Optimal regimes for laser cooling of solids

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Abstract

In the framework of nonequilibrium statistical operator, the equations are derived for number of phonons, photons and collective population difference, describing the process of laser cooling for solids. With the use of these equations, the expressions are obtained for the coefficient of performance of optical thermal machine in reverse thermodynamic cycle and for limiting temperature of cooling. The criteria are formulated for the determination of type of samples, of temperature diapasons and spectral ranges that are the most perspective for the experiments on laser cooling. Numerical calculations substituting these conclusions are carried out.

Keywords