**Supplementary Figure 6:** Experimental validation on a commercial light-sheet microscope. 

a) Polymethylmethacrylate (PMMA) microparticles with a diameter of 20µm and refractive index of $n = 1.495$ were embedded in an block of OptiPrep (Progen Biotechnik GmbH) / agarose (Sigma Aldrich) with refractive index of $n \approx 1.43$) and which was labelled with Alexa Fluor 488. A stationary illuminating light sheet with a waist of 1.7µm and a lateral extension of $\approx 100µm$ was generated with a LZ1 (Zeiss) light-sheet microscope, incident on the agarose embedded sphere. Stacks were acquired at a step size of 0.414µm. 

b) Simulation results of the intensity distribution behind the sphere at a plane incident to the sphere center. 

c) Experimental intensity image. Scale bar is 20µm in both cases. Dashed lines indicate regions with specific diffraction patterns that the simulation correctly reconstitutes.