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## Propagation of $\gamma$ -rays in periodical "optical" medium of $^{178}\text{Hf}$ with inverse population of nuclear levels

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### Abstract

A process of nuclear superfluorescence in a three-level periodical "optical" medium of  $^{178}\text{Hf}$  is theoretically simulated. The formalism of Maxwell-von Neumann equations in terms of Schrödinger representation is used to solve the problem. The time shape of the superfluorescent  $\gamma$ -pulse formed in the nuclear diffraction channel is calculated under the conditions of two-wave diffraction in the Bragg geometry as a function of effective medium thickness, deviations from the Bragg conditions, and lifetime of the  $^{178}\text{Hf}$  nucleus at the lower working level. © 2007 by Allerton Press, Inc.

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