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Correcting for the loss in degree of polarization caused by beamline optics

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The impact from optics on circular, elliptical, and inclined linear polarized light at synchrotron beamlines is known and understood but perhaps not always addressed. This impact is of particular interest for beamlines operating below ~150 eV and it becomes severe for energies below 40-60 eV, depending on the beamline's optical layout. The Bloch beamline at MAXIV Laboratory is designed for angular and spin resolved photoemission spectroscopy, generally operating in the 15-200 eV energy range. It is sourced by a quasi-periodic elliptically polarizing undulator that delivers circular polarization and linear polarization at any inclination.

We have designed a compact 4-reflections polarimeter that can be inserted into the focus of the synchrotron beam in the experimental station's analysis chamber and determine the actual polarization of the light at the sample. Based on this information we can set the undulator gap, helical phase, and inclined phase in an unconventional configuration to compensate the impact from the beamline optics on the polarization and deliver a high degree of circular or linear inclined polarized light to the users.

At present the polarimeter has been commissioned and is in operation while the undulator compensation procedure is still in its commissioning phase. Here we report the design and the design considerations of the polarimeter, the undulator compensation procedure, and first experimental results.

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no

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