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Studies on virtual platform for the HALF beamline

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The autonomous alignment and optimization of syn-chrotron beamlines pose significant challenges. Traditionally, manual alignment is a time-consuming and ex-perience-dependent process, often requiring extensive diagnostic efforts and data collection. With the construc-tion of the Hefei Advanced Light Facility (HALF) under-way, the development of a virtual platform for beamlines will be an invaluable tool for beamline scientists and users. This platform will enable software testing and im-prove the prediction of optical element parameters in advance. In this paper, we present the development and comprehensive study of a virtual platform representing beamline BL10 at HALF. Additionally, we explore the integration of an AI-driven control system for optical element control in next-generation synchrotron radiation beamlines within the virtual platform.

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