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The latest developments of multilayer Laue lenses

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Imaging of nanometer details in structures is of critical importance to distinguish hypotheses or solve various societal problems. With X-rays this can be done non-destructively using a number of imaging modalities that each provide differing information about the sample. To obtain high resolution images, an intense coherent source and high quality optics is required. We are developing diffractive type of X-ray optics, multilayer Laue lenses, that are considered to be most promising to extend towards atomic resolution. In the past few years, we achieved substantial improvement of their quality and numerical aperture by introducing novel laboratory-based wavefront metrology based on speckle tracking, ptychography and machine learning. Our new lenses enable high resolution phase contrast imaging and extend X-ray microscopy to even higher energies for imaging at reduced dose.

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