T3_43 NEW TECHNOLOGIES FOR UNDERSTANDING OPTICS: “TRAVELLING ON THE CREST OF A WAVE”

Davide Mascoli, Pasquale Onorato, Alessandro Belli, Anna De Ambrosis, *Department of Physics “A. Volta”, University of Pavia, Pavia, Italy* (mascoli@fisicavolta.unipv.it)

Research results on student understanding of optics indicate that even after introductory university courses students often cannot account for the pattern produced on a screen when light is incident on a single or double slit. Moreover many students do not know whether to apply the ray model or the wave model in a given situation and often they use inappropriately both. Optics experiments (from diffraction to light polarization), that show some important aspects of physical optics were performed to motivate students to obtain quantitative relations in the form of phenomenological laws. A teaching learning sequence based on these experiments has been tested with high school students. The experiments require simple and inexpensive material or tools readily available in a well-equipped teaching laboratory. Diffraction patterns are produced by monochromatic light coming from a commercial laser diode. To measure light intensity we propose three different methods: i)a traditional manual measurement of the alternating maxima and minima; ii)a MBL based measurement; iii)a “digital camera” based measurement. In the latter case the photo camera is used as a light detector. Here we discuss how digital photos can be extremely useful in physics research and teaching. Computer analysis of these "live photos" involves measuring the wavelength and intensity of light at different points allowing us to extract detailed data about a diffraction or interference pattern. Specific software was developed with our students in order to treat the experimental data by allowing a comparison with the theoretical prediction.