

Automated adjustment of the focussing optics of a free electron laser

Janina Schmidt

Georg-August Universität Göttingen

Project with: Prof. Dr. Gerlind Plonka-Hoch, Dr. Klaus Mann,
Dr. Bernd Schäfer

FLASH is a free electron laser capable of producing femtosecond short pulses of light in the x-ray spectrum. Before the beam is used in experiments, it should be focused such that the beam profile has desirable properties. This is done by a Kirkpatrick-Baez mirror system which consists of two mirrors that can be bent and rotated. 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. This poster presents a model that approximates the properties of the beam in the experiment plane for given mirror settings. Additionally we present some results of an automated adaption of the shape of the mirrors obtained through a reinforcement learning model.