

Development of Superconducting Undulators

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NbTi superconducting undulators (SCUs) are currently reliably operating at the Advanced Photon Source (APS) at Argonne National Laboratory (ANL). These devices have significantly enhanced x-ray flux and brightness at the high energy spectrum. As NbTi SCU technology is close to its full potential, further performance enhancement requires using different superconducting materials. Nb₃Sn is a promising candidate to achieve that goal. Recently the APS has started developing an Nb₃Sn double undulator compatible with the APS storage ring. The magnetic length of each Nb₃Sn undulator is about 1.4 m, totaling to 2.8 m. The completed device is planned to be installed in the APS storage ring. This device will be the world's first Nb₃Sn based SCU that will serve in routine user operations. Due to the challenge involved with the technology, the project is broken down into 3 phases and they are described in this presentation. In addition, a novel 2G-HTS undulator feasibility study as well as its challenges are also be briefly discussed.