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Radiation Heating Analysis for Superconducting Undulator LAURA BOON, Purdue Univ, KATHERINE HARKAY, YURY IVANYUSHENKOV, YUKO SHIROYANAGI, Argonne National Laboratory — In January 2013 the Advanced Photon Source commissioned a Superconducting Undulator (SCU). The superconducting magnet is thermally isolated from the beam vacuum chamber, which absorbs the beam-induced heating [Y. Ivanyushenkov et al, IEEE T. Appl. Supercon. 22 (3) (2012) DOI: 10.1088/1742-6596/425/3/032007]. The cryo-coolers cooling the vacuum chamber can handle 40 W of heating. Throughout the SCU design process calculations were made to determine the radiation heating from an on-axis and off-axis electron beam. Simulation results show that when the electron beam is vertically off-axis radiation heating increases from the on-axis heating of less than 1 W. During user operation beam-position-limiting detectors (BPLD) are used to limit beam motion and keep the radiation heating below 25 W. During machine studies when the BPLD is not armed other measures must be taken to protect the SCU. Presented in this talk will be the comparison between analytical calculations and measured temperature rise on the installed SCU. The measured temperatures have been converted to a power using a finite element model.

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