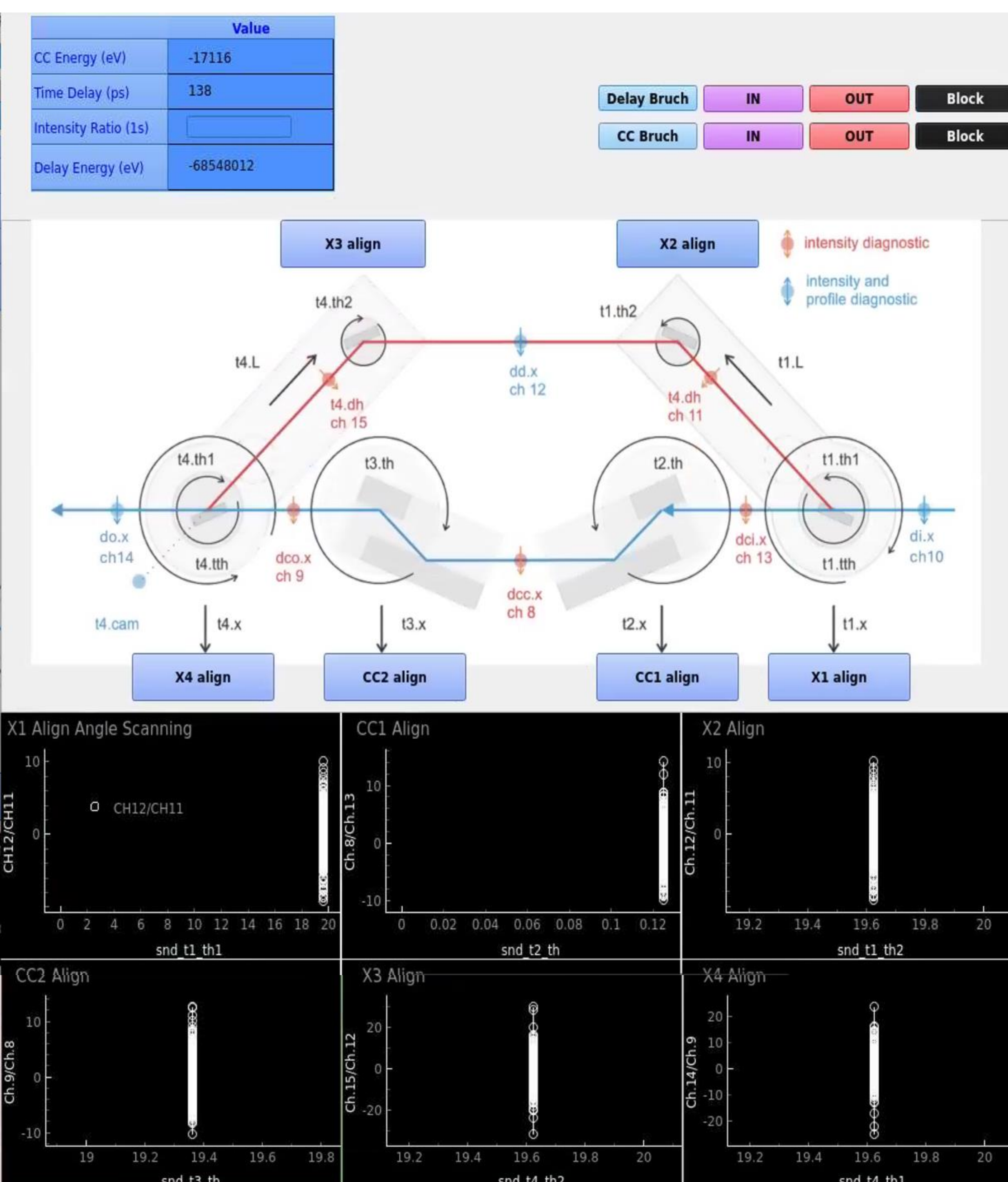


MainWindow - New Form.ui

Methodology-Graphical User Interface

Using Qt Designer, I created a user-friendly monitor screen with plots as well as a motor control screen

