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CXLS inverse Compton scattering interaction point chamber

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The Inverse Compton Scattering Interaction Point (ICS-IP) vacuum chamber provides a UHV environment where the electron and IR laser beams are overlapped in space and time to generate hard X-rays between 4 and 20 keV. The chamber has over two dozen motorized stages that position YAG screens with ~ 10 nm precision utilizing the EPICS framework for instrumentation interface. Using agile programming methods, MATLAB GUIs were created to control all the motors inside the chamber. Each YAG screen has a linear array of holes ranging between 10 microns and 2 mm that are imaged by cameras mounted on top of the chamber. Programmable focus lenses and IR mirrors are positioned to focus the IR laser at the interaction point. An X-ray optic is mounted onto a six degree of freedom nano-positioner enabling capture and collimation of X-rays coming from the IP. The X-ray optic can also be extracted from the beam path to transport the freely diverging X-rays to the experiment hutch for imaging experiments. We present the systems integration of the chamber, diagnostics elements, and control software and comment on its performance during instrument commissioning.

Footnotes

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