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## **Wed-Mo-Or10-04: Combined-function magnetic measurement system**

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Production-quality magnetic measurements are required to characterize accelerator magnets for the Advanced Light Source Upgrade (ALS-U). Measurements of the magnetic axis, multipolar content and mechanical fiducialization are typically performed on three separate apparatus. In this work, we describe the methodology and development of a combined-function, stretched-wire magnetic measurement system for high-throughput magnet characterization. For magnetic axis measurement, a vibrating wire apparatus is coupled with a hardware-in-the-loop optimization algorithm to automatically seek the magnetic axis given a starting search point. The same wire is then displaced on a circular trajectory in the magnet aperture, and the induced voltage is processed into the magnetic field harmonics. Finally, laser diodes are used to track displacements as the wire is probed around magnet pole tips for mechanical fiducialization. Measurement results are presented with a discussion on the methods and attainable level of automation in the combined-function magnetic measurement system for accelerator magnet characterization.

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