Book Review: Author's Comment

Editors' Note

It is not the policy of this Journal to permit authors of books reviewed in its pages to argue in print with the views presented. Reviewers are chosen for their expertise and impartiality; the opinions expressed are not necessarily those of the Editors or the Publishers, but appear here substantially as provided by the Reviewer. To allow the Journal to become a forum for discussion of such critical opinion detracts from the purpose of book reviews. However, there are very rare occasions when some genuine disagreement arises about inaccuracies or misrepresentation of facts. Such disagreement is claimed by Dr. Georges Lucas with respect to the review, in *J. Photochem.*, *33* (1986) 136, of his book. Because of the factual element that is questioned, the Editors have decided to publish Dr. Lucas's comments in full, without prejudice as to Editorial views, in order that readers may judge the arguments for themselves.

Transfer Theory for Trapped Electromagnetic Energy

by Georges Lucas; published by Wiley, New York, 1985, 3rd edn.; 96 pp.; price, £9.00

I believe L. F. Phillips's comments (*J. Photochem.*, *33* (1986) 136) to be misleading and that they therefore call for an answer.

The laser cavity consists of two mirrors; one of these is partially transmitting. In this set-up there is no transport of absorbing particles from the cavity to the outside.

If the partially transmitting mirror is replaced by an opaque reflecting plate, into which any number of pores are drilled (grid), the model presented in my book is obtained. As long as the optical transparency of the grid is kept low (below 1%), the system, if irradiated, acts as a photon trap. Electromagnetic energy is trapped and emission of a coherent light beam is prevented. Consequently, there is no analogy whatsoever with chemical lasers etc. as stated by the reviewer. In all those cases a laser beam is emitted.

This permanently irradiated cavity closed by the reflecting grid will be continuously fed with absorbing particles. If a steady state is maintained, the irradiated system will only be able to get rid of the trapped electromagnetic energy via energy-charged material particles, in contradistinction to lasers (flowing gas lasers etc.). These material particles will freely leave the cavity through the pores of the grid. The predicted effect, *viz.* an exponential increase in trapped electromagnetic energy transfer by the absorbing particles, will be observed when the ratio of the light intensity to the volume

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of the cavity reaches a critical value. The system then passes through a transition point and attains a self-controlled state. If the initial volume is too large with respect to a selected light intensity, the cavity's volume will have to be reduced. Hence the cavity will contract, as described in my book.

It is unlikely that Professor Phillips can find one single reference where the foregoing is "contradicted by innumerable experiments".

The reviewer should have noticed that "the imagined effects . . . by moving the ends of the cavity closer together" have been experimentally verified. (The book contains an experimental part.) The exponential increase in trapped electromagnetic energy transfer is observed precisely, when the distance between the mirror and the reflecting grid tends towards a minimum. Before reaching its transition point, the system will act as a simple absorbing medium.

For obvious reasons the reflecting grid (equivalent to a partially transmitting mirror) faces the mirror. Therefore, absorbing particles have to leave in the axis of the cavity, while they can enter from any direction.

As far as I know, in the past 15 years no experiment has contradicted the transfer theory. As for the described model, no priority has been detected.

The reviewer's remarks also imply criticism of the experimenters and students who worked on this subject (four theses have been presented).

We have here an example of a case where experimental evidence is brushed aside by a reviewer.

GEORGES LUCAS