J. Plasma Physics (1989), *vol.* 41, *part* 3, *pp.* 577–578
Printed in Great Britain

CORRIGENDUM

Quantum-kinetic theory of free electron lasing in a spatially periodic longitudinal electrostatic field by a relativistic electron beam

J. Plasma Phys. vol. **36**, 1986, p. 195

By S. H. Kim

Center for Accelerator Science and Technology, University of Texas at Arlington, Arlington, Texas 76019

(Received 13 March 1989)

A longitudinal undulating electric field in the lasing electron beam direction (or the longitudinal direction) and an electromagnetic wave propagating in the longitudinal direction (laser wave) drive a current that cannot be in the longitudinal direction. Thus this current can emit an electromagnetic wave having the same wave vector and polarization vector as those of the incident electromagnetic wave. This process is called stimulated bremsstrahlung in the longitudinal electric wiggler. Because of recent strong interest in this free electron lasing mechanism, it is appropriate to correct errors in numerical factors in the gain formula and equations in our paper.

Unfortunately, there are a number of errors in the equations from (2.10) to (3.6), which originate from an error in (2.10). Only the important equations will be corrected.

Equation (2.10) should be corrected to

$$T(p_{1z}\to p_{2z}) = \frac{\pi e^2\phi_0^2}{8\hbar^2}\delta[(E_2-E_1)/\hbar-\omega]\,\delta_{p_{2z},\,p_{1z}+\hbar k+\hbar k_0} \times\left[\frac{|\langle U_2, H_r V_3\rangle\langle U_3, U_1\rangle|^2}{(E_3-E_1)^2}+\frac{|\langle U_2, U_4\rangle\langle U_4, H_r V_1\rangle|^2}{(E_4-E_1-\hbar\omega)^2} + \frac{\langle U_2, H_r V_3\rangle^*\langle U_3, U_1\rangle^*\langle U_2, U_4\rangle\langle U_4, H_r V_1\rangle}{(E_3-E_1)(E_4-E_1-\hbar\omega)}\right]+S(-k,\,-k_0,\,-\omega), \tag{2.10}$$

where the subscripts 3 and 4 indicate the quantity at $p_{3z}=p_{2z}-\hbar k$ and $p_{4z}=p_{2z}-\hbar k_0$.

Also (2.15) should be written as

$$\left(\frac{\partial f}{\partial t}\right)_r = \lim_{\hbar\to 0}\sum_1 T(p_{1z}\to p_z)\,[f(p_{1z})-f(p_z)] = -\frac{\pi e^4 m^2c^2\phi_0^4A_0^2\,k^2(k+k_0)^2(E+mc^2)^2G^4}{8k_0^2p_z^2}\delta[c^2p_z(k+k_0)/E-\omega]\frac{\partial f}{\partial p_z}\frac{\partial}{\partial p_z}. \tag{2.15}$$

Accordingly, the gain formula (3.3) should be written

$$\mu = \frac{\pi^2e^4\phi_0^2\,kN}{16c^3p_0\,k_0^2}\frac{\partial F}{\partial p_z}(p_0). \tag{3.3}$$

https://doi.org/10.1017/S0022377800014112 Published online by Cambridge University Press

By Lorentz transformation to the high-energy ($\gamma \gg 1$) beam frame, the longitudinal electric wave with wave vector $-k_w \hat{\mathbf{z}}$ and phase velocity v_w can be replaced by the static longitudinal electric wiggler with wave vector $k_0 = k_w(1+v_w/c)$ and the same amplitude. Accordingly, (3.3) is consistent with the gain formula for the free electron laser using a longitudinal electric wave, which is derived directly from first principles (Kim 1989).

REFERENCE

KIM, S. H. 1989 *Phys. Lett* **135** A, 39.