X-ray waveguides

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Abstract:

Due to the extreme success of waveguides as optical applications for visible light, we studied the possibility of extending that principle into the range of x-rays and neutrons. This talk discusses the basic theoretical properties of such devices and presents results obtained from several new designs of x-ray waveguides. The theoretical discussion will focus especially on the mechanism of resonant beam coupling and on the understanding of the guiding mechanism of *quasimodes* in these structures [1,2]. A straightforward extension of that approach leads to new waveguide-structures with several guiding layers, showing an interference pattern of beams exiting the different channels. We present measurements of that phenomena together with results for waveguides with extremely thin guiding layers (100 Å). Finally we discuss applications in phase contrast microscopy [3], resonant enhanced fluorescence and the possibility of using such interference effects as optical components for the production of divergent, coherent beams with spotsizes of 100 Å to 1000 Å.

References:

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