Relativistic quantum mechanical analysis of a free electron laser

L. Schächter[a)]
Department of Electrical Engineering, Technion, Israel Institute of Technology, Haifa 32000, Israel

(Received 27 July 1986; accepted for publication 13 November 1986)

A free electron laser based on a magnetic undulator in its linear regime is analyzed using the Klein–Gordon equation to describe the electron dynamics. Special attention is paid to an electromagnetic wave with a general polarization and an arbitrary spectrum. The influence of high harmonics is investigated. The effect of decreasing periodicity of the wiggler on the analysis is investigated too.