**Coherent XUV Multispectral Diffraction Imaging for dense plasma diagnosis**

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Interest in fast imaging at the nanoscale using coherent XUV and/or X-ray radiation has received increased attention nowadays primarily due to the rapid growth of nanotechnology. Such coherent, directional, and high-brilliance X-ray radiation sources are currently provided by X-ray free-electron laser facilities. However, these facilities are scarce worldwide with limited access, since they require large financial investments for development, maintenance, and manpower. Recently, we suggested an alternative path, reporting on an automated table-top system for multispectral XUV coherent diffraction imaging (CDI). [1]. The coherent XUV radiation is generated in a semi-infinite gas cell via high harmonic generation of the near-infrared femtosecond laser pulses ensuring high-stability conditions and supporting operation at high repetition rates. The XUV spectral selection is performed by specially designed multilayer XUV mirrors that do not affect the XUV phase front and pulse duration. Several pairs of multispectral mirrors can be automatically interchanged, thus providing different narrowband XUV spectral regions for CDI applications, employing either transmission or reflection. Here we examine the option of applying the multispectral coherent XUV CDI method for plasma diagnosis. Considering (a) the higher frequency of the XUV radiation with respect to the plasma frequency (b) the ns time scale of the plasma dynamics and (c) the option of performing IR-pump–XUV-CDI-probe measurements, the detailed dynamical evolution of the plasma formation becomes viable.

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**References**

[1] S. Petrakis et al., Appl. Sci. **12**, 10592 (2022) <https://doi.org/10.3390/app122010592>