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Construction of Cryogen-Free 4.3T Superconducting Wiggler for NSLS-II Ring

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With 3 GeV electron beam energy for the National Synchrotron Light Source II (NSLS-II) ring, only superconducting wiggler (SCW) producing greater than 4T peak field can cover photon energy range of 20keV and 200keV with sufficient number of photons. The High energy Engineering X-ray (HEX) Diffraction beamline, which is primarily funded by the New York State Energy Research and Development Authority (NYSERDA) and NSLS-II, will be equipped with 1.2m-long SCW with 70mm period length and 4.3T on-axis field. This SCW is free from liquid Helium and is cooled only with cryo-coolers. Electron Beam Chamber (EBC) with vertical aperture of 8mm is made from 316LN stainless steel and copper plating is applied both entire upper surface and +/- 12.5mm wide from the center in the inner surface. The expected heat load from the electron beam of the NSLS-II ring is estimated to 10W/m. This paper describes the design principles and engineering challenges for the device.

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