QUANTUM INTERPRETION OF THE CLASSICAL “SCHOTT TERM” FOR RADIATION SELF FORCE

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Recent experimental and theoretical results indicate the feasibility of direct measurements of the classical radiation reaction, which is the effect of electromagnetic field emitted by an accelerated charge on the motion of the charge itself [1,2]. The classical radiation damping formula consists of two terms, usually called “the Schott”' and “Lienard” terms. The Schott term is included in the expression for radiation self-force in the form of the total time derivative of the quantities that determine the motion of the particle. This means that it cannot be directly measured in experiments. Nevertheless, the recent reports on the feasibility of detecting experimentally the effects of the action of classical radiative self-force on the motion of electrons (positrons) channelled in oriented crystals at the CERN Secondary Beam Areas (SBA) beamlines, indicate that the Schott term can be measured directly [3].

We give the interpretation of the classical Schott term as a result of quantization of the transverse degrees of freedom of relativistic electron moving in the external field. As a basic example the case of channeling in the aligned crystals is considered.

REFERENCES

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