

SEMINAIRES DE LA BRANCHE PHYSIQUE

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DIFFRACTIVE OPTICS WITH SUBWAVELENGTH FEATURES

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In most optical materials the atomic or molecular structure is so fine that the propagation of light within them may be characterized by their refractive indices. When an object has structure which is larger than the wavelength of light, its influence on the propagation of light may be described by the laws of diffraction, refraction and reflection. Between these two extremes is a region in which there is structure that is too fine to give rise to diffraction in the usual sense but is too coarse for the medium to be considered as homogenous. For this, a full description can only be achieved through a rigorous solution of Maxwell's electromagnetic equations and resonance phenomena are often observed. Recent developments in micro-lithography have extended the possibility of generating sub-wavelength structures and it is now possible to produce materials with remarkable new optical properties.

We shall review the optical properties of subwavelength diffractive optical elements relying on “artificial materials”.

Keywords : subwavelength structure, artificial material, homogeneization, diffractive optics, gratings, Bloch wave.

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