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### **Title**

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## **Automated suppression of errors in LTP-II slope measurements with x-ray optics**

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Systematic error and instrumental drift are the major limiting factors of sub-microradian slope metrology with state-of-the-art x-ray optics. Significant suppression of the errors can be achieved by using an optimal measurement strategy suggested in [V. V. Yashchuk, Rev. Sci. Instrum. 80, 115101/1-10 (2009)]. Here, we report on development of an automated kinematic, rotational system that provides fully controlled flipping, tilting, and shifting of a surface under test. The system is integrated into the Advanced Light Source long trace profiler, LTP-II, allowing for complete realization of the advantages of the optimal measurement strategy method. We provide details of the system's design, operational control and data acquisition. The high performance of the system is demonstrated via the results of high precision measurements with a spherical test mirror. This work is supported by the U.S. Department of Energy under Contract No. DE-AC02-05CH11231.

Keywords: surface slope metrology, drift error, systematic error, optimal scanning, metrology of x-ray optics, deflectometry

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