

## Slow light: An instructive story

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The notion of “slow light” has been introduced into scientific language at the very beginning of our century, when Prof. L. Hau with her team from Harvard University have managed to reduce the group velocity of light by more than 7 orders of magnitude, down to 17 m/s. The authors of this research took advantage of the effect of electromagnetically induced transparency (EIT), which may provide, in a three-level system with  $\Lambda$ -like energy diagram, a narrow spectral feature needed to obtain anomalously high dispersion of the refractive index.

This fascinating achievement was met enthusiastically by scientific community. The experiment of Prof. Hau was reproduced in different modifications, and a few new approaches to “slow light” have been proposed. As often happens, at the leading edge of development of an as-discovered phenomenon, scientific journals are inclined to be more liberal with respect to related manuscripts. As a result, soon after this discovery, there have appeared some publications in which the well-known effects of retarded response of optically nonlinear media were ascribed to group velocity reduction.

In this lecture, we will briefly consider examples of such mis-interpretation. Among them are the slow-light effects based on the EIT in degenerate  $\Lambda$ -scheme and on the so-called coherent population oscillations. These stories look curious and instructive, in the light of the famous medieval principle known as “Occam’s razor”, which sounds as “Entities should not be multiplied beyond necessity”. As applied to physical research, it means that if some phenomenon is explained comprehensively, one should not make additional assumptions to be able to explain it in a more sophisticated way.