

Automated Focusing Optics Adjustment for Free-electron Lasers

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FLASH is a free-electron laser capable of emitting femto second short pulses of light in the x-ray spectrum. Before the beam is used in experiments, it should be focused. This is done by a Kirkpatrick-Baez mirror system which consists of two mirrors that can be bent, rotated, and translated. At the moment this mirror system has to be tuned by hand before each experiment, which is very time-consuming. The goal is to find a method to choose the 12 parameters of the KB optics automatically, depending on the varying properties of the incoming beam and on the experiment's requirements. We present our model for simulating the propagation through the mirror system as well as methods to solve the resulting optimization problem.