

Novel Chamber Design for An In-Vacuum Cryo-Cooled Mini-Gap Undulator

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Abstract

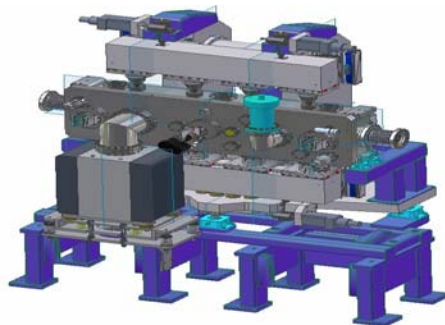
A stainless steel, Ultra-High Vacuum (UHV) chamber, featuring a large vertical rectangular (53"W by 16"H) port, has been fabricated to house the one meter magnet assembly of a newly installed undulator insertion device for beamline X-25 at the National Synchrotron Light Source. To achieve UHV the new chamber is equipped with; a differential ion pump, NEG pump, nude ion gauge, residual gas analyzer, and an all metal roughing valve. Temperature of the magnet assembly is maintained below 90°C during vacuum bake.

The large rectangular port cover is sealed to the main flange of the chamber using a one-piece flat aluminum gasket and special sealing surfaces developed exclusively by the Nor-Cal Products, Inc. The large flange provides easy access to the gap of the installed magnet girders for *in situ* magnetic measurements and shimming. Special window ports were designed into the cover and chamber for optical micrometers to provide precise measurements of the in-vacuum magnet gap from outside of the chamber.

The vacuum chamber assembly features independently vacuum isolated feedthroughs that can be used for either water or cryogenic refrigeration cooling of the monolithic magnet girders. This would allow cryogenic-cooled permanent magnet operation and has been successfully tested from +100°C to -150°C. The figure shown below is the front CAD-view of the X-25 mini-gap undulator assembly. A detailed description of the vacuum chamber and its associated systems will be presented in the paper.

Keywords: undulator, MGU, insertion device, CPMU, synchrotron radiation, NSLS, light source

Presentation: Poster



A front view of the 39-port chamber in the middle of mini-gap undulator