T6_4 DIFFRACTION AND INTERFERENCE AS A REMOTELY CONTROLLED LABORATORY (RCL) – REAL DEMONSTRATION OF EXPERIMENT

Sebastian Gröber, Hans-Jörg Jodl, Arne Lütkefedder, Martin Vetter, *University of Technology Kaiserslautern, Mannheim, Germany* (groeber@physik.uni-kl.de, hjodl@physik.uni-kl.de)

In wave optics the student shall perform his or her own experimental experience about diffraction and interference generated by one dimensional lattices because of several reasons: diffraction is not a phenomenon of everyday life, a mathematical description can be worked out easier, the diffraction by a grid is setting the basis for a deeper understanding of further topics at school level (e. g. x-ray diffraction) and at university level (e. g. Fourier optics). Routine teaching in class and accessible lab material allows only the performance of demonstration experiments by a few selected diffraction objects. In this contribution we will present a real experiment on 'diffraction and interference' controlled via Internet (http://rcl.physik.uni-kl.de; see section labs, called 'diffraction and interference II'). The user of this RCL can choose between about 150 diffraction objects (various slit widths, distance between slits, number of slits). To achieve higher contrast we produced these objects via electron beam lithography, so much more maxima and minima can be analyzed. In addition the user can choose between five lasers in the wavelength region 500 – 800 nm. The investigation of the diffraction pattern can be performed by the user on three different levels: qualitative observation of the pattern and storing the webcam image; quantitative analysis of the recorded pattern by means of ruler with millimetre scale (geometry) or by means of a movable light detector (intensity distribution). Beside obvious standard investigations on this 150 objects the user can study the dependence of diffraction on wavelength, the dependence of the height and width of intensity maxima and number of adjacent maxima on number of slits. On top the user can investigate the resolution power of grids by means of two lasers with difference in wavelength of 35 nm. The design and the technology of this RCL as well as our didactical approach support modern teaching/learning methods (e. g. experimenting of different dependences by various groups of students), subject oriented teaching methods (e. g. planning of an experiment) and new organisation of teaching/learning like blended learning.