Annals of the Academy of Romanian Scientists
Series on Philosophy, Psychology and Theology
ISSN 2067-113X Volume **1**, Number **2**/**2009**

PHOTONICS-SCIENCE AND ENGINEERING OF THE LIGHT

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Rezumat. *Studiul prezintă apariția și dezvoltarea fotonicii în contextul fenomenelor complexe de generare, amplificare și detecție a radiațiilor electromagnetice din spectrul optic, unde fenomenele specifice opticii, coerența atomică și autoorganizarea sunt reprezentative. Aplicațiile inginerești ale fotonicii în toate domeniile de activitate sunt prezentate în strânsă relație cu dezvoltarea fără precedent a tehnologiei, culminând cu remarcabilele realizări din domeniul nanotehnologiilor. De aceea, problema armoniei universale a naturii găsește o abordare dinamică și, în special, problema fundamentală a cunoașterii capătă noi dimensiuni.*

Abstract. *The study presents the emergence and the development of photonics in the context of the complex phenomena of generation, amplifying and detection of the electromagnetic radiations from the optical spectrum, where the phenomena of specific optic and atomic coherence self-organization are representative. The engineering applications of photonics in all the fields of activity are presented in a close relationship to the unprecedented technological development culminating in the remarkable accomplishments from the field of nanotechnologies. Thus, the question of the universal harmony of nature finds a dynamic approach, and especially this fundamental problem of knowledge acquires therefore new dimensions.*

Keywords: Photonics, self-organization, engineering applications of photonics, nanotechnologies, universal harmony

1. Introduction

In 1900, Max Planck introduced in physics the assumption of "quanta" that highlight the discreet exchange of energy in nature, the linkage between energy of quanta and frequency of electromagnetic radiation which it represents being given by the Planck constant. Based on this hypothesis Planck explained properly spectral distribution of the black body radiation.

In 1905, Albert Einstein postulated the existence of the "photon" in the form of a particle of light with energy $\varepsilon = \hbar\omega$ and momentum, managing to correctly explain the photoelectric effect and the Compton Effect.

The hypothesis of photons in physics provides an essential element of quantum physics, the dual nature wave-corpuscle of the radiation, which was extended in 1921 by Louis de Broglie and for material particles.

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