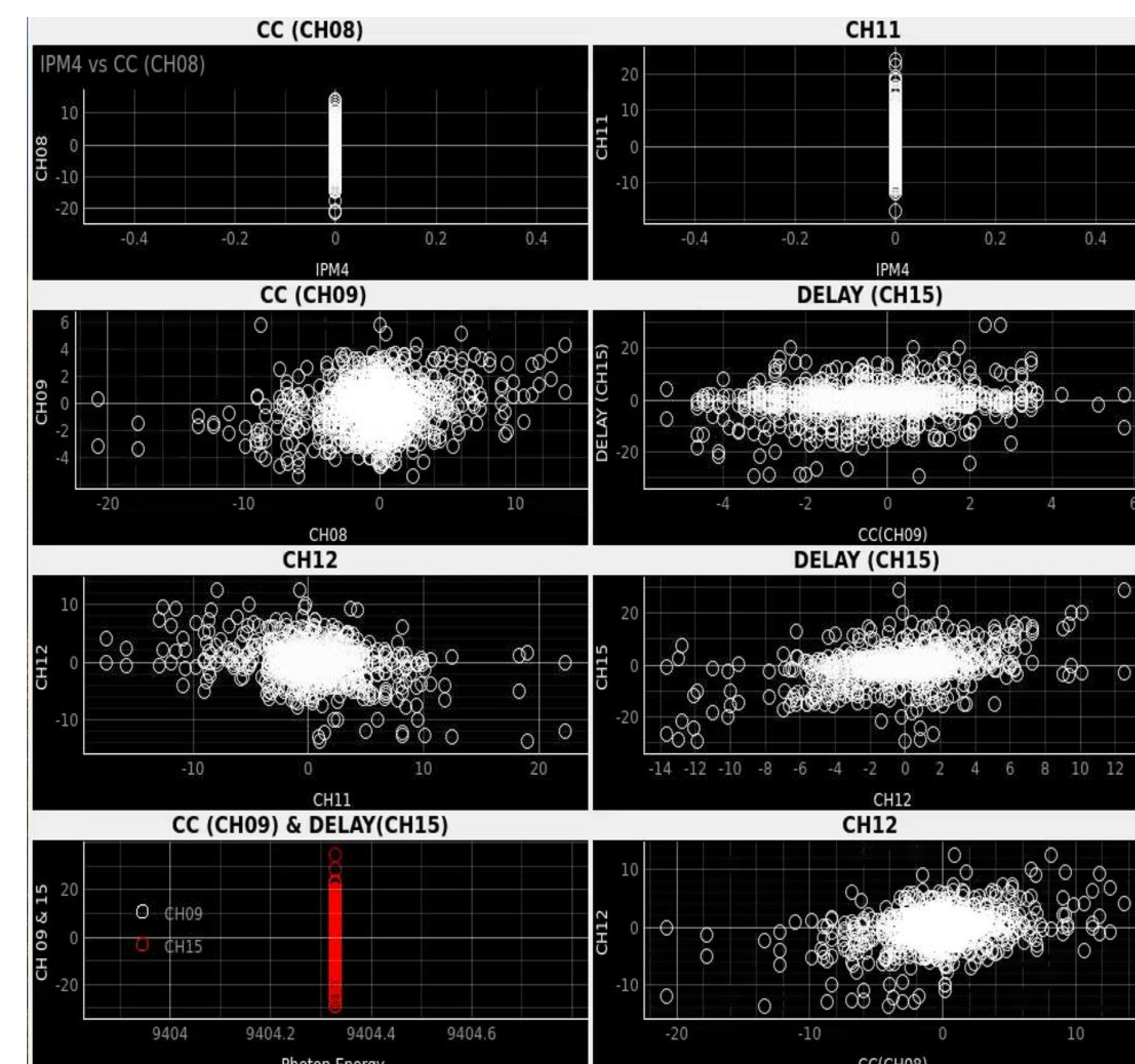
- Screens designed using PyDM and Qt widgets.
- Channels connect to XCS Process Variables via EPICS
- “Align” buttons rotate stages for precise crystal alignment
- Energy levels plotted against theta values
- “Block” buttons control shutters in/out of the beam path
- Consulted scientist to tailor GUI to specific needs



Future and Use

Major application for scientists and controls engineers:

- Streamlined split and delay monitoring, with multiple diode plots all in one view
- Automated angle-scanning feature at the push of a button will grant unprecedented convenience and efficiency



- Plots show the energy intensity ratio between diodes for insights into beam alignment and energy level trends

Experience and Further Thoughts

- Qt Designer was excellent for design and layout creation. Custom scripting for advanced functionalities like component movement and external DAQ scanning is our next step.
- Spending time on monitors in the hutch control room enhanced the internship experience, being around the XCS/SnD instrumentation and the staff

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