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On light traveling in free space slower than the speed of light and other curiosities associated to light propagation and light scattering

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We shall present, in a very-easy-to-understand language, three curiosities associated with light propagation and light scattering as follows :
(1) It has been recently experimentally demonstrated that transverse spatially structured photons travel in free space slower than the speed of light [1]. We shall show that this experimental fact receives a very simple explanation in the language of Maxwell electromagnetism in the framework of the description of an arbitrary shaped beam in terms of an expansion over a (usually)continuous set of plane waves, providing an angular spectrum decomposition. The argument relies on the fact that almost all plane waves in the spectrum are tilted and therefore propagate along the direction of propagation of the beam
with a velocity component lower than the speed of light.
(2) The same decomposition provides an easy way to understand the failure of the optical theorem in the case of arbitrary shaped beam illumination of particles which has been analytically demonstrated a few years ago with fairly sophisticated mathematical instruments (both for vectorial [2] and scalar beams [3]). The argument relies on the fact that each plane wave has its own forward direction and that the forward direction of almost all plane waves is different from the forward direction of the beam.
(3) opposite to item 1 dealing with light propagating slower than light in vacuum, we shall demonstrate that intensity spots inside a spherical particle illuminated by a pulsed laser may travel faster than light [4], and shall speculate on circumstances which would allow to produce Cerenkov radiation. The argument relies on the fact that, in nonlinear media, high energy intensity spots would possibly produce quasi-particles.
References
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