

Undulator Technology for Ultimate Storage Rings (USRs)*

M. Jaski, R. Dejus, C. Doose, J. Grimmer, Y. Ivanyushenkov, Y. Jaski, M. Kasa, S. Kim, E. Moog, I. Vasserma, J. Wang, M. Borland, E. Gluskin, Advanced Photon Source, Argonne, IL 60439, U.S.A.

Abstract

One of the limitations on tuning range, brightness, and flux from undulators in storage rings is the extreme x-ray power and power density. It is difficult to engineer photon shutters and other components that can withstand these high heat loads. An alternative is to turn off the heat load when the photon shutter is closed by, for example, turning off the current in an electromagnetic undulator. To remove the heat load produced by a hybrid permanent magnet (HPM) undulator, the gap must be opened mechanically.

Electromagnetic undulator technology has progressed at the APS with the recent development of three new devices: a normal-conducting electromagnetic variably polarizing undulator with quasi-periodic capabilities has been installed at the APS, a superconducting undulator is scheduled to be installed at the APS, and a test model of a normal-conducting variably polarizing undulator with the added capability of rapid switching (10 Hz) between left- and right-circular polarizations is being built. A review of these devices along with the application of electromagnetic devices used with USRs will be discussed. The application of helical superconducting undulators to take advantage of the narrower horizontal emittance of the beam in a USR is also discussed.

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Primary author: Mr JASKI, Mark (Argonne National Laboratory)

Presenter: Mr JASKI, Mark (Argonne National Laboratory)