

Optimum grating parameters for a VUV spectrometer

The object of the invention is to provide manufacturing parameters for a holographic diffraction grating on a concave or toroidal surface, which is used as the single optical element in a VUV spectrometer with a flat detector. The spectrometer geometry is also defined alongside the diffraction grating parameters. The invention from the research center Juelich (Germany) consists of a proprietary software code which uses various numerical methods to determine the optimal grating parameters, with the aim of producing such gratings for VUV spectrometers with a minimal line width for a pre-defined wavelength and at the same time achieving high spectrometer efficiencies.

■ Description of the technology

The invention is based on a software code that determines manufacturing parameters for an optimized holographic diffraction grating on a concave or toroidal surface, together with the geometry of the corresponding VUV spectrometer arrangement (entrance slit, grating and detector). The method described contains the numerical determination of the full parameter set for the grating and the spectrometer. The offer focuses on providing optimum grating parameters for the production of spectrometers. Such parameters are made available through licensing.

■ Innovation and advantages of the offer

The method described above leads to accurate gratings with the ability to provide sharp spectrometric images at high efficiency and low stray light level. This could not be achieved by mechanically ruled gratings or by holographic gratings on flat surfaces.

■ Non-fusion Applications

Beside the actual application domain – VUV spectrometry in Fusion, there are also applications licensed in extreme ultraviolet refractometry. A commercial spin-off was created outside fusion to exploit the application for development of a diffraction grating for EUV reflectometry.

■ EUROfusion Heritage

The method was developed at the Forschungszentrum Jülich and used to develop diffraction gratings for the HEXOS spectrometer on W7-X (1.2 M€, 20 ppy project). It was further used to develop the ITER VUV spectrometers (hardware to be delivered by Korea; 10 M€ project).

In the meantime, a commercial spin-off was created outside fusion: Development of a diffraction grating for EUV reflectometry.